SUSAN STEWART - ANTONY GORMLEY'S 'CHORD'

From ANTONY GORMLEY: CHORD, MIT Visual Arts Center, MIT, Cambridge, USA, 2016

Sculptures are three-dimensional forms with a potentially infinite number of aspects. In this regard they multiply our perspectives as we stand outside of them as they also invite us to inhabit the viewpoints in space and time that are their own. Whether we can touch them or not, they resist our entry as they also affect us with their presence. They transmit an inherent anthropomorphism: we recognize they are the products of human intention and we only truly encounter them when we come to them first-hand, much as we encounter persons. If sculptures are monumental, our appreciation may be mixed with fear; if they are on a human scale, we intuit their likeness and their otherness; if they are miniscule, our interest may be mixed with both condescension and tenderness.

As early as Vitruvius's 'De architectura', the plastic arts, including sculpture and architecture, have been seen in the Western tradition as expressing a harmony that, as the treatise states, "arises from the details of the work itself, the correspondence of each given detail among the separate details to the form of the design as a whole." Vitruvius draws on the Aristotelian idea that each natural object possesses an internal morphology of order and symmetry that is reflected in its external form. But for Vitruvius the coherence of the made work is produced, not in the end by the imposition of such a defining form, but rather by the structuring capacities of mathematical proportions.

These two founding principles of sculpture-its anthropomorphism on the one hand and its relation to the harmony of proportions on the other-have been at the heart of Antony Gormley's four-decade-long exploration of his art. CHORD, his new work connecting the ground floor to the 4th floor skylight in the staircase of Building 2 at the Massachusetts Institute of Technology, continues his career-long challenge to distinctions between figuration and abstraction. Situated at the busy intersection of MIT's Science Departments (Mathematics, Physics and Chemistry) and Humanities Departments (Literature, Global Studies and Languages), the work offers an ingenious meditation on the quantitative unity of organic and inorganic forms, the given and the made. William Welles Bosworth's stairwell, commemorated by Gormley's commission as part of the celebration of the building's 100th anniversary in 2016, lends a frame of severely functional classicism to the sculptor's delicately refined work. The angular staircase, with its square metal balusters, plain wooden handrails, and treads punctuated by metal nosings, all the more underscores the effervescence of Gormley's cascading column.

CHORD's fundamental unit of composition is the polyhedron (from the Greek 'poly', many, and 'hedron', base). Here, 33 polyhedrons make up the vertical helical chain. The work is held together by 905 stainless steel elements of slightly varying section sizes (1) that have been welded and joined at nodes to 541 polished stainless steel balls, each with a diameter of 60 millimeters. The 55-foot high, 1700 pound work was made in parts and assembled on site. It is one of a number of, as Gormley calls them, "cellular polyhedral sculptures" that he has completed in recent years. The structure is a dynamic and harmonious totality-touching one part of it will have an impact upon all of it, with each dimension tuned to the entirety.

Modelled and designed in Gormley's London studio, the work was made in Salem, Massachusetts. (2) Once the cells of the sculpture were assembled, they were then connected into six larger segments and transported to the MIT installation site. In the final phase, a team of welders worked amidst scaffolding within the stairwell, moving from the skylight toward the floor, joining the segments as they went.

Now, like fish-eye lenses, the stainless steel balls each mirror their surroundings. Depending on the viewer's perspective-ascending or descending, or simply pausing to observe from, the stairs-the work seems to vault or dangle while its steel elements catch the light. When touched, the work vibrantly responds, coming alive with the internal tension of its own elements, reflecting light. During the day, the rather harsh artificial light of the interior spaces yields, as the viewer climbs, to the natural light streaming in from the roof. At night, in clear weather, the artificial light will not block glimpses of the night sky and stars.

Polygons are structures that appear in elementary geometry as regions of planes meeting in pairs along their straight-line edges and in turn coming together at vertex points. Polygons can also be manifested as polyhedral-solids in three dimensions-possessing the same features of flat polygonal faces, straight edges, and vertices. Regular polyhedra in nature, for example, include the forms of some viruses, the hexagons of beehives and the nests of wasps, the segments of turtles shells, and the rhomboid packing of pomegranate seeds. Irregular polyhedra are commonly found as crystals. The shapes are also important to inorganic chemistry: regular polyhedra form a paradigm for symmetry that reaches deeply into particle physics. DNA polyhedra are cage-like architectural forms based in interlocked and interlinked DNA strands. CHORD as an artifact of human attention alludes to, and echoes, the building blocks of life itself.

Since in mathematics the term 'chord' describes a straight line joining the ends of an arc, the work's title indicates not only the polyhedral nodes, but also the line segments that join them. CHORD's cascade, or spume, of polyhedra underscores its own connections and subtly evokes the simplicity of the umbilical cord and the harmonies of music. The incommensurable referents of these concepts only underscore the marvel of their common geometry.

Abstract and concrete at once, Gormley's polyhedra appear as projected, or three-dimensional "drawings." Indeed, technically, his work is made up of what can be called the "skeleta" of polyhedra, which, due to their transparency, raise the question of whether their interior volumes are part of their form. Gormley here follows in the footsteps of Leonardo da Vinci, who created similar, but detached, frame models of regular solids for Luca Pacioli's late 15th century mathematical treatise, Divina Proportione. CHORD is particularly inspired by those irregular polyhedral-intuited by Leonardo's abstracted models with their unspecified faces-that are found in bubbles and foam. In such frothy forms manifesting both convex and concave faces, adjacent faces are highly efficient, for they can meet without a gap.

Describing his intention for the work, Gormley has written, "When making this work, what intrigued me was the reconciliation of the organic and the geometric. This geometry is a characteristic of foam structures, a universal and economic way to structure space: bubble geometries exist in the pith of desert grasses and in our bones. Its random yet principled matrices have been assumed into parametric design."

Gormley reminds us, with "parametric," of the fixed relations of polyhedral forms wherever they appear and whatever their ultimate shape. In 1750 the

Swiss mathematician Leonhard Euler for the first time considered the edges of a polyhedron, allowing him to discover his polyhedron formula relating the number of vertices, edges, and faces. (3) Euler's work created the birth of topology and his discovery of the relational attributes of polyhedra led to further discoveries about the way orientation works, or does not work, on surfaces. His insight led to further discoveries of the geometric structures that could be realized by combining polygons and polyhedral: for example, Henri Poincaré's description of "dodecahedral space," obtained by considering the faces of the dodecahedron as "doors," which one can pass through to emerge at the opposite face.

Gormley's CHORD imaginatively outlines this body of knowledge as it orients the viewer moving clockwise (up) and counter-clockwise (down) the staircase. As many of Gormley's previous sculptures were made via abstracted or multiple castings of his own body at varying proportions and so unsettled our sense of what figuration in sculpture might be, here he analogously collapses the ontological relation between the work and its referent. CHORD refers to the Platonic ideal of geometry as it also instantiates it-the sculpture is a set of polyhedra joined by chords as it also describes and refers to the abstract and eternal concept of these forms.

As a sculpture that stands within traversable space as a model and instance of geometrical universals, CHORD thereby speaks not merely to our relation to all of nature, but also to our place within it. From the discussion of geometrical solids and the shape of the universe in Plato's 'Timaeus' to Euler's discovery of the shape-making function of edges, homologies hold between our elongated spherical bodies, the earth as an obloid sphere, and on to contemporary theories about the possible shape of the universe-including speculation linking it to Poincaré's dodecahedral space or to a three-dimensional torus.

CHORD's 33 polyhedra catching the light within Bosworth's austere stair inevitably echo as well the numerology of Dante's 'Commedia'-specifically the golden stairs stretching to Infinity in Paradiso 21. The golden stair that Dante sees rising from Saturn into the infinite spaces above him is a traditional symbol of the life of contemplation or spiritual vision. The stair is a version of Jacob's ladder, viewed in Dante's time as a trope for monastic life; the angels of God "ascending and descending on it" signified those monks who climbed to God by contemplation and descended to their fellow men by acts of compassion. In our own age, when technology so often takes on the Manichean role of destroyer and savior of nature at once, perhaps MIT's young scientists and humanists, hurrying between laboratories and classrooms, will, under the inspiration of this work of art, remember their role-if not as angels-then as compassionate guardians of our shared nature in Nature.

1 Range of section sizes of the steel elements: 5/16th, 3/8th, 1/2, 9/16th and 5/8th inches.

2 Fabricated by SUMMIT Fabricators, Salem, Massachusetts. The initial lay-out of nodes was snapped in a digital 3D file to a 50 millimeter grid that allowed each node's position to be defined. Then, using a simple jig, poles of a length multiple to 50 millimeters were inserted into a set of holes spaced across the corresponding square grid. Each node junction was plotted with a three-figure x.y.z. coordinate. The corresponding lengths of the stainless steel bars were then pre-cut and coded to define their positions and relevant nodes.

3 The "Euler characteristic" x relates to the number of vertices V, edges E, and faces F of a polyhedron: for a convex polyhedron or more generally any simply connected polyhedron, x=2; for more complicated shapes, the Euler characteristic relates to the number of toroidal holes, handles, and/or cross-caps in the surface and will be less than 2.