

## ARTISTS' STATEMENTS

# SIGGRAPH 2009 Lifetime Achievement Awards

## FORM, GRACE AND STARK LOGIC: 30 YEARS OF ALGORITHMIC DRAWING

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### Abstract

This essay outlines the personal experiences, influences and ideas that underlie 60 years of Roman Verostko's artwork and that drew him to embrace "algorithmic art." The author spells out qualities of form unique to computer-assisted algorithmic drawing as well as the genre's pitfalls and discusses his good fortune to have been an active participant in what Peter Weibel has labeled the "Algorithmic Revolution." For his pioneering work, Roman Verostko was awarded the 2009 SIGGRAPH Lifetime Achievement Award.

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My approach to art grew from a curious wonder I have enjoyed since childhood. This wonder awakened easily when I came upon something in my world that I had never seen before. When I first came upon the work of Jean Arp I felt a marvelous awakening upon seeing such graceful form. Later in life, to my own surprise, I was also drawn by a curious fascination for circuit boards, computer languages and the visual forms one could generate with simple algorithms.

During the 1960s, the first phase of my mature work as a painter concentrated on creating visual form inspired by early 20th-century pioneers of "non-objective art." Artists such as Piet Mondrian, Naum Gabo and his brother Antoine Pevsner pointed the way to a new world of form. I embraced the constructivist concept of a "new reality" that could stand by itself as an art form without reference to other reality. Such art led to the creation of visual forms that were unique realities themselves—forms or objects we had never seen before [1].

This quest for a "new realism" courses through all my mature work as an artist. It migrated directly from my

painting practice of the 1960s into the procedures I adapted for my first algorithmic drawing and painting [2].

### The Attraction of Algorithmic Art

What drew me to algorithmic procedure was the "form-generating" potential of algorithms executed with computing power [3]. The potential for generating visual forms I could not otherwise envision beckoned me, and I waded in with vigor. Programs such as my Magic Hand of Chance and Omphalos generated non-repeating animated visual forms and verbal displays on a computer monitor. While these programs enjoyed modest success with their innovative sequences, the screen display did not satisfy the visual qualities I valued most as a painter [4]. I turned to the pen plotter, which could manage a palette of ink pens and draw at 1,000 increments per inch. With my first algorithmic pen and ink drawing on paper, I was smitten and converted to plotter drawing. I began generating surprising worlds of form with BASIC programming using logical procedure and elementary plane geometry.

By adapting oriental brushes to the drawing arm of the pen plotter, I was able to achieve some of the life I valued in Chinese calligraphy (*Shufa*). I wrote an interactive program so that the software guided both brush and pen strokes. Brush strokes coupled with clusters of pen strokes on similar form structures emerged in my *Pathway Series* (Color Plate G). Drawing instructions could specify thousands of pen strokes with subtle internal relationships of scale, position and distribution. This ability to draw visual forms with clusters of precisely distributed pen strokes exceeded what I could do by hand.

### Qualities of Form in Algorithmic Drawings

All media have unique form features as a consequence of the form-making process. I valued the mark of the sculptor's chisel, the painter's brush stroke

and the letterpress imprint of type on paper. The artist's tools and materials, in the process of transformation, leave their traces as a legacy of the art itself, and, for the master, certainly the mark of the individual artist as well.

We must ask, "What unique form features reveal the nature of algorithmic pen plotter drawings?" As I reflect on years of work, I see three pronounced features that I have come to value:

1. *Form-generating power.* This is both an attractive and a frustrating feature of algorithmic procedure implemented with computing power. With the introduction of nested loops for visual improvisation, the procedures quickly exceed what humans can compute. The form-generating power staggers the imagination, as endless arrays of form are possible. One dilemma follows: How does one program "art-form decisions" to separate, as it were, the wheat from the chaff? I work at it using trial and error in refining routines and setting filtering parameters. Yet the best procedures I have achieved generate forms that fail. I view the problem as "the art form decision bit," for which I have never found a totally satisfying solution.

2. *Variability and self-similarity of form.* In his *Ars Poetica*, Aristotle laid out the value of variation on a theme or a character, which is to say that art thrives on visual analogues with various twists and turns of form. With algorithmic procedures, the artist invents and controls the latitude of the twists and turns employed by the generator.

Nested loops can operate on an initiating data array, and through each successive loop, the code can have a rule (or changing rule) for modifying data. The change wends its way through each drawing loop, yielding similarity and change for each loop. My cyberflowers play with an initial set of control points. Forms can be built from relationships that control the entire structure. My cyberflowers are generated from the relationships of four to eight sets of coordinates. The program employs the



Fig. 1. *Cyberflower, Sunshine I*, algorithmic pen and ink drawing, 23 × 29 in, 2008. Victoria & Albert Museum Collection, London. Image courtesy of the artist. (© Roman Verostko)

relationship parameters for each set to control every pen stroke in the work.

A family of forms generated by the same parent code necessarily yields a “self-similarity” coursing through each member. Yet each member retains a unique identity. In my work, examples would be the *Visions of Hildegarde*, the frontispieces for the limited edition of George Boole’s *Derivation of the Laws . . .* [5] and my *Cyberflowers* (Fig. 1).

3. *Tireless and extensive precision in drawing.* The pen plotter and the computer, working together, proceed at an even and tireless pace. They are capable of maintaining precision for 24 hours without fatigue. Drawing precisely, with a seemingly endless ability to improvise, pen plotter drawing yields evenly drawn pen-and-ink lines that start and end without the flourish sometimes found in drawing by hand. Algorithmic drawing by machine creates work that is uniquely different from drawing by hand. I value each for its unique qualities. Individual algorists also have distinctive drawing styles embedded in their form-generating code.

### Bugs, Clogged Pens and Such

Let me hasten to add that there are hazards in this art; code gets buggy, pens fail, paper loses its register and sometimes a honed ink pen cuts into the paper. Success depends on knowing when to discard a pen, getting the right ink viscosity, controlling drawing speeds, experience with handling paper and a wealth of patience so that one takes time to fix software and restrains oneself from taking a hammer and thrashing the machines.

### Concluding Note: The Algorithmic Revolution

When astronauts landed on the moon in 1969, I counted it my great fortune to have been alive at that important historic moment. A few years later I came to realize my greater good fortune was to have had the opportunity to participate in the unfolding of the “Algorithmic Revolution” [6]. By wrestling with algorithmic drawing procedures, however primitive and elementary, I have experienced marvel-

ous moments when the stark logic of coded procedure transforms paper and ink into surprising grace and beauty. For me such moments magnify the mysterious nature of our evolving selves and lighten the tedium of working on software.

### Acknowledgment

My wife, Alice Wagstaff Verostko, passed away in December 2009 after a year of 24-hour nursing home care. Among other handicaps, she had difficulty with cognitive functions like finding the right word and managing simple tasks like writing and speaking. Even though she could hardly write and I didn’t know what went on inside her head, I took this article to her for editing, as usual. She was my faithful editor with great insights on all my writings.

I thought she never did get to editing the article and it got mixed up among items in the nursing home, but when I removed her belongings from the nursing home I found the article and discovered that she did indeed edit it—her two editing notes made a remarkable improvement. I will always cherish the original document she edited knowing she had a vibrant inner life up to the end. And it will be a consolation knowing that within weeks of the end she contributed to an article I wrote for *Leonardo* that includes her last edit even as she struggled with severe handicaps.

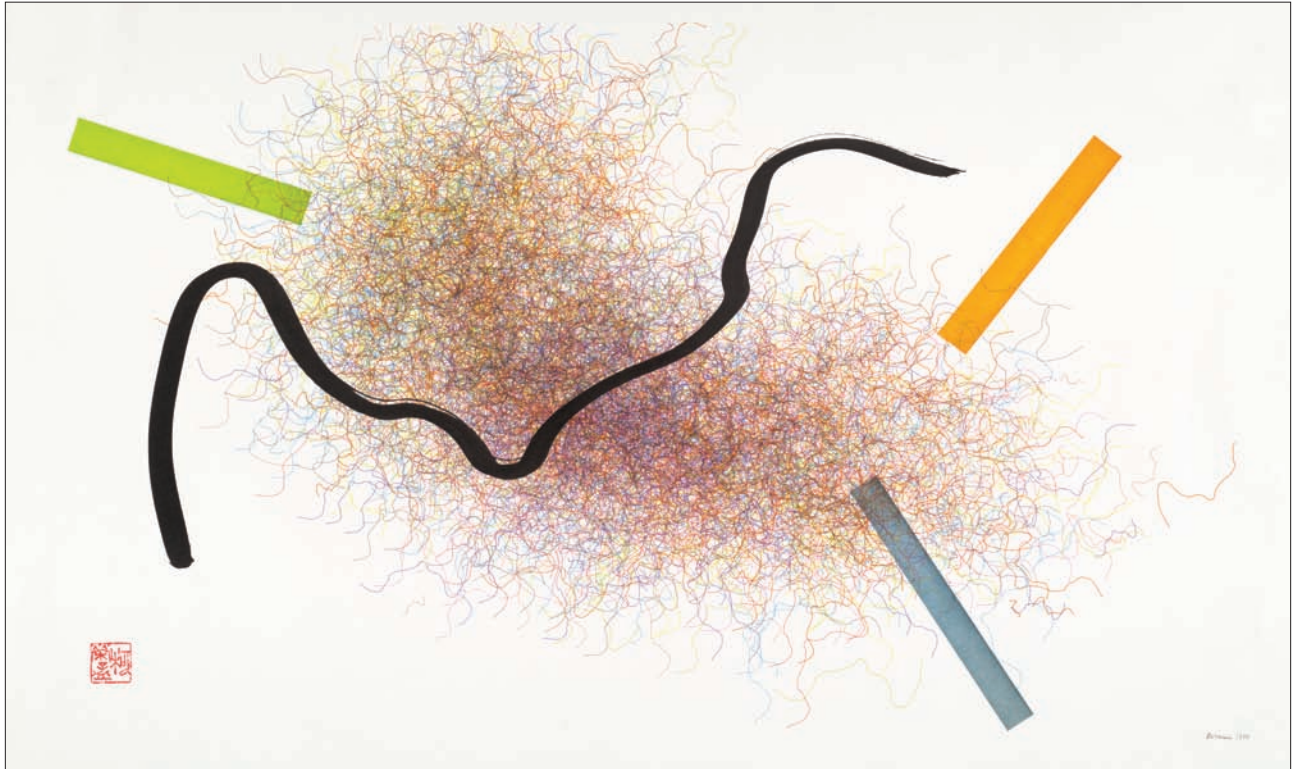
### References and Notes

*Unedited references as provided by the author.*

1. Realistic Manifesto, 5 August 1920. Naum Gabo and Antoine Pevsner advanced “the new reality,” denouncing descriptive line and color. Gabo reading the manifesto: <[www.ubu.com/sound/gabo.html](http://www.ubu.com/sound/gabo.html)>.
2. <[www.verostko.com/history/compare/compare.html](http://www.verostko.com/history/compare/compare.html)>.
3. An algorithmic sequence I had filmed at Univac in St. Paul, MN, in 1969 drew me to the power of algorithmic art: <[www.penplot.com/history/npls/univac/univac.html](http://www.penplot.com/history/npls/univac/univac.html)>.
4. <[www.verostko.com/history/compare/compare.html](http://www.verostko.com/history/compare/compare.html)>.
5. <[www.verostko.com/boole.html](http://www.verostko.com/boole.html)>.
6. Peter Weibel’s catalogue essay on the ZKM Algorithmic Revolution exhibition notes how it happened quietly, without fanfare: <[www.zkm.de/algorithmische-revolution/](http://www.zkm.de/algorithmische-revolution/)>.

*Roman Verostko, b. 1929, a founding member of the algorists, has practiced drawing and painting since graduating from the Art Institute of Pittsburgh in 1949. Reflecting on well over a half-century of his work, he sees continuity between drawing with his hand and drawing with his code, a technique he calls drawing with his “mind-hand.” Since the mid-1980s, all his algorithmic works have been drawn with pen plotters guided by his original software. With ink pens and occasional oriental brushes mounted on the plotter’s drawing arm, Roman’s “mind-hand” draws worlds of form he could only dream about in his pre-algorist period.*





Roman Verostko, *Pathway Series, Bird 2*, algorithmic drawing with ink pens and oriental brush with artist's seal, Ké Reng Meng, 39.5 × 24 in, 1990. Victoria & Albert Museum Collection, London. Image courtesy of the artist. (© Roman Verostko)