LAYERED PLANAR GEOMETRY AND ITS THREE-DIMENSIONAL OCCURRENCE IN SPACE: FUNDAMENTAL CONCEPTS IN VISUAL ART

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Abstract: The knowledge of geometry has been a fundamental basis for art forms throughout history. Whether Indian miniature painting or Native American folk art, ancient Egyptian architecture or Suprematist painting, the application of geometry pervades and forms the visual world we move through. By looking at existing patterns in architecture, science, and nature, new formations can still be discovered and applied by the contemporary artist. The freedom of scale and combination of modern materials leads to a new order in form and space. Through a basic understanding of geometry complex ideas can surface and surprise the viewer. My own work deals with hidden images: layers of planar surfaces visible from a certain angle, which change according to distance and personal interaction. Three planar surfaces, consisting of canvas and screen, are parallax or completely unrelated in their geometrical design. The surfaces, as concrete as they are alone, together convey images with constantly changing focus and appearance. One knows what is physically present but captures, and then loses, the optical image in an oscillating phenomenon. In this lecture/slide demonstration I will present the developments in my work in using math and geometry as major elements to construct small maquette-sized pieces to large wall installations.

1. Introduction

I am interested in isolating visual situations which occur in nature, architecture, materials, and textiles. Through the understanding and knowledge of geometry we can remember and appreciate complex structures and designs. I can look over and over again at walls, through fences and windows, while enjoying the interaction of such multiple picture-planes. This satisfies my desires and curiosities and compels me to reorganize and create my own visual constructions. Hidden images are revealed by looking at a site or piece from different angles. New formations can be discovered by varying the distance from the object or just through the amount of time spent interacting with it. We are willing to look and look again, and find something new. Such unexpected finds are constantly nourishing my visual vocabulary.

2. Developments in my Work

The method of printmaking has always been an important process in the development of my ideas. Through this planar method I could easily edition, print on, or through various surfaces offset, overlap or reverse an image to end up with different formations and layered compositions. When using two different modulars I could create a variation of pieces while using the same plates over and over again. However, the scale limitations of the printmaking process eventually lead me to create larger installations.

In the process of my current work, I reorganize simple geometric forms and assemble them into a new order by repeating, reversing, and overlapping formations to create a new visual sensation within a spatial relationship. Since 1987 I have experimented with 2 or 3 separate planar surfaces. Two of the surfaces are transparent, so they can interact with the third underlying layer. The distance between these surfaces changes according to the scale of each piece.

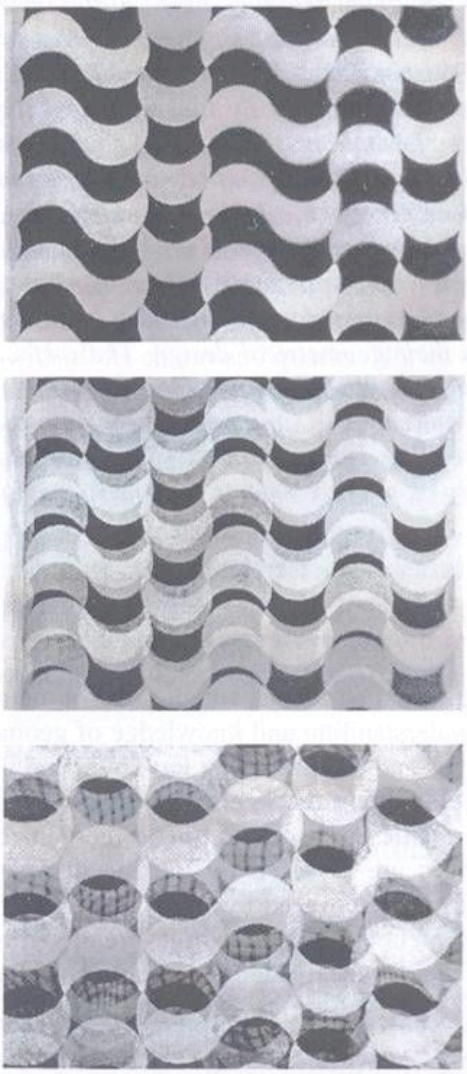

Figure 1. Seven Interwoven Columns. Stages one, two and three

Seven Interwoven Columns (1992) is shown here in three stages. Stage one: a pattern with columns of half circles turning or alternating is created on the underlying layer of canvas. Stage two: a screen layer of half circles is added, slightly offset to the first layer. Stage three: a third layer of half circles is reversed, completing the circles and given a spherical illusion.

In 1993, *Interrupted Moebius*, a three-layered 6 feet high and 24 feet wide piece which protrudes one foot into space was created for the Berkshire Museum in Pittsfield, Massachusetts. The undulating horizontal lines are equally spaced and repeated on each surface; together they visually tip and create a three-dimensional effect.

Fig 2. Interrupted Moebius. Side view

3. A Closer Look at the Spiral

The form of the spiral caught my attention repeatedly during my sabbatical leave in 1997, as I was traveling and visiting archeological sites throughout India and Indonesia. The spiral -an infinite expansion within space- is a form we find manifest in nature, architecture, and art; it is a form and symbol we can trace back through various times and cultures to pre-history.

In nature, a form so simple and complex as a fern captured my attention. Initially it is a spiral still trying to uncurl and expand, fascinating in its compressed form in which it exists for a limited amount of time, before changing, expanding, and then ultimately vanishing as it uncurls.

I came across a series of architectural spirals in the state of Madhya Pradesh in India. In the hilltop fort of Mandu, I saw an irrigation system which ultimately directs water into a step well below. The water filtered from one spiral flows into the next and next until it reaches the final step well.

The spiral is habitually evoked and employed through methods of rolling and coiling man-made materials. Coils of rope are stored in spiral formations; baskets are woven and created through the incorporation of the spiral.

In textiles we find printed, woven, and embroidered images of spirals inspired by and reinvoking natural sources such as vines and webs. We also find the constructed spiral - which can be round or angular- constructed from a center point, a square, triangle or pentagon.

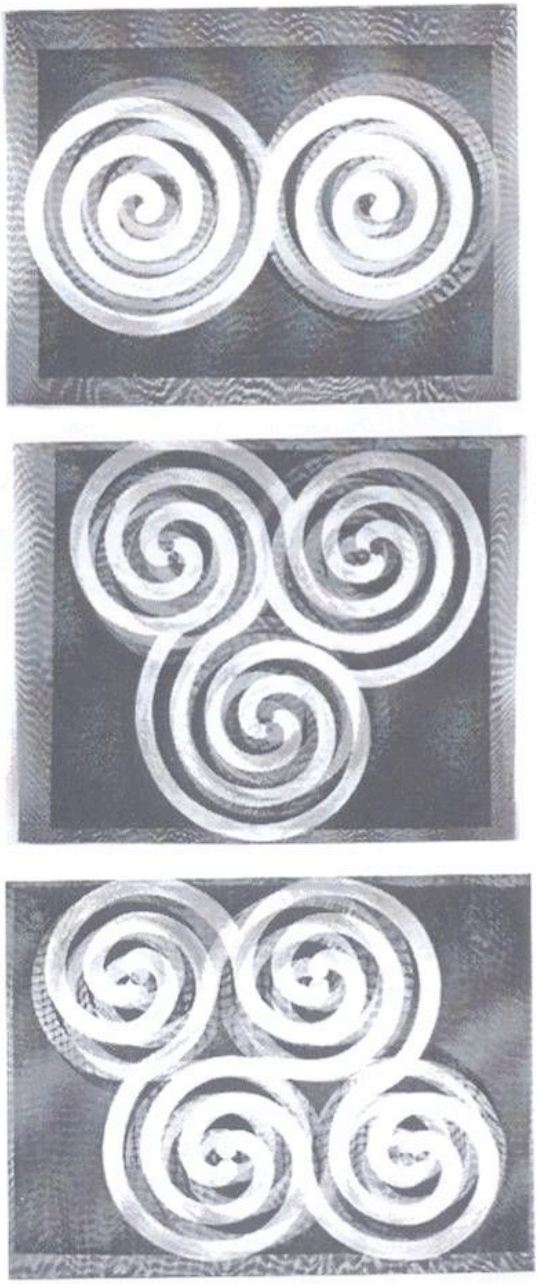

Fig 3. Spiral 2, Spiral 3 and Spiral 4

The spiral became a form so strong and interesting to me that it could not be ignored. Therefore, I adopted, transformed, added, and applied the spiral to my visual vocabulary. I toyed with this ancient form; I was interested in connecting and repeating spirals so I could work with a 2, 3, and 4 spiral formation, and at the same time create a three-dimensional illusion in space. In order to achieve this effect, I had to overlap three layers: while keeping the centers of the layers parallax, the design of each individual layer was changed. On surface one, spirals were moving clockwise; on surface two, circles within circles of the same distance were applied; on surface three, spirals were repeated as on surface one but mirror-reversed and moving counter-clockwise. Now the viewer could experience the three-dimensional effect of visually moving in and out of the planar layered surfaces which contain the spirals.

4. Perceptions in Layered Planar Geometry

Certain visual appearances -new or old- will always catch the spectator's eye. The simple, well-known geometric forms which are used in ephemeral rituals and practices of daily life will never be dull. I found myself looking at the art of kolams anew as I traveled through the Southern state of Tamil Nadu in India. These threshold designs again and again captivate my interest and my eye. I am especially intrigued by those designs which have been partly erased and redrawn so they appear slightly out of focus. Here we deal with a design so symbolic or abstract that it will always follow the basic geometric principles of circles, squares, or triangles. These are also the basic shapes which I apply freely in my work. As I repeat, reverse, or interrupt a certain formation or movement on a surface, the shape seems to take on different properties and in turn dictates different sizes and interactions.

I have created a series of pieces which involve only the shape of triangles. The strongest three-dimensional effect (illusion) was achieved with the piece *Set and Offset Triangles*. The first layer consists of two rows of triangles pointing down. In the second layer two rows of triangles again appear, but this time they are reversed, pointing up and appear tilted slightly to the right.

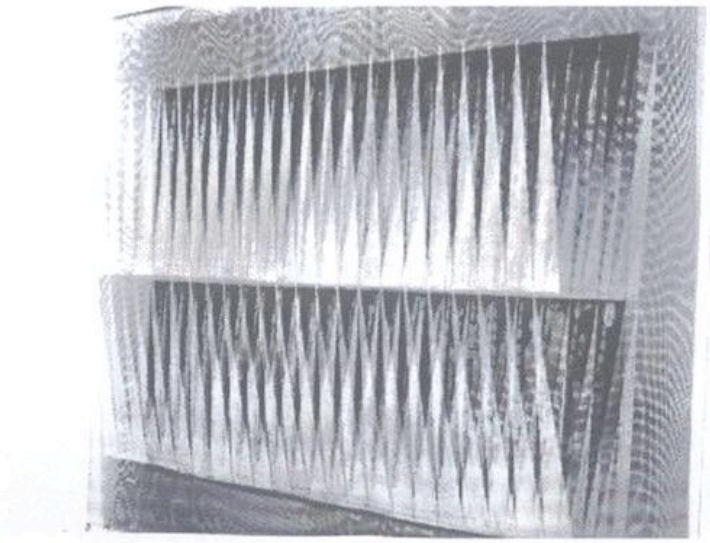

Fig 4. Set and Offset Triangles. Side view

In the third layer the rows of triangles point upwards, but appear to tilt instead slightly towards the left. Each triangle is constructed with one 90 degree angle. When the layers are assembled together, they create an illusion of two rows of wedged tetrahedrons with a constantly vibrating tip.

For more than a century, scientists have been reminding us that the retina gives off luminous sensations of its own, and when the eye is provoked by certain combinations of form and color we might see what is not there. In my recent work I deal with the optical mixture of form and color. Physically form and color in a piece do not change. Yet the eye will find three-dimensional spaces within the two-dimensional surfaces. And so the viewer sees more than what is actually received by the eye.

I do not intentionally create an optical illusion or make use of the moire phenomenon (which is commonly known to occur when two repetitive figures are overlapping at an angle of less than 45 degrees). The result of my pieces might be viewed as such a phenomenon, but I am still surprised when a piece is completed and such a three-dimensional illusion does occur.

The circle is a shape that is not read distinctively from right to left, or left to right, or top to bottom or reversed. *Circles of Attention* is a seven by seven foot three-layered installation which protrudes 12 inches into space. Within this piece, four overlapping circles are present on the underlying surface, four circles within a circle comprise the second layer, two circles within a circle form the outer layer. The viewer is drawn into the center of these circles and experiences a rotating movement and perhaps a meditative feeling.

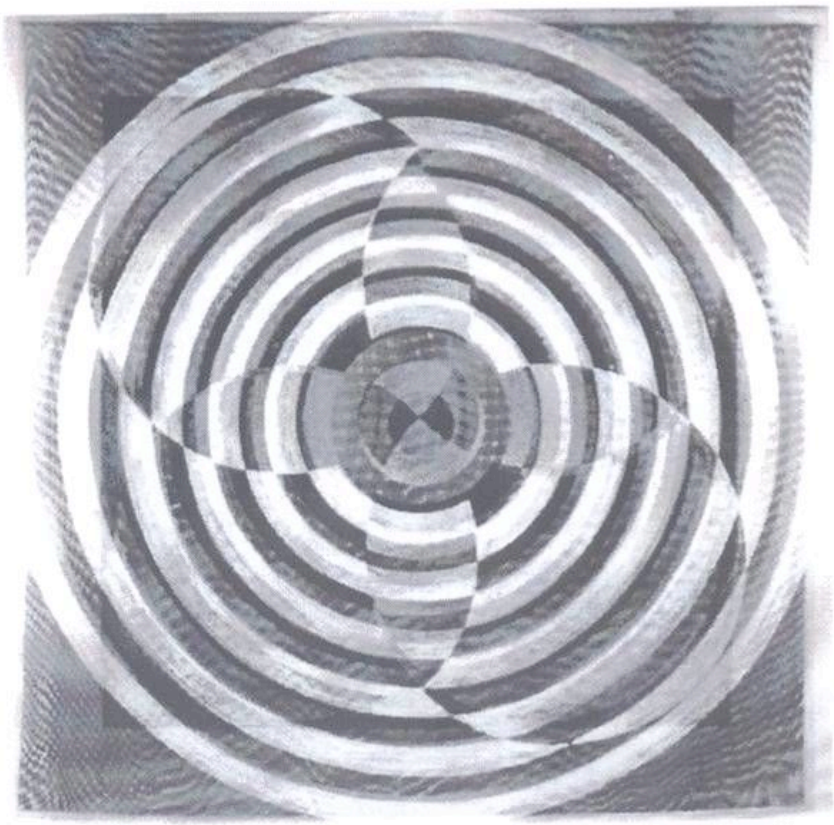

Fig 5. Circles of Attention

I like to engage the viewer into my pieces, I like the idea of thinking of the eyeball as a "scanning device," the retina as a "selective light detector," the brain as an "interconnected digital computer." Through a basic understanding of geometry complex ideas can surface and surprise the viewer.

In 1991 I installed a piece entitled *A Screen Play* at the American Academy of Arts and Letters in New York which consisted of a wall painting with the image of triangles forming a pyramid within a circle, a second layer showing a slightly shifted triangle which interacts with the first layer, and a few feet in front of this a free-standing tetrahedron with the same proportions as the wall-painting, its front surface parallel to the wall installation and parallax to the center of the other triangle. Inside the tetrahedron you can see another smaller tetrahedron hanging from the inside wall of the front triangle. A paradigm for this still exists in the old library of the Cracow University, where, with the absence of blackboards, a university wall was used in the 14th century to illustrate principles of geometry.

5. Conclusion

Every step and discovery in my work is important: one piece will nourish the next one or retrieve from a previous work. Outside influences only interact when a new concept and idea is already formed. I see what I want to see; when the eye and mind are ready to store more information I digest and recreate. I enjoy challenging the viewer to interact my pieces: three-dimensional occurrences in space which are based on the concepts of layered planar geometry.