Blending the Languages of Mathematics and Painting:
The Work of Michael Schultheis
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Both mathematics and painting, especially non-representational painting, invoke a mysterious language that, at times, seems comprehensible only to the initiated. If this is true, then Michael Schultheis is one of the initiated who uses his expertise to combine the esoteric elements of both disciplines, creating paintings that are as approachable and personal as they are unique. In his work, the languages of art and math offer insight into one another. The tactile and layered surfaces of Schultheis' paintings invite viewers to consider the archeological nature of the work, where the languages of artistic and mathematical traditions are buried.

Trained as an economist, Schultheis worked in computer software engineering for over seven years. He recalls long meetings where ideas were furiously debated for hours and noted on white boards until they were covered with layered marks. These encoded marks created a map of the engineers' thought processes. Representing hours of work, Schultheis photographed the white boards at the end of these meetings to document the hard-earned information. While doing this, he became fascinated with the beauty and elegance of the flowing marks, which reminded him of markings in the notebooks and scientific diagrams of Leonardo da Vinci. Both da Vinci's notes and the photographs of the white board illustrate how analytical idea can develop visually, with the hand leading in mind. They provide us with an opportunity to discover the nature of analytical and creative thought processes through layers of handmade marks. The connection was the catalyst for Schultheis to begin his exploration in painting.

For this reason, Schultheis places particular emphasis on his own artistic process. The language of painting that he employs is rooted in the tradition and ideas of abstract expressionism. The abstract expressionists, those that became known as the New York School of painters during the 1950s, shared a Nietzschean view of art as a fusion of rational order and irrational impulses. The blending of rational and irrational thought was realized in the painting process itself, more so than in the finished piece. In fact, it could be said that the term "abstract expressionism: as it applies to these artists refers more to a process than a style or time period. Many incorporated a process of automatism, which allowed them to guide their marks with informed intuition. For example, Jackson Pollock's splattered paint technique relied on a practiced physical gesture. Later, in the 1960s, CyTwombly, like his predecessors, continued using a process of automatic drawing but incorporated an iconography of everyday life consisting of quickly scrawled text and numbers, similar to the way mathematical equations are rendered in Schultheis's work.

To understand Schultheis's connection with this tradition, it is relevant to consider his physical and mental process. He begins by applying a layer of paint with a very delicate Japanese calligraphy brush. Starting in the top left corner and progressing to the bottom

right hand corner, he fills the blank canvas with equations relating to a specific topic, much like the practice familiar to him from his days as an engineer. The language of mathematics evoked be these equations forms a base of existing knowledge upon which he builds, providing the background, both physically on the canvas and intellectually in the artist's mind, for the ideas that the artist wants to explore. They are analogous to "rational order," and provide the artist with an opportunity to reacquaint himself with the basic concepts, historical context, and general notation of a given subject.

The notations that form the first layer lead Schultheis to consider visual models or illustrations, which he begins to develop in the second layer of his painting. Instead of revising parts of the equation with an eraser, the way one might on a chalkboard, he covers up segments of his notations with a large brush. Then, with a fine brush, he draws images into the areas that have been covered. Schultheis describes the third layer of the process:

Then something happens that causes me to see a variation on the current form, or an extemporaneous relationship to the existing idea, and I follow the impulse to the canvas with whatever will most precisely manifest this new image. Using non-conventional tools, I draw this new idea with the edge of a palette knife, an X-Acto knife, or a large chisel to scrape into the surface and pull out the new image. I often use my hands and fingers to sculpt the paint into a prominent line, use a rag to rub away previous forms, and spray water onto the surface to wash away all the previous color except that which adheres to the limned outlines of a structure. For hours and hours I live in this third step. I constantly revise equations with the Japanese calligraphy brush, rubbing out an area and thus creating a window into the equations. I draw and re-draw new ideas. All of these ideas are analytical. But they also live in the realm of beauty.

In these works, Schultheis blends the language of mathematics, movements from the history of painting, and his own experiences. For example, the impetus for the paintings Cycloids 01 and Cycloids 02 and the quadriptych *Hypocycloids* is the equation for a cycloid and the artist's knowledge of history and literature that are stimulated by that equation. A cycloid is a geometric curve formed by a point on the circumference of a circle that rolls along a straight line. If a circle has radius *a*, then the cycloid is described by the parametric equation:

$$X = a\,(t - \sin t)$$

$$Y = a\,(1 - \cos t)$$

At approximately the same time that Galileo was studying the cycloid in 1599, the Chinese military strategist and inventor Qi Jiguang was defending the Great Wall of China during the Ming Dynasty. Employing his own inventions on the battlefield, Qi Jiguang invented a wheel and flint apparatus that produced sparks from the rim when rolled. The sparks from General Qi Jiguang's invention formed the locus of a cycloid, and are alluded to in red throughout these paintings. The orange and brown palette of these

works echoes the colors used in the official portrait of General Qi Jiguang which resides in the permanent collection of the Shandong Provincial Museum in Jinan, China.

The primary catalyst for the *Cycloids* series, however, occurred when Schultheis visited the National Academy of Sciences auditorium. In 1970, Cyril M. Harris designed the auditorium using a cycloidal curve, which turns a coordinate system based on the cycloid into the acoustically perfect interior of this space. Recalling his visit to the auditorium, Schultheis wrote, "I felt like I had stepped into a three-dimensional rendering of my childhood Spirograph toy. This toy allowed me to create all kinds of shapes on paper by rolling a circle inside of another circle, and it provided me with endless hours of geometric discovery."

The language of mathematics provides Schultheis with a deeply personal way to understand and describe the world. These paintings serve as a portal into a realm where mathematical ideas become as poetic as they are rational, challenging us to sift through the layers of paint to discover a labyrinth of idea and histories, both universal and personal, embedded within. The process used to create these paintings reminds us that art and math are not mysteries themselves but, rather, beautifully constructed languages through which we attempt to understand ineffable phenomena.