BIOLOGY IN THE GRID: GRAPHIC DESIGN AND THE ENVISIONING OF LIFE

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As I began Phillip Thurtle's well-researched *Biology in the Grid: Graphic Design and the Envisioning of Life*, I wondered how his "envisioning of life" would intersect with the abundant evidence that a complex array of grids have served as a foundational element in art, architecture and design production throughout history. A few examples that quickly come to mind include those used to construct perfectly proportioned Egyptian and Aztec temples, Islamic and Buddhist art, Chuck Close's stylized portraits and the layout of medieval illuminated manuscripts. Rosalind Krauss's 1978 statement that the surfacing of the grid in early-twentieth-century modernist art was an announcement of "modern art's will to silence, its hostility to literature, to narrative, to discourse" [1] is also a part of the grid litany, although one that gives a negative cast to how we use grids to engage with objects in our world.

As it turns out, *Biology in the Grid* moves along a markedly different track. Despite the integration of graphic design, the entertainment industry, advertising and cultural theory, the book is largely orthogonal to the long art and design trajectory. Thurtle sees grids as a framework within a biopolitical circumstance and makes the point that "living in the grid" does not equalize us because all lives are not treated similarly despite the seeming uniformity of the form. In his words:

> I will argue . . . despite the homogenizing appearance of grids, not all lives in a grid are treated similarly. Uncovering these differences is politically important but also requires understanding how grids are ordered. This involves asking questions such as "What are the specific values that grids are intended to support?" Understanding life in the grid also demands the use of imagination. In this way we see how grids can be used to reorder lives to be less oppressive and more creative. Strangely, it is through a study of the most monotone and bureaucratic of terms, "regulation," that we see how closely bound the impulse to control and the desire to imagine coexist through envisioning. (p. 6)

Thurtle, a biologist who specializes in the cultural and conceptual basis of biology, uses a bifurcated research strategy to bring together the value of standardization and the value of envisioning what lies beyond the kind of accepted tropes that standardization reinforces. The gist of the argument is that while twentieth-century biological research focused on narrowly defined elements (parts or modularity), the trend now is systemic. He claims that the entry of the computer into biological research is conceptually too limited to explain how the field has shifted to a systemic vision. In his view, while the computer aids standardization, standardization on its own terms does not address how difficult it is to turn the complexity of life into the data and operable commands that a computer will recognize. Envisioning, by contrast, offers an element that captures a composite act. The value of envisioning is that it mixes imagination, visualization and desire. "To envision something in the biological sciences means having a vision for how something *could* occur under specific circumstances" (italics his, p. 3).

Thurtle's carefully crafted explanations of the difference between holism and evolutionary development are the most insightful aspect of his layered discussion. Traditionally holism has spoken in terms of the relationship of parts to an integrated whole.

Evolutionary development modeling, by contrast, is not predicated on a final, complete result. Rather, as he elegantly shows, an articulate evolutionary model can address how it is that one part and another part create a third element. Less effective are his efforts in bringing biology and the grid to what he says literary theorists call world-building. As he explains the analogy, twentieth-century consumption practices and values were informed by the grid; looking through this lens we can see how the entry of computation (or the data enriched information of technical images) and world-building offer conjoined visions "for a world that can be envisioned (imagined and controlled) in all its complex interactions" (p. 3).

Chapter 1 introduces the aesthetic of Ernst Haeckel (1834–1919), a German zoologist and artist who worked prodigiously in both the nineteenth and twentieth centuries, as a means to think about how forms are used to represent living things. Haeckel's representations make many points sequentially, and his exquisite images offer some formal entry into this artist/scientist's theories of life. Curved and wavy lines suggest vitality and closed circular lines aid in building up architectural volumes for his forms. The sum total offers an accounting for both structure and change in living forms. Biopolitical framing is addressed through compelling critiques noting Haeckel's use of the grid-like sequences to "validate" his racial theories.

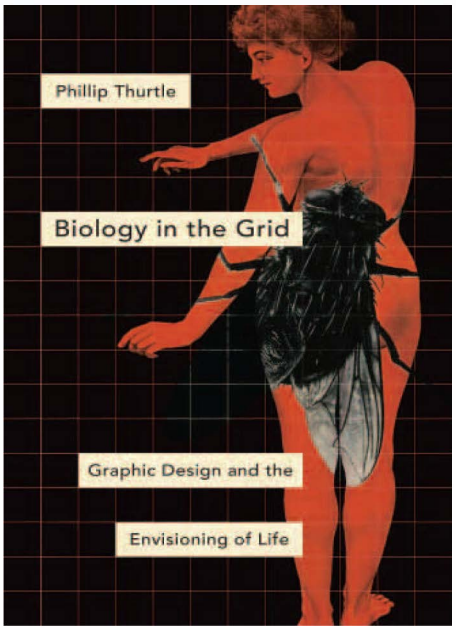
In Chapter 2 we meet the grid as a tool for consumer experiences. Introducing graphic design as a twentieth-century innovation, despite the form's long history as a design tool, Thurtle's emphasis is on grid layout as a communication technique used in design layouts, film framing/editing and comic books. How they speak to spatial and temporal characterizations, while referencing changes, is articulated using schematic and realistic representations. He does not perceive the grid as neutral, as he explains with examples such as how grids with size and scale distinctions are essentially decisions that influence how we see what is presented to us. Vilém Flusser's work on how images engage viewers is used to support Thurtle's two-part imagistic arguments. The first part (or phenomenological element) rests on the claim that the power of images defies the linear logic of typical arguments. The political-economic complement to this is that technical images harness the power of vision as a form of regulation that constructs experiences from the fragments of industrial and postindustrial processes.

Subsequent chapters grapple with how regulation, standardization and organic development relate to one another. Thurtle's approach is very broadly based, looking at norms and at what deviates from our expectations. Chapter 3 probes the tension between regulation and development through asking how pests—organisms that can evade a grid—are a part of how we see life. *The Fly*, a potent 1958 Kurt Neumann science fiction film based on a failed teleportation experiment, drives this discussion. A fly unexpectedly enters the machine with a man and brings about an unforeseen catastrophe, with a man-sized man/fly and a fly-sized fly/man serving as evidence that something went radically wrong. Grids, introduced through artifacts, are used to explain that our world is composed of many types of competing orders and regulating norms. One is *The Fly*'s poster, which featured a window screen (grid) in front of a woman's face. Obviously, a window screen keeps flies from entering our living spaces. A contrasting image is a shot of a torn window screen from the movie's opening credit. This still shot frames Thurtle's point that living elements interact with a grid in more than one way. He tells us that the biopolitical underbelly of the 1958 film is its depiction of a deeply classed, gendered and racialized dimension.

> It is not that pests are disordered, it's just that they embody a suggestion for a different type of order, one that uses grids in new ways to find new potentials. Understanding life as a form of political pestilence is politically important for understanding the potentials behind the constrained options open to all forms of lives trapped in the grid. (p. 95)

The author's concern in Chapter 4 is what happens when the power of association and regulation found in the visual design of grids is thought to drive the development of the organism. He navigates this tricky territory primarily through the work and ideas of two thinkers instrumental in the late nineteenth and throughout the twentieth centuries, William Bateson (1861–1926) and Edward B. Lewis (1918–2004). Their research allows Thurtle to demonstrate how illustrations, which were used to articulate a modular theory of life and modularity in general, evolved. Both Bateson and Lewis identified as geneticists, and both were interested in how heredity could produce a variety of bodily forms. Thurtle tells us that twentieth-century modularity was driven by an interest in how small shifts in processes could lead to changes in organisms. These figures introduce avenues for thinking about how variety could suggest order. Batesons theory of variation, Thurtle tells us, is not a coherent theory of modularity, although it is predicated upon the process of segmentation. The ways in which William Bateson's work influenced his son Gregory Bateson's theories on information and cybernetics adds a living and intergenerational example to this chapter, aiding Thurtle in elaborating how modularity morphed into a more systemic outlook.

Edward Lewis, who helped found the field of evolutionary developmental biology, was a corecipient of the 1995 Nobel Prize in Physiology or Medicine for his work with Drosophila (fruit flies). His work showed how a series of simple steps could make for complex and varied outcomes and laid the groundwork for



our current understanding of the evolutionarily conserved strategies controlling animal development. Using as an example an animated movie Lewis crafted for his 1995 Nobel Lecture [2], Thurtle explains how this scientist's ideas altered thinking in this area. I was impressed by the way the "fly" animation in effect paralleled the pesky fly in the science fiction movie; the difference, of course, is that Lewis's film is a scientific animation rather than a narrative.

> Animating his model allowed Lewis at least three specific improvements: he depicted his complex model of development as a moving image, he easily shifted between scenes incorporating actual mutant flies with animations of developmental models, and he created composite images where images could be overlaid with other images or text. These three improvements allowed Lewis to depict the role of molecular signaling during development in interesting and engaging ways not easily possible in a static illustration or a written description. (p. 167)

To be sure, the sequential motion of the animations succinctly gave form to both regulation and transformation, or how disparate elements can be drawn together and interact, but I didn't see how the cinematic product aids the viewer in conceptualizing a biopolitical space or any of the biopolitical notations earlier in the book. Thurtle tells us it shows the value of imagination and envisioning in biological research, and it does that. But he fails to demonstrate how the scientific grids can be used to envision and imagine a better biopolitical reality. To his mind, as laid out in the Epilogue, envisioning our world now includes the manipulation of materials and organism, and thus "studying biology should also mean cultivating more creative and less oppressive approaches to studying lives in the grid" (p. 213).

Unfortunately, as I began to sift through this and all the components of the book to craft this review, I began to wonder if Thurtle, like twentieth-century biologists, was offering a modular picture with his introduction of a biopolitical element. Biopolitics, a social theory associated with Michel Foucault, aims to examine how human life is managed politically and how power operates. Despite the *Biology of the Grid* title, the book avoids aspects of human biology that are difficult to interface with sociological and cultural theories. There is no mention of neuroscientific work on evolutionary development, psychology or cognition, and subjective perceptions are missing. So, my question wasn't why envisioning, imagination and the manipulation of materials, which have always been a part of the history of art, architecture and design, were omitted. Rather, my question was why the biology was so limited. For example, Thurtle so elegantly showed how Lewis's imaginative work captures a synthesis process and effectively communicates the idea of how two disparate elements create a third, novel element, but he never framed this kind of broadening in terms of human cognitive development and evolutionary processes of the brain. To my mind, there is a measure of irony to this, because he frames his ideas about imagination and envisioning through the work of insightful individuals (Haeckel, Bateson, Lewis and so forth).

I highly recommend this well-researched and carefully presented book, despite its limitations. In other words, while I learned a great deal from this volume, its historical narrative also kept reminding me of so much that was missing. For example, Thurtle seems to credit Haeckel with bringing sequential imaging to the fore. Yet Andreas Vesalius's 1543 *de Fabrica*, the book that spawned the field of biological illustration, is filled with sequential plates. Similarly, the histories of design and drafting are replete with grids, from medieval illuminated manuscripts and perspective frames and gridded diagrams that were instrumental in helping students conceptualize anatomy. Adding motion to the body with schematic and representational elements did change conceptualization, as Thurtle points out. His discussion, however, also brought to mind popup books, spearheaded by Vesalius's *Epitome* in particular. In *Epitome*, a companion to *de Fabrica*, the anatomies were expanded to 3D as the pages were turned. Few of these books remain extant. It is assumed that this is due to their use as an educational tool; they fell apart due to handling.

Finally, at the beginning Thurtle tells us, "My goal as a scholar of the cultural and conceptual basis of biology is to create stories that are historically informed, scientifically robust, and imaginatively captivating" (p. 3). He succeeds in this. He also succeeds in showing that "caring for living things should begin by recognizing the importance of holding heterogeneous elements together" so there is room for our differences. On its own terms, this book is a rigorous effort to bring biology, regulation, imagination and envisioning together. It impressively conveys how contemporary tools that capture motion have altered traditional distinctions between time, space, linearity and so forth. It is also a compelling discussion on how conceptualizing something that was not previously a part of the "known" becomes "known" to an individual or a group, which is why I highly recommend it.

References

1 Rosalind Krauss, "Grids," in *The Originality of the Avant-Garde and Other Modernist Myths* (Cambridge, MA and London: MIT Press, 1985) p. 1.

2 Edward B Lewis, 8 December 1995 Nobel Prize speech, "The Bithorax Complex: The First Fifty Years," and his animated film. Both are available at www.nobelprize .org/prizes/medicine/1995/lewis/lecture.