A Beginner’s Guide to Symbolic Geometry:
An Interview with Professor Michael Schneider
by
Christine Rhone
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A native of New York City, Professor Michael S. Schneider has been an educator for more than four decades, most recently at California College of the Arts in the San Francisco Bay Area. He teaches the intersections of geometry, number, nature and philosophy, reviving the lost art of symbolic geometry in works of art and architecture. He has authored and illustrated A Beginner’s Guide to Constructing the Universe: The Mathematical Archetypes of Nature, Art, and Science, and six accompanying Constructing the Universe Activity Books. His interest in geometry came early in life and took flight with inspiration from the work of Keith Critchlow and John Michell.

Career highlights include earning degrees in mathematics and mathematics education from the Polytechnic Institute of Brooklyn and the University of Florida; receiving a Fulbright-Hayes Scholarship to study ancient mathematics and sciences in India; working on special projects at the New York Academy of Sciences; giving workshops at the Metropolitan Museum of Art in New York; and discovering the unifying geometry of the ‘Portal of Paradise’ sculptures at the Cathedral of St. John the Divine. His down-to-earth and relaxed teaching approach makes number-work both concrete and imaginative, a winning combination with adults and children alike.

Michael Schneider and his partner Elaine Scheeter reside in what is not so much a home as the crow’s nest of an invisible ship, perched atop a hill overlooking a winding road in the land of the legendary music group the Grateful Dead and filmmaker George Lucas. This is in Marin County just north of San Francisco, a high place of aspiration where at least some good city-folk may hope to grow old. The modest wooden house, built just after the great earthquake of 1906, stands as a lookout point, giving the best view of any hazards on the horizon, the interior enriched with beams of ancient redwood holding memories.

* This interview took place on 22 January 2020, in San Anselmo, California.
of the gypsy families who once lived there. Yes, it’s steep—positively a scramble—to climb the garden stairs up through the ivy patches to get to the front door. On one side, a mysterious shed shelters the remains of decades of creative geometry and mathematics projects, with spiralling Fibonacci constructions on teaching poles and enigmatic sound-light inventions illustrating eternal truths. And boxes and boxes of small items and notes.

It is difficult to ignore the seven majestic trees populating the hillside, joining the earth and the sky. Their presence is like a sound, a note that elevates and enroots, an ever-constant Tree of Life. These are Engelmann oaks, native to southern California and upper Baja, otherwise known as Pasadena oaks. This makes perfect sense, when we think that Elaine Scheeter is strongly native to Pasadena and was so enchanted by the oaken spell when she first saw the house many years ago that she purchased it immediately without even looking at all the rooms. Elaine and Michael have inhabited the home for many years, sharing it with a lion-sized statue of Bastet, the Egyptian cat goddess of home and hearth.

CHRISTINE RHONE: Michael, I am here with you once again in your magical space. I could listen to the trees humming all day, but let’s start with remembering our old friend, John Michell. In his preface to your book, A Beginner’s Guide to Constructing the Universe, he wrote, ‘Geometry is the purest visible expression of number. In Platonic terms, the effect of its study is to lead the mind upward from Opinion onto the level of Reason, where its premises are rooted. It then provides the bridge or ladder by which the mind can achieve its highest level in the realm of pure Intelligence. Geometry is also the bridge between the One and the Many.’ Is there anything you’d like to add?

MICHAEL SCHNEIDER: Here John is referring to Plato’s description in the Republic of our journey, or the ascent of the mind, in four different stages. The first stage is ignorance, when we don’t even know that there is anything worth knowing. The second is opinion. This is where, for example, chat-show participants are forever stuck or, in the words of the American philosopher Charles Fort, ‘For every expert there’s

an equal and opposite expert'. The third stage is reason. At this stage there is need for education and the study of mind-sharpening subjects. These lay the ground for the fourth stage, which is intelligence, or nous. But there is no guarantee that the fourth stage can ever be reached, because each person has to make the effort to achieve it as an individual. The deepest aim of my teaching career has been to develop the third level, teaching knowledge that is always true of any culture, no matter the time or place—mathematics, number, geometry, music—to prepare people to receive wisdom at the highest level, to become vessels for the noetic consciousness, for wisdom beyond intellect.

CR: Well, I’m surely not the only one to regret that mathematics wasn’t taught this way when I was in school . . .. Could you tell us about the three levels of mathematics that you explain in your Beginner’s Guide?

MS: Certainly. There is, of course, only one mathematics. It’s the same everywhere, so no matter what you’re doing with it, you’ll get the same result. It’s the context that makes the difference. Secular mathematics is the ordinary mathematics of going to the store, paying and getting change, telling time, measuring land boundaries, cutting wood to build bookcases, and so forth. What is taught in school can be called secular mathematics. This is a purely quantitative approach that hides the potential wisdom that the numbers can teach us.

Symbolic or philosophical mathematics recognizes numbers and shapes as representatives of far-reaching principles. The numbers one through twelve correspond to geometrical figures: the circle, the line, the triangle, the square, and so on. These are not just quantities, but archetypes, ambassadors from eternity. Each shape represents a different problem-solving strategy in the cosmic economy. The patterns of nature are like a cosmic calligraphy, but we mostly don’t suspect even the existence of this language. My writings and teachings are primarily concerned with symbolic mathematics.

Sacred mathematics can be a somewhat problematic term because of the current overuse or misuse of the word ‘sacred’. We hold the sacred within ourselves, and we consecrate locations and studies by the presence of this awareness, not the other way around. It is awareness that is the ultimate sacred wonder. Religious art is sacred not just because of its subject matter, but because it was designed using the subtle symbolic language of number, shape, and proportion. This language was used to teach self-understanding and self-development. The arts and
architecture of ancient Egypt may provide some of the most accessible examples of design that used number symbolism to teach this to trained initiates, who could translate the symbolism into meditative exercises. True sacred geometry cannot be taught through books.

CR: In your Beginner's Guide, you mention something called 'mythmatics'—what is that?

MS: It refers to mathematics on the symbolic and sacred levels. We don't usually think of mathematics as being part of mythology, but in the view of philosophical mathematicians, numbers and their associated shapes represent stages in the process of becoming. The archetypes of number and shape were personified in ancient cultures as gods, goddesses, and world-builders. The classic myths elaborated on particular aspects of the universal principles they represented. The proportions of temples were always designed, situated, and built in accord with the number and shape symbolism representing the temple's deity.

Also, the tradition known as 'gematria' gives another perspective on mythmatics. This associates number values with the letters of an alphabet, such as Greek or Hebrew. Through gematria, the names, titles, and attributes of deities reveal their role in the cosmic constructive process. The names of gods and goddesses are unfolding as visual representations, when we draw a geometric construction. This process can help us understand their relationships. For example, the numbers that come out when we investigate Zeus and Hermes are the numbers that define the musical notes and intervals said to have been invented by Zeus and Hermes. By looking at their names, we gain insight into the numbers involved in the music they invented. That's another way of looking at number and shape in mythmatics.

CR: You also propose character groups for the first twelve numbers, which I find very helpful. What are they?

MS: To understand the universe, we need only to look at the numbers one through twelve, and then their multiples and powers and so forth. The first twelve numbers are those by which this whole universe manifests its designs. They can naturally be divided into four groups. First we have the numbers one and two. These can be considered
numbers of foundation or numbers of initiation, representing unity and polarity. If I take a circular elastic band and hang it on my finger, it just sits there as unity, but the great unity needs a polarity to get itself started. If I pull back one end of that elastic band, then I can do something with it: I can shoot it, or with two feet I can walk forward. In other words, the idea of polarity will get things going, like the two poles of a magnetic field.

In the second group, we have the numbers of structure: three, four, six, eight and twelve, represented by the triangle, square, hexagon, octagon and dodecagon. These are the numbers that nature and humans build with, because they exhibit great physical strength. The triangle is the strongest shape in architecture and nature.

The third group contains the numbers five and ten, which are symbolic of life. We have the five fingers of a hand, five-petalled flowers, the starfish, and many other forms that show up in life. They do not appear so much in structure, because the angles of a pentagon are not easily used in building.

The fourth group contains the numbers seven, nine and eleven, which are called the numbers of mystery, first because they cannot be constructed with a compass and straightedge with complete accuracy, and second because they have interesting number properties. For example, the ancients referred to seven as the ‘virgin’ number. It is untouched by other numbers in the sense that no number less than seven divides or enters into it, as two divides four, six, eight and ten; three divides six, nine and twelve; four divides eight and twelve; and five divides ten. Seven was also considered ‘childless’ since it produces no other number by multiplication within the first twelve numbers, as two produces four, six, and so forth. Seven, nine and eleven have been used symbolically to represent mystery in its various forms around the world.

All of these characteristics of one through twelve come from their number and do not depend on culture. That’s why, around the world, we see the same symbolism and use of shapes in architecture, mythology, fairy tales and folk sayings.

CR: Now, let’s take a look at some art from different cultures. The first image is an Attic red-figured cup from the fifth century BCE by the Antiphon painter. It shows us a craftsman making a helmet (Plate 1) and something about the number four.
These paintings are called *tondi*, representing a circular design, and were found at the bottom of Greek wine cups of a type known as a *kylix*, a two-handled cup on a stem. When you finished your wine, you got to see a picture. In this case, it is a craftsman sitting on a bench making a war helmet. This may possibly be Daedalus, who was an artist, a craftsman, and the architect of the labyrinth. His bench is on the ground and to his back is a column. If we start with the circle immediately around the picture, and we inscribe a square within that circle, we see a perfect alignment with the column and the ground line that he’s sitting on. This tells us that this piece was intentionally designed with a square structure. When we divide the square naturally, in other words, we draw the two diagonals and make a plus sign between the mid-points of the top and bottom, and then connect those, making a tilted square, then another square within that, and another square within that: we see the guidelines by which the artist composed this work. We see that his body, his back, and his head fit nicely within these squares. There’s an interesting intersection where his hands are, and the helmet just about sits on the mid-horizontal, with the wreath precisely following a line.

This painting was composed in terms of the worldwide philosophical belief that these geometric forms are the essence of beauty, which we remember deep within us. This is the idea of Socrates: the concept of *anamnesis*, literally meaning ‘re-minding’ or ‘re-membering’. Reminding us of what? Reminding us of the universal truths that are within us that we see expressed by the geometry. And so when we see art that has been composed with the secret underlying geometric design, we can *feel* that geometry, even though we don’t see it, and we respond to it in our inner knowing. With the square we get feelings of structure and stability, and that’s appropriate for this young man sitting patiently working on his craft.

Moving swiftly back in time to ancient Egypt, here’s another example of the lost art of symbolic geometry. I think I see two pharaohs (Plate 2). But we’re really seeing an archetype of five and three.

Yes, we see pharaohs Amenemhat III of the Twelfth Dynasty and Akhenaten of the Eighteenth Dynasty, who ruled 3,500 to 4,000 years ago. They’re wearing what’s called the *nemes* headdress. This is an Egyptian headcloth worn only by pharaohs. It was of stiff linen and hung down on the sides, making a sort of truncated triangle.
But it takes a discerning eye to notice that the *nemes* headdresses worn by the two are very slightly different. Amenemhat’s headdress conforms as part of an equilateral triangle with an empty space above his head, which is symbolic of the unspeakable mystery that can’t be physically characterised. By dividing this triangle, we can see some of the alignment of the elements of the face. Amenemhat’s triangle shows very high regard for his spiritual mastery, because that triangle symbolises spiritual accomplishment. He’s done some work within and achieved a level considered to be spiritual or god-like. Perhaps think of the trinity, and the triangle, as holiness. He’s balanced the opposites of life and transcended through the third, the middle, path.

With Akhenaten, his *nemes* headdress conforms to the sides of a downward-pointing pentagon, symbol of life. Akhenaten must have been considered still to be on the wheel of life, not having reached the spiritual accomplishments that Amenemhat did. The geometry of the five reveals some alignments with his features. It corresponds to the Buddhist idea of the wheel of life. You’re on the wheel of life until you become a *buddha* and transcend from it. Akhenaten is still on the wheel of life, while Amenemhat has risen above it. The five is very common in *nemes* headdresses, but it’s very rare to find the triangle. The famous gold mask of Tutankhamun, who was the son of Akhenaten, is based on this same five: like father, like son.

**CR:** Wait a minute, I thought that Akhenaten was the most radical religious reformer of ancient Egyptian history.

**MS:** Well, while we cannot know directly of any spiritual achievements of Amenemhat, the capstone of the pyramid at Dashur says that he was ‘given life forever’. This Egyptian term means that he had achieved spiritual mastery. And while Akhenaten is correctly known as a radical religious reformer, his reforms included a perverse narcissism: he’s considered a progenitor of monotheism, but only he was allowed to worship the sun disc while the populace worshipped images of Akhenaten. His royal names included ‘Beloved of Aten’ and others that do not indicate great spiritual achievement. The Egyptians applied intentional number and shape symbolism that did not vary over time, so I believe these associations are justified.

**CR:** And these associations are sometimes surprising. But let’s look at another piece from ancient Egypt. This is the pectoral of Princess
Sithathoryunet, which I understand has to do with the number six (Plate 3).

**ms:** Yes, this princess lived in the reign of Senusret II, a pharaoh of the Twelfth Dynasty, roughly 1900 BCE. It’s a small piece of jewellery called a pectoral, because it’s worn on the chest. It’s small, only a little more than three inches across, and is on display at the Metropolitan Museum of Art in New York, where I’ve seen it many times. It’s quite beautiful. Let’s remember that when we see a picture, for example, these two hawks and the serpents and the scarab beetles, we are also looking at writing. To the Egyptians, these images are words that appear on both a pictorial and a literary level. What this picture literally means is that the god of the rising sun grants life and dominion over all that the sun encircles, for one million one hundred thousand years, to king Khakheperre, which is another name for Senusret II.

Now, if we look at the geometry, we see a circle. Let’s look first at the upward-pointing triangle. Notice how the triangle aligns at the bottom exactly with the base and two sides go up perfectly, going along the edges of the tail of the hawk and the serpent wrapped around the sun, and each of the suns, making a beautiful triangle. This has a spiritual aspect to it, but to understand it more fully, we also place a downward-pointing triangle, making a hexagram star. If we draw another hexagram within the central hexagon, it will come right to the chest, cut through the beak and down both sides and go along one edge of each *ankh* glyph, symbol of life. Another hexagram star within that makes a cross in the centre of the *ankhs*. It also goes across the base of the sun, the horizon, rising above the scarab that’s pushing it up, and cuts through the crown of the figure down below. One final hexagram star defines the width of the cartouche containing the name of the king, and abuts the other side of the *ankh* symbols, containing them in a box. It also shows us the base of the cartouche. By seeing this pectoral, but without the geometry, we can *feel* the geometry. We get the feel of the rightness of the proportions and its deep symbolism without even seeing it. It was very important for the Egyptians, as well as many others, to use this sort of geometry in their designs. The geometry is speaking a divine language, and sacred works must align to this ideal geometry.

**cr:** Jumping forward about three millennia, the next image shows Hildegard of Bingen and a vision of the Universal Man (Plate 4). The geometry of this piece is about seven and five.
Hildegard of Bingen lived from 1098 to 1179. Much of her life was spent as a nun in a religious order. She was known for having visions, which she would tell to a monk who would paint them. There are quite a number of them. She is also known as a musical composer. This image is from her Liber Divinorum Operum and is called ‘Universal Man’. We see at the bottom left an image of Hildegard looking up, having that vision. On the outermost right edge of the painting, we see the finger of God holding a flaming circle above other concentric circles. The innermost circle is red, and a man is standing with his arms held outward. Around it are water, sky, fire, and outside all the circles is a man with red skin, with his head at the top and his feet at the bottom. According to Hildegard’s text, this red figure represents ‘Divine Love . . . the fiery life of God’s substance’. From him is emerging the ‘Universal Man’. The red figure is sometimes compared to Adam Qadmôn, which is a Hebrew term from Kabbalah meaning ‘primal man’. The colour matches the literal meaning of Adam’s name, adamah, the red earth, red clay.

The geometry of this image tells us more about it. A circle around the protective flames contains a heptagon, a seven-sided figure, and a circle within it. It is the distance between those two circles, separated by the heptagon, that gave the artist the width of the red flames. Within that heptagon, we can draw a heptagram or seven-pointed star. This perfectly encloses the circle of the man within. Seven is, of course, a number of mystery, the divine mystery. But the geometry of the man himself is defined by the five-pointed star. We can see how his arms rest on the star, and the red circle at his mid-section is exactly enclosed within that star. This confirms that we have pentagonal symmetry within heptagonal symmetry. The pentagonal symmetry is appropriate because it refers to life, in the earthly mundane sense of the life that this man lives, and five is also a symbol of humanness, of humanity. So the overall geometric symbolism tells us that mystery surrounds life, or mystery links the heavenly and earthly. We live in this mundane world, but we are reminded that the sacred is infusing everything and surrounding us. In remembering this, the earthly man becomes Universal.

These layers of symbolic geometry add so much—we never considered any of this in my art or art history classes.

Yes, it reinforces the meaning of the pictures and touches us at that deep anamnesis level where we know the truth of these numbers and
shapes and can feel them, and that adds to the work. It’s pretty much a lost art. We’re in a world of practicality. It would be too expensive for architects to work with a compass, as Frank Lloyd Wright did. He was a rarity. But back in the day, it was absolutely essential. It would have been unthinkable not to do art and architecture and design without the sacred divine language of geometry at its essence—unthinkable!

CR: In the next piece, the geometry is more obvious. This is a Tibetan mandala called Vajra Nairatmya, from the eighteenth century, so it’s relatively recent (Plate 5). In it, we see symbolism of the number eight.

MS: *Mandala* is a Sanskrit word that means ‘round’ or ‘circular’. It’s an adjective that can be used as a noun to refer to any circular thing: a ring, a ball, the disc of the sun or moon, a wheel or a halo, and so forth. The circle symbolises the number one for ancient mathematical philosophers. It’s the great source of all shapes, the womb where all geometry develops. The centre of a circle is a single point, around which lie an infinity of points all equidistant from it. The circle is the archetype of the One and the Many. Its simple, rational shape is ruled by the endless, irrational number $\pi$, so it is an appropriate symbol for the whole of consciousness.

The contemplative use of mandalas is ancient and important. Monks will sit in meditation before a mandala and they work their mind, their attention, from the periphery towards the centre, not just the centre of the painting, but the corresponding centre within themselves. And this mandala here, even though it’s only a few hundred years old, expresses the same rules that mandalas have used for many centuries, because they’re a powerful tool, not just an image. We have a square around the circle, and inscribed in the square is a circle surrounding a rainbow of flames protecting the sacred ground, the temple precinct within. The geometry that this piece is based on is the number eight—the octagon or octagram. The circle represents the heavenly vault in virtually all cultures—circle of space, circle of time, the universe, or heaven. The square is universally a symbol of earth, the four directions, the four corners of the world, the four seasons, and so forth. But if we take a square and give it a turn, as if it were a circle, 90 degrees, we reveal the octagram, the eight-pointed star.

Symbolically, the octagram represents that which is between heaven and earth: circular heaven above, square earth below, the octagon
1. Seated helmet maker, Antiphon painter, red-figured kylix, *ca. 480 BCE* (Reproduced courtesy of Heritage Image Partnership Limited/Alamy Stock Photo)
2. Amenemhat III, Twelfth Dynasty, and Akhenaten, Eighteenth Dynasty
Museum of Egyptian Antiquities, Cairo
3. Pectoral of Princess Sithathoryunet, gold and semi-precious stones, Twelfth Dynasty, *ca.* 1887–1878 BCE
4. Hildegard of Bingen, 'Universal Man', illumination from *Liber Divinorum Operum*, 1165
5. Vajra Nairatmya mandala, Tibetan thangka, eighteenth century
6. ‘The Fall and the Expulsion from Paradise’, Limbourg brothers, illumination on vellum, 1415–1416
7. North Transept Rose Window, Chartres Cathedral, stained glass, *ca.* 1235
8 a, b, c. ‘The Geometer’s Breakfast: Cosmic Proportions in a Humble Meal’, John Michell, watercolour on paper, \textit{ca}. 2004
and octagram in between. This is why we see it in so many sacred buildings, for example, the Dome of the Rock in Jerusalem, the Vatican, or the Native American hogan lodge. It occurs in secular buildings as well, like the United States Capitol, to remind us that when we are there, we’re being watched by heaven and by earth, the divine and the earthly. Both authorities are watching what’s going on in there, and so we’d better behave! The eight here conveys that same sentiment. You are standing between heaven and earth; take your journey. Each layer of the octagram builds ever-inward, giving us each next level of these inward-moving squares of the temple with four gates, until we perfectly surround the centre. This contains the dancing deity, who is the essence of this mandala and of what the monk is seeking, the jewel within.

CR: Now we have a painting by the Limbourg brothers, from 1415–16, so the early Renaissance period (Plate 6). It depicts the story of the fall and expulsion from Paradise and reveals the symbolism of ten.

MS: Yes, we have multiple scenes of the Garden of Eden and the story from Genesis. On the left is Eve looking at the tree, around which is the notorious serpent, then slightly to the right and below, we see Eve offering an apple to Adam. In the centre is a tower and to the right, we see God admonishing Adam and Eve for eating from the tree of the knowledge of good and evil. Further right, we see Adam and Eve expelled from the Garden. They’ve gone east of Eden.

The underlying geometry can be understood if we show a circle surrounding this scene and mark ten equally spaced points around that circle. We then connect every other point. This produces two pentagons, one pointing up, one pointing downward. The pentagon is a symbol of life. Very often the ten, or two pentagons, occur in scenes when there’s an interplay, like two five-pointed fingered hands shaking to make a ten. The interplay is often between two, in this case between Eve and the serpent, Adam and Eve, and then between God and the pair. To understand the scene geometrically, we draw vertical lines connecting crossings of the two pentagons and the corners of the pentagons. This divides the image into scenes, and subdivides the scenes. The vertical lines that connect the crossings of the pentagon at the centre perfectly show us the width of the tower. To the left and the right, the lines connecting the corners of the pentagon frame
the scene and create a division between Adam and the tree, and then on the right between God and Adam and Eve. Adam is sticking his head a little bit further towards this vertical, and Eve is completely outside it. She’s being depicted, I guess, as being the guiltier party here. There is also an alignment at the back of the deity’s robe. It’s all very accurately done and the ground line is very clear. And, if we take the diagonals of a square that contains the circle and swing them upward, we will find and connect points which reach perfectly to the top of the tower, revealing that the whole scene occurs within a square root of two rectangle. This symbolically represents an emergence beyond the ordinary earth, which is what this tower signifies. The symbolism of ten is quite appropriate for this scene.

CR: Jumping back two centuries in time, our next artwork is the North Transept Rose Window of the great cathedral of Chartres, a piece based on the number twelve (Plate 7).

MS: This window was made around 1233 and was a gift of Blanche of Castile, the Queen of France. It’s a lovely design of central area circles, tumbling squares, semi-circles—magnificent when it’s bathing the congregants in its sacred light. John Michell understood its significance. He wrote in *The Dimensions of Paradise*: ‘The underlying geometry of the northern rose window at Chartres extends beyond the window itself as a twelve-fold scheme . . ..’ Let us start with a large circle, find twelve equally spaced points around it, and connect every fifth point to compose a twelve-pointed star. Within the triangles of those points, we have little circles, and from the extreme points around their circumference, we can make another twelve-pointed star within. We can see how the geometry extends through the window to perfectly determine its elements, the tumbling squares. There’s the centre with the twelve radii and the semi-circles going all around. One large equilateral triangle perfectly encloses that circle of the window, reinforcing the spiritual aspect, the divine, in the trinity of things. Twelve is the number of universal structure. It contains all the other numbers of structure within it. The twelve points can be connected by four triangles, three squares, two hexagons, and even octagons. Even Buckminster Fuller found that twelve is the supreme number of

structure. He called it the dymaxion and made it three-dimensional, which is extremely strong. So twelve, besides representing the twelve disciples, represents a universal structure. That’s why it’s appropriate for this rose window, bringing in the light of the sun and transforming it into a universal holy light.

CR: The last picture we’ll talk about is a recent watercolour, ‘The Geometer’s Breakfast’, by John Michell (Plate 8 a, b, c). His sense of humour led him to find geometry in the most unexpected of places. The image tells a story about the marriage of seven and twelve.

MS: He called this painting ‘The Geometer’s Breakfast: Cosmic Proportions in a Humble Meal’. That’s John all over: the sacred and the mundane, and his sense of humour uniting the two. This image depicts a golden table on which is a chequered tablecloth and two plates. On this is a piece of toast and a fried egg with its white and its yolk. A fork and knife are placed at the top, and below is a wonderful rhyme:

You need not be a scientist or study at the Slade  
To see that there’s geometry in everything God made.  
Go into any teashop and you won’t have long to wait  
For one poached egg on toast and there’s proof upon your plate.

John can see the divine wisdom in this picture, but the rest of us, we see breakfast!

To understand the genius of this painting, we look at its geometry. Overall, it’s in the dimensions of twelve to ten (Plate 8A). These are the two great number systems. John is giving us this image as their interplay, where twelve and ten were intentionally reconciled, harmonised, and woven together into the geometric scheme that shows up in ancient Jerusalem and many other places. This includes the imperial system of weights and measures, a system which is based on both tens and twelves. It uses the great divisibility powers of twelve, which has more divisors than any other small number, and ten, which has expansive powers. In my opinion, the imperial system is far superior to the calculating properties of the metric system, which is considered easy because you can slide a decimal place to multiply or divide. A natural tension exists between ten and twelve, and John makes use of this. The chequered mat is a double square, and the rest of the figure is developed from it. The golden table itself fits in this two by three grid,
and two identical circles that intersect each other’s centres create the *vesica piscis* that contains the large plate at its centre (Plate 8b). Some of the lines correspond with an octagram star, which surrounds the double plate that is drawn on the large plate.

Even more cosmically, the relative areas of the breakfast circles express a very simple numerical relationship. If the area of the yolk is equal to one unit, the egg white has precisely the area of two. The ring of the plate containing the toast has an area of three (Plate 8c). It’s as simple as one, two, three. We can *feel* these proportions without mentally calculating anything, and that’s what John is bringing out here. Let’s go further. If we consider the radius of the yolk equal to the numbers one through seven multiplied, which happens to be the distance in miles from the centre of the earth to the centre of the moon, if the moon were placed on the earth, then the whole area of the plate containing the toast would precisely be the numbers one through twelve multiplied. In order to do this, we’re rationalizing *pi* as the fraction 22/7. What we’re witnessing in this breakfast is the famous marriage of seven and twelve, seven a number of mystery and imagination, twelve a number of rationality and structure. And yet this diagram unites them in a harmonious marriage of opposites, between twelve which is very easily constructed, and seven which is impossible to be constructed.

There are many examples in mythology of this universal marriage of seven and twelve. For example, in the founding of Rome, twelve vultures pointed out the seven hills for Romulus and Remus. In music, we can have the seven notes of the diatonic scale or the twelve notes of the chromatic scale, which includes the flats and the sharps. They interplay in a variety of ways mathematically, geometrically, and mythologically around the world. It’s all based on the numerical and geometric characteristics of these numbers and not anything cultural. John has summed up these cosmic proportions in a humble meal. We all had a good laugh in his ability to combine the subtle ephemeral sacred with the mundane! And this is a goal of the philosophical geometer’s quest: to find constructions where opposites are reconciled, blended, and happily balanced.

CR: Yes, perfect: thank you very much, Michael.

MS: Thank you, my great pleasure.