Cognitive and skill requirements to achieve aesthetic proportions and balance using the golden ratios and fractal geometry in media photography.

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Abstract:
Because the nature of man's life on earth is based on evolution, at all times human beings have a new observation, a new interpretation of phenomena, new ways of control, new ideas being generated, new sciences being created, theories and techniques becoming history, and gigantic civilizations emerging. Nature remains the inspiration of the first creative artist, through which man discovered hundreds of years BC the golden proportions of the visual balance of the virtues of the creation of God, the aesthetic proportions were used in all the man-made arts such as architecture, photography, furniture, and other arts, The natural development of mathematics, engineering, and the observation of the repetition of geometric forms in nature has led to an interest in the structure of cognitive mathematics and the relationship of mathematics to other natural sciences. Things in nature have their natural characteristics In addition; it was the search for a mathematical explanation for things in astronomy, environmental sciences and atmospheric phenomena. When Mandelbrot thought that clouds were not balls, that mountains were not cones, and that the coasts were not circles, (Fractal Geometry) or (geometry of fractions) means research in the partial components of mathematical forms or things in nature according to a set of mathematical characteristics. The various roles of computer applications from specialized graphics programs based on fractal geometry emerged. This study examines these aesthetics, inspired by nature, to use them and employ their innovations in raising the aesthetic values of media images whether fixed or moving. Media or student who prepares for it

Research problem:
The problem of research in the main question is, Is it possible to achieve an aesthetically acceptable aesthetic ratio comparable to what is called the golden ratio achieved by a Fibonacci sequence by using photos and videos employed in the field of media that using the theories of modern mathematics in the geometry of fractals (Fractal)?

Research Methodology:
The researcher takes the descriptive approach to theories of golden ratios for the visual language, modern mathematics and fractal geometry to achieve these proportions by using photographic and video photography.

Research hypotheses:
The researcher assumes that the gold ratio of the Fibonacci retracement is not the only percentage that achieves the aesthetics of the ratios in the fixed and moving images, when the images are employed in the media. And that the use of theories of architecture (Fractal) in modern mathematics can achieve aesthetic proportions and balanced visual equilibrium.

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research results:

• God gave us the sense of this beauty, human discovered the ratio, and these foundations through the sequence of Fibonacci, and engineering fractures (Fractal Fractal).
• Gold ratios of a golden snail, golden triangles, circles, or any other forms applicable to the farms captured by the photographer (cinematic and television).
• The application of golden ratios achieves a visual balance of eye movement within the frame.
• Fractal geometry achieves gold ratios when applying its rules in video art.

What is the Golden Ratio:

The golden ratio has been claimed to have held a special fascination for at least 2,400 years, although without reliable evidence.
Some of the greatest mathematical minds of all ages, from Pythagoras and Euclid in ancient Greece, through the medieval Italian mathematician Leonardo of Pisa and the Renaissance astronomer Johannes Kepler, to present-day scientific figures such as Oxford physicist Roger Penrose, have spent endless hours over this simple ratio and its properties. But the fascination with the Golden Ratio is not confined just to mathematicians. Biologists, artists, musicians, historians, architects, psychologists, and even mystics have pondered and debated the basis of its ubiquity and appeal. In fact, it is probably fair to say that the Golden Ratio has inspired thinkers of all disciplines like no other number in the history of mathematics.
Ancient Greek mathematicians first studied what we now call the golden ratio because of its frequent appearance in geometry the division of a line into "extreme and mean ratio" (the golden section) is important in the geometry of regular pentagrams and pentagons. According to one story, 5th-century BC mathematician Hippasus discovered that the golden ratio was neither a whole number nor a fraction (an irrational number), surprising Pythagoreans. Euclid's Elements (c. 300 BC) provides several propositions and their proofs employing the golden ratio and contains the first known definition.
A straight line is said to have been cut in extreme and mean ratio when, as the whole line is to the greater segment, so is the greater to the lesser.
The golden ratio was studied peripherally over the next millennium. Abu Kamil (c. 850–930) employed it in his geometric calculations of pentagons and decagons; his writings influenced that of Fibonacci (Leonardo of Pisa) (c. 1170–1250), who used the ratio in related geometry problems, though never connected it to the series of numbers named after him. Luca Pacioli named his book Divina proportione (1509) after the ratio and explored its properties including its appearance in some of the Platonic solids. Leonardo da Vinci, who illustrated the aforementioned book, called the ratio the sectio aurea ('golden section'). 16th-century mathematicians such as Rafael Bombelli solved geometric problems using the ratio.
German mathematician Simon Jacob (d. 1564) noted that consecutive Fibonacci numbers converge to the golden ratio this was rediscovered by Johannes Kepler in 1608. The first known approximation of the (inverse) golden ratio by a decimal fraction, stated as "about 0.6180340", was written in 1597 by Michael Maestlin of the University of Tübingen in a letter to Kepler, his former student. The same year, Kepler wrote to Maestlin of the Kepler triangle, which combines the golden ratio with the Pythagorean theorem:

Geometry has two great treasures: one is the Theorem of Pythagoras, and the other the division of a line into extreme and mean ratio; the first we may compare to a measure of gold, the second we may name a precious jewel.
18th-century mathematicians Abraham de Moivre, Daniel Bernoulli, and Leonhard Euler used a golden ratio-based formula which finds the value of a Fibonacci number based on its placement in the sequence; in 1843 this was rediscovered by Jacques Philippe Marie Binet, for whom it was named "Binet's formula" Martin Ohm first used the German term goldener Schnitt ('golden section') to describe the ratio in 1835.James Sully used the equivalent English term in 1875.
By 1910, mathematician Mark Barr began using the Greek letter Phi (**φ**) as a symbol for the golden ratio. It has also been represented by tau (**τ**), the first letter of the ancient Greek τομή ('cut' or 'section').
In 1974, Roger Penrose discovered the Penrose tiling, a pattern that is related to the golden ratio both in the ratio of areas of its two rhombic tiles and in their relative frequency within the pattern. This led to Dan Shechtman's early 1980s discovery of quasicrystals, some of which exhibit icosahedral symmetry.
The ancient Greek Euclid ((365–300 BC) wrote of it in “Elements” as the “dividing a line in the extreme and mean ratio.” The Parthenon, built in 447 to 438 BC, appears to use it in some aspects of its design to achieve beauty and balance its design. The illustration below shows one of the ways that the golden ratio is often reported to appear in its design. This, however, is subject to some debate, as the application of the golden ratio is often not accurately described in many sources. Furthermore, using the second step of the Parthenon seems somewhat arbitrary. There are, however, other dimensions of the Parthenon which appear to be golden ratios. This is discussed in more detail at The Parthenon and the Golden Ratio.

Analysis of Da Vinci’s Vitruvian Man

Another of Da Vinci’s most famous works is that of the Vitruvian Man, created around 1490. The official title of the drawing is “Le proporzioni del corpo umano secondo Vitruvio,” or “The proportions of the human body according to Vitruvius.”
The drawing is based on the correlations of ideal human proportions with geometry described by the ancient Roman architect Vitruvius in Book III of his treatise De Architectura. Vitruvius described the human figure as being the principal source of proportion among the Classical orders of architecture. Vitruvius determined that the ideal body should be eight heads high. Leonardo’s drawing is traditionally named in honor of the architect. This image demonstrates the blend of art and science during the Renaissance and provides the perfect example of Leonardo’s deep understanding of proportion.
What are fractals:
fractal is a never-ending pattern. Fractals are infinitely complex patterns that are self-similar across different scales. They are created by repeating a simple process over and over in an ongoing feedback loop. Driven by recursion, fractals are images of dynamic systems – the pictures of Chaos. Geometrically, they exist in between our familiar dimensions. Fractal patterns are extremely familiar, since nature is full of fractals. For instance: trees, rivers, coastlines, mountains, clouds, seashells, hurricanes, etc. Abstract fractals – such as the

Mandelbrot Set – can be generated by a computer calculating a simple equation over and over.

One way that fractals are different from finite geometric figures is the way in which they scale. Doubling the edge lengths of a polygon multiplies its area by four, which is two (the ratio of the new to the old side length) raised to the power of two (the dimension of the space the polygon resides in). Likewise, if the radius of a sphere is doubled, its volume scales by eight, which is two (the ratio of the new to the old radius) to the power of three (the dimension that the sphere resides in). However, if a fractal's one-dimensional lengths are all doubled, the spatial content of the fractal scales by a power that is not necessarily an integer. This power is called the fractal dimension of the fractal, and it usually exceeds the fractal's topological dimension.

Analytically, fractals are usually nowhere differentiable. An infinite fractal curve can be conceived of as winding through space differently from an ordinary line – although it is still 1-dimensional, its fractal dimension indicates that it also resembles a surface.

Sierpinski carpet (to level 6), a fractal with a topological dimension of 1 and a Hausdorff dimension of 1.893

Starting in the 17th century with notions of recursion, fractals have moved through increasingly rigorous mathematical treatment of the concept to the study of continuous but not differentiable functions in the 19th century by the seminal work of Bernard Bolzano, Bernhard Riemann, and Karl Weierstrass, and on to the coining of the word fractal in the 20th century with a subsequent burgeoning of interest in fractals and computer-based modelling in the 20th century. The term "fractal" was first used by mathematician Benoit Mandelbrot in 1975. Mandelbrot based it on the Latin frāctus, meaning "broken" or "fractured", and used it to extend the concept of theoretical fractional dimensions to geometric patterns in nature.

There is some disagreement among mathematicians about how the concept of a fractal should be formally defined. Mandelbrot himself summarized it as "beautiful, damn hard, increasingly useful. That's fractals." More formally, in 1982 Mandelbrot stated that "A fractal is by definition a set for which the Hausdorff–Besicovitch dimension strictly exceeds the topological dimension."[15] Later, seeing this as too restrictive, he simplified and expanded the definition to: "A fractal is a shape made of parts similar to the whole in some way." Still later, Mandelbrot settled on this use of the language: "...to use fractal without a pedantic definition, to use fractal dimension as a generic term applicable to all the variants".

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