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A Geometric Bridge across the Middle Passage: Mathematics in the Art of John Biggers

By Ron Eglash

The art of John Biggers is often interpreted in terms of its celebration of African traditions and its ecological themes such as the "web of life," or as an exemplar of richly iconographic painting. But the striking geometric forms used by Biggers both cross and exceed these categories. While helping him to visualize the fecundity of his African heritage, geometry's universal truths and cold precision stand in stark contrast to our expectations of cultural specificity and organic roots. Much of the genius in Biggers late work depends on his ability to smoothly blend these conceptual opposites.

Background

John Biggers was born in 1924 in Gastonia, North Carolina, the youngest of seven children. Biggers biographer Alvia Wardlaw notes that several aspects of this early life are echoed in his later works of art; most importantly the central role of multigenerational family, and the strength and dignity of black women. His father and uncle had each built a "shotgun" house (so named, it was rumored, because the simple layout would allow you to fire a shotgun through the front door and have it come out the back without hitting a wall) on opposite sides of the street. The reflection symmetry of these twin frames would also play an important role in the geometric basis of his later work.

After the death of his father in 1937, Biggers was sent to a boarding school, Lincoln Academy. To pay for his tuition, he took a job in the boiler room, where copies of the *New York Times* book review were kept. The boiler room made an ideal studio; he used the book reviews as both literary resource and an opportunity to practice his skills in copying the engravings which illustrated the reviews. Several drawings were included in his application to Hampton Institute, where he began his first classes in art. At Hampton he was influenced by Viktor Lowenfeld, who arrived in 1939 after escaping Nazi persecution in Austria. The former head of the African art museum in Vienna, Lowenfeld encouraged his students to explore their heritage in their work. Other inspirations included a visit from professor Alain Locke of Howard University. Author of "The Legacy of Ancestral Arts" article in *The New Negro* book which he edited, Alain Locke bought two of Biggers' drawings and gave him a copy of the book. Biggers' most important role model probably was Charles White, who had been awarded a grant to paint a mural at Hampton Institute.

Wardlaw vividly describes the anger and depression experienced by Biggers during 1945, when he was subjected to abject, demoralizing conditions as he served in a segregated Navy unit in Norfolk Virginia. Following Lowenfeld in his move to Penn State, Biggers completed undergraduate degree and graduate degrees and painted the realities of hardscrabble black rural and urban life. He was hired as chair of the arts department at Texas Southern University in Houston in 1949. His *First Shotgun* painting was completed that year, beginning his lifelong fascination with an icon that developed into a visual mathematics in his work.

Pilgrimage to Africa

In 1957 Biggers received a UNESCO fellowship to travel to Africa. One of the first African American visual artists to travel to Africa, Biggers refers to this experience as a “positive shock.” He was overwhelmed by the integrity and order of West African culture, its central roles for strong women, and its integration of spiritual, artistic, and economic domains. His book, *Ananse: The Web of Life in Africa* (1962) reflects these revelations through drawings that range from quiet fishing villages to explosive drumming celebrations.

Following the publication of *Ananse*, Biggers murals work took a dramatic turn. Edmund Gaither, director of the Museum of the National Center of Afro-American artists, characterizes this as “the movement from descriptive murals... toward metaphorical examples.” Biggers work had always been emotionally evocative, but these new works were luminous spiritual allegories. For example, Biggers provides this comment on the symbolic content of his mural “Birth from the Sea” (1964-1966) in the text *Black Art in Houston*:

In the center is depicted the womb of the sea. From it emerges a vessel, a Fanti fishing boat carrying a sphere: an egg—a new world. Dancing beside the boat is the maternal sea, whose wisp of garment is like an umbilical cord binding boat and figure as twins.

For many writers considering the work of Biggers, these symbolic relations are the central focus of his art. It’s true that Biggers himself has described his art in terms of these symbols, and this is undoubtedly an effective way to understand it. But from my own point of view in ethnomathematics, I am struck by the geometric evolution of his work. In *The Murals of John Thomas Biggers*, Olive Theisen notes that Biggers’ work became “more abstract, geometric, stylized and symbolic.” In particular, she cites Biggers’ piece *Migration*, drawn from 1957 to 1988, in which “the left side of the drawing is rounded and smooth, but on the far right side, the work becomes more geometric, and strongly patterned, with harder-edged forms.” I think she is right about this historic progression from rounded, smooth,

curvilinear forms to straight-edged forms, but I disagree with characterizing the transition as one of non-geometry to geometric.

The smooth, rounded shapes are strikingly mathematical. In *Birth from the Sea*, for example, one can see parallel curves, swerving in unison like isoclines on topographic maps, that mark lines in the ocean sand, fabric in textiles, and, in the central figure, the cornrow pattern on a woman's head. His first mural following his trip to Africa, *Web of Life*, features several examples of what we would today call fractal geometry: structures in which similar patterns are repeated at many scales (figure 1). If we use the word



Figure 1: *Web of Life*, 1958

“geometric” to include such non-linear patterns, then the geometricizing of Biggers’ work can be seen in two phases: the later Euclidean structures observed by Theisen, and an earlier phase, which began with his work in Africa. I see this earlier phase as having anticipated some of the geometric observations in my own book, *African Fractals: Modern Computing and Indigenous Design*.

Shapes and patterns that could have inspired both of these phases are evident in *Ananse*, his collection of drawings from Africa. Biggers clearly meant to emphasize the powerful resources that African society held for counter-racist, counter-primitivist portraits of black culture and design was a critical component. He notes the “exquisite abstract patterns” of Ghanaian bas-relief decoration (often precise logarithmic curves: see *African Fractals*, pp. 78-79, 109), the clay “storage bins that look like giant wasps’ nests,” and many examples of flow and rhythm. His text accompanying the drawings emphasizes organic connections—fecundity, fertility, unions of environmental, physical, and spiritual health—and so it is no surprise that he began with the nonlinear, fractal shapes of organic structure. *Web of Life* and *Birth from the Sea* support that connection in both name and imagery.

From Organic Harmony to Sacred Geometry

But why the later switch to an emphasis on Euclidean shapes in the 1970s? I think there are several forces at work here. One is a change in cultural politics. During the 1960s, black/white racial difference was often posed as a difference between natural and artificial. The opposition was not unique to black politics; the 1960s counterculture was generally framed as

organic revolutionaries versus a Euclidean establishment. The psychedelic aesthetic of hippy adornment was essentially what we would now call fractal: paisleys with-in paisleys with-in paisleys, flowing robes with folds of folds, rippling organic hairstyles. Establishment icons were in the Euclidean shapes of rectangles, circles and triangles, as evidenced by the Euclidean computer font introduced with the IBM punched card system. It is no coincidence that hippies accused “straights” of being “square.” In this opposition, black cultural nationalism had a parallel in the hippie ethos of return to Mother Nature; in their case a cultural return to Mother Africa.

In the early 1980s, this organicist view of black identity was succeeded by a youth subculture that was more interested in the urban codes of graffiti, break dancing, scratch and rap. African heritage culture did not disappear in hip-hop, but was reinterpreted in less organic terms, such as the phrase “dropping science” (often used in reference to ancient knowledge systems). Biggers was by no means a part of that generation, but I think it’s reasonable to see him as sensing change, and reacting through his own idiom. Reaching back again into his experience in Africa, he must have realized that the move toward Euclidean structures inspired by this new historic period—the appreciation of artifice and abstraction that would later be explicitly named by hip-hop artists such as “Dr. Octagon” -- could also be addressed through the resources he documented in his *Ananse* drawings. There he cited a wide assortment of basic Euclidean shapes: “gourds adorned with stripes, moons, and stars,” “cone-shaped roofs,” “pyramidal hair style,” and an assortment of “colorful abstract symbols and designs” that include triangles, crescents, diamonds, spirals, etc.

The first piece to express this new period was *Metamorphosis—Birth and Rebirth* (figure 2). Here we see the same smooth rounded forms, but

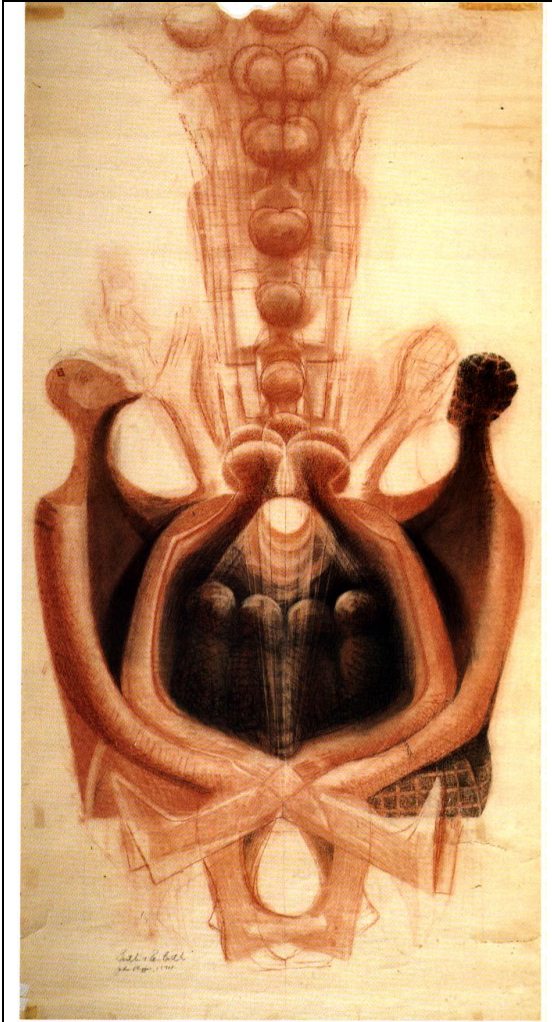


Figure 2: *Metamorphosis*, (1974)

now placed together in a reflection symmetrical to a central axis. There are also faint traces of a linear grid work in hairstyle and textile on one side, marking the asymmetry of gender in the midst of the symmetry of human reproduction. This use of symmetry of rounded figures to achieve the effect of a more linear or Euclidean geometric structure is given full expression in his next work, *Family Unity* (1974-1978). Biggers cited the Dogon origin story in his description of the piece: “The spirit of the ancestral pair is at the center. According to legend, God made eight people in twins, not just two.” (His mural visualizes this recursive twining of twins by a reflection comprising three groups of reflected human figures (two raised to the third power = 8).

While Dogon mythology added to his repertoire, his next mural, *Quilting Party* (1980-81) broadened the cultural palette, incorporating a syncretic mixture of both African American vernacular designs as well as previously untapped African

patterns. Quilting imagery, says Biggers, reflects his recollection of his mother and aunts stitching together fragile, worn bits of cloth, as well as serving as a metaphor for his own cultural reconstructions. Textiles in Biggers’ murals morph from African American quilting patterns to African textiles; the shotgun house of his childhood appears here as well, but its triangular form also melds into a classic African triangle motif.

In *Ananse* Biggers had already made the connection between African and African American hairstyles: “Many west African hairstyles are worn by Negro women in the United States, including this one—“cornrows.” Biggers made the scaling pattern of plaited African hair form the basis for the central figure in the *Quilting Party* mural, and surrounds it with an extraordinary succession of Euclidean forms: triangle, square, pentagon, hexagon, octagon, decagon, duodecagon—a kind of geometric incantation (figure 3).

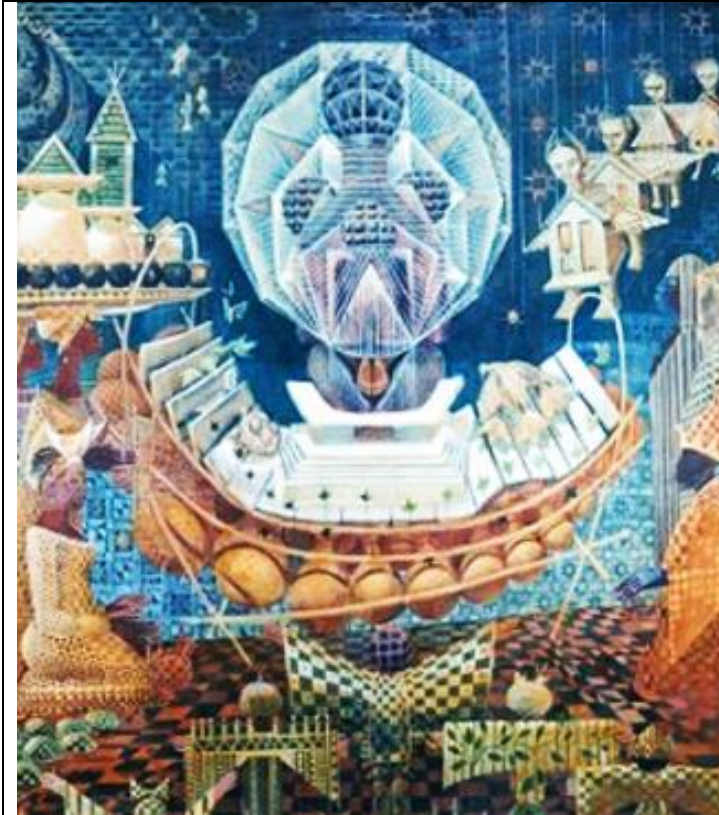


Figure 3: Detail from *Quilting Party*, 1980-81.

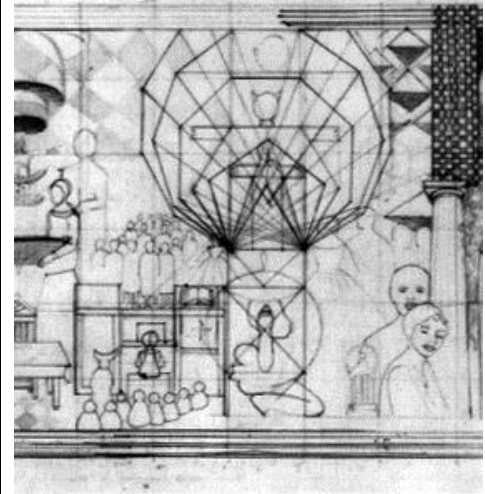


Figure 4: Study for *Christia V. Adair*, 1983.

His study for the central figure in *Quilting Party* was applied to a later mural, *Christia Adair*. (figure 4). Here we can see how he used the bottom side of the initial triangle as the common measure for all sides in all the successive forms, and that triangle's lower vertices align with all successive vertices.

The triangles common to both shotgun roof lines and African decorative motifs continue in many of his later murals, where he uses them as both tools of geometric exploration and symbolic expression. In Africa triangle designs often explore the complexity of deceptively simple arrangements. Nothing could be simpler, for example, than dividing a square along its diagonal, producing two right triangles (with sides of ratio one, one, square root two). Who would guess that you can create a dazzling whorl simply by placing four of these triangles together, as we see in traditional African designs as well as works of Biggers, such as *How I Got Over* (figure 5). Four such bisected squares form a hexagon. All of those arrangements,

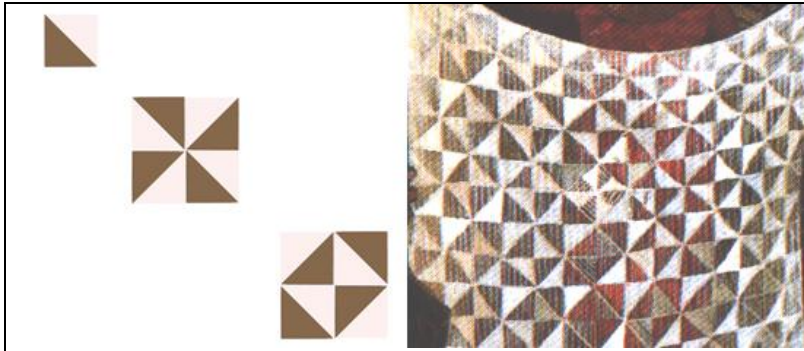


Figure 5: Dividing a square along the diagonal to create composites; detail from *How I Got Over*

and more, can be seen in Biggers work; often in an Escher-like morphing from one to another as in *The House of the Turtle* mural (figure 6).

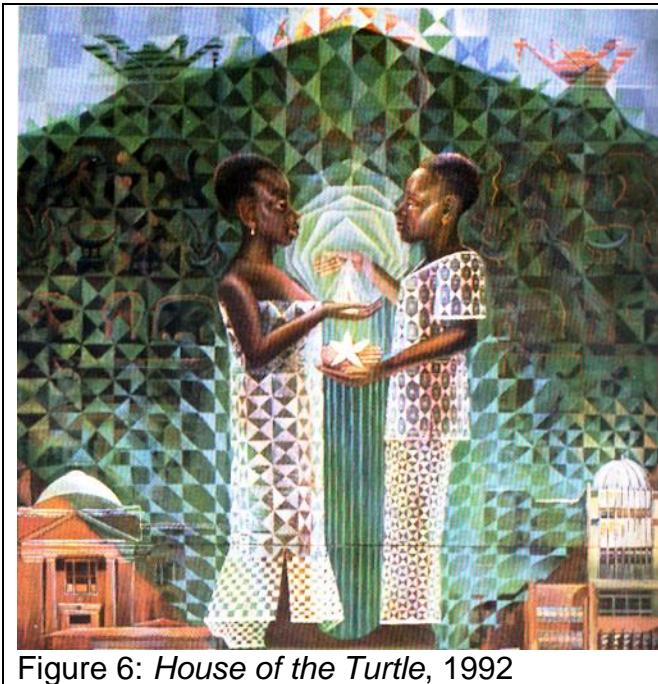


Figure 6: *House of the Turtle*, 1992

At the start of this essay I claimed that the 1960s/post 1960s difference in Biggers work should not be seen as a contrast between non-mathematical and mathematical, but rather between fractal, non-linear geometry versus Euclidean geometry. While Biggers himself also insisted (in retrospect) that the earlier work was equally mathematical, he preferred to see it in terms of a universal use of proportion, in both the earlier nonlinear and later Euclidean forms:

But this dawned on me in Africa, but it was so powerful, I left it alone. ...I said something is happening here that is much further than the eye can see. And I didn't ask any questions, because I learned in Africa if you ask a silly question, you get a silly answer. And ah so it took some years for this to come. And one day I realized after I had studied sacred geometry, I realized the proportions. The proportions were simply exquisite. The proportions gave you a vibration. (Unpublished transcript of an interview with Jeanne Zeidler at Hampton University, November 18, 1991, p. 20).

In February 2004 at Morehouse College, I met with Robert Powell, an African American professor of physics who was at Texas Southern, and had introduced Biggers to many of the mathematical concepts underlying sacred

geometry. Powell said that their conversations began in 1978, when Biggers brought by a book by Peter Thom that said the golden mean held the secret of the Pyramid, and asked him to explain what that meant.

Powell was teaching a workshop on sacred geometry at Morehouse and was carrying on the Biggers tradition, insisting that my distinction between fractal and Euclidean geometry—like the distinctions between different cultures or religions—was illusory, getting caught on superficial details, and failing to grasp the underlying universals.

Coda

In an interview with Nancy Walkup, Biggers provides a new perspective on the shotgun house: “First let me really give you the true name of it -- the shogon house. In Yoruba that means ‘God's house’.” Biggers speculates that the Yoruba word was corrupted into “shotgun” (the interview is posted at www.getty.edu). In his ability to transform the myth of firing a shotgun, with its resonance of KKK terrorism, into a link to African spiritual heritage, Biggers finds a source of cultural politics and spiritual redemption. It is this extraordinary transformational talent that allows Biggers to place the universals of mathematics and the particularities of his own heritage on the same canvas, and paint a new future for all humanity.

Dr. Ron Eglash holds a B.S. in Cybernetics, an M.S. in Systems Engineering, and PhD in History of Consciousness, all from the University of California. A Fulbright postdoctoral fellowship enabled his field research on African ethnomathematics, which was published by Rutgers University Press in 1999 as *African Fractals: modern computing and indigenous design*. He is now an associate professor of Science and Technology Studies at Rensselaer Polytechnic Institute.