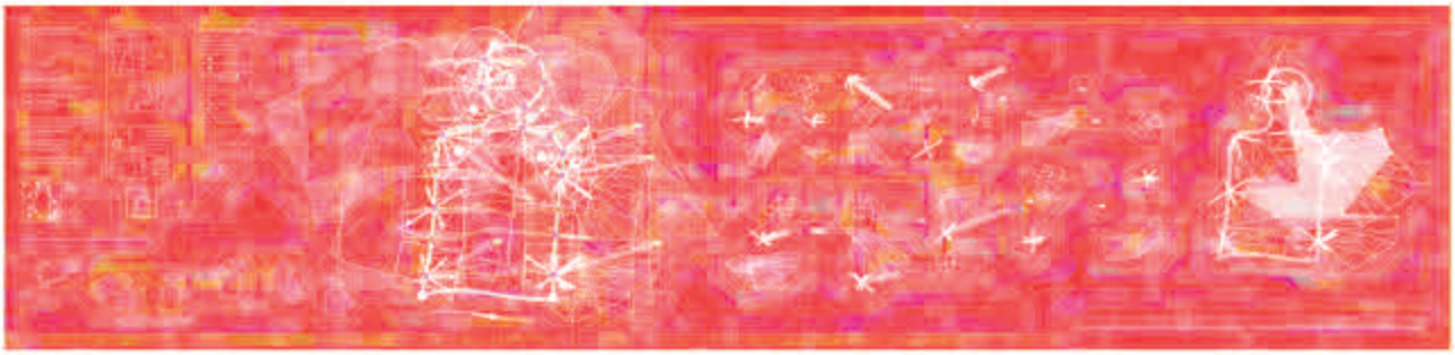

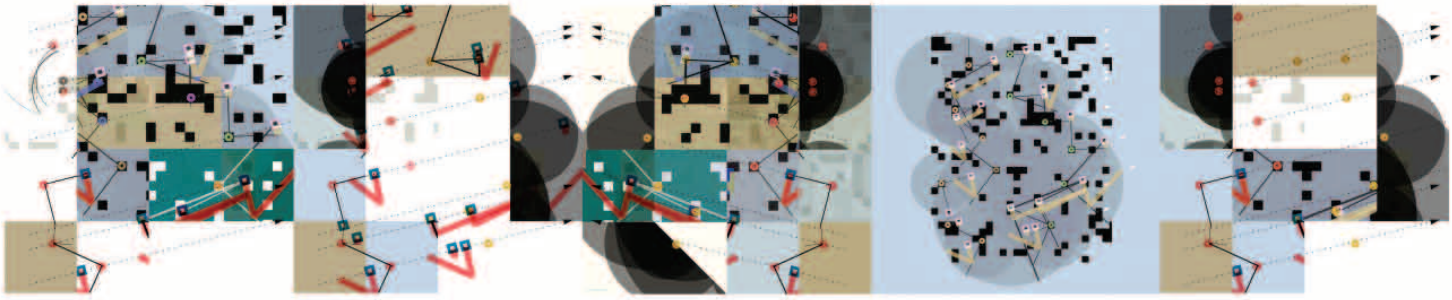

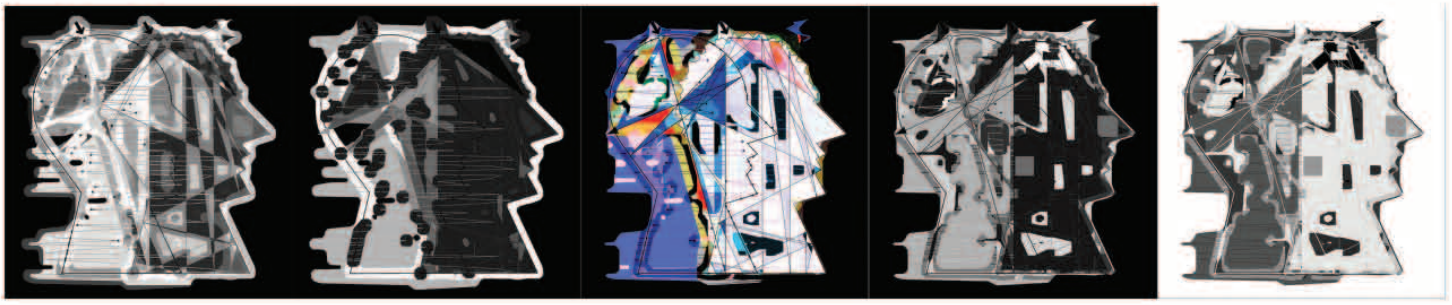

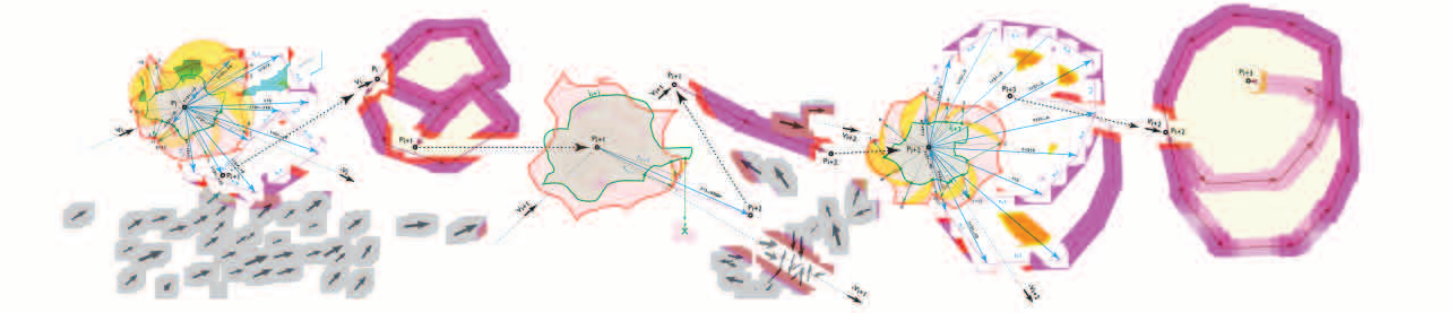

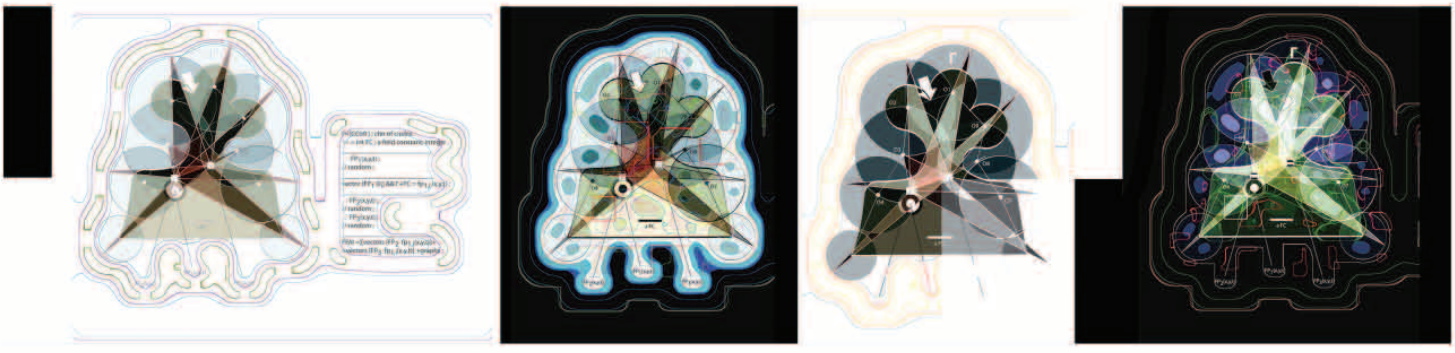

ARTIST'S NOTE

Intrinsic Art

A Cultural Capsule

SHERBAN EPURÉ

ABSTRACT

In this article, the author introduces Intrinsic Art as the theoretical foundation of his work. He explains how Intrinsic Art is a synthesis of art's fundamentals, mathematics, philosophy and technologies. Three strands of his work derived from it include Meta-Phorms, S-Bands and Protruded Sculptures.

WHAT IS INTRINSIC ART?

My work is very much about invention, but for it to be understood, "invention" needs to be explained.

In 1968, inspired by a book on mathematics by Martin Gardiner [1], together with my training in mathematics and electronics, Romanian folk art and directions in contemporary art (without overlooking instinct, which played a big part), I became interested in creating art based on objective knowledge. In my view, this meant producing "something tangible" from "something invisible" (such as thought). On the other hand, knowledge—the vast repository of human experience—is conveyed by symbols: word and image; and often, parts of mathematical expressions. Here I present the formative background to the creative attitude that emerged from such considerations and coalesced in what I call Intrinsic Art. By this I mean a cultural foundation ("capsule") that functions for my art in ways similar to a computer's operating system. And because knowledge transcends time, Intrinsic Art aims at lasting relevance, regardless of trends. To quote Einstein, "Politics is for the moment and equation is for eternity." Therefore, this approach relates to the eternal (in the sense quoted). The intrinsic qualities of art underlie the permanence of value; in politics, value fluctuates. I was attempting to evaluate art, mathematics, technologies and worldviews, as I will explain in the following sections.

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Article Frontispiece. Meta-Phorms, selection. (© Sherban Epuré)

ART EVALUATION

To be relevant in the long run, a work must be supported by permanent intrinsic qualities that can be objectively substantiated. Birkhoff [2] attempted to quantify aesthetic worth (as follows: aesthetic value is order divided by complexity), but his formula has lost appeal because it is too disconnected from human experience. Even so, it remains a valuable working formula: to increase aesthetic value, "make order and reduce complexity!" For many, vitality is more important than "cold" aesthetics. It is better to be a poor devil but alive than beautiful but dead.

Personally, I use a method that regards art as fulfillment for the eye, the heart and the mind, or sense, emotion and spirit (this applies to both analog and digital formats). It gauges fundamental art qualities based on statistics obtained by polling many well-known artists [3]. According to this method, the intrinsic quality of a painting (and, by extension, the image) blends approximately 20 detectable attributes that contribute unevenly to the whole. If, let us say, 100 percent represents the total art quality, then seven essential attributes—sincerity of emotion, originality of concept, originality of execution, intensity, harmony and modulation of color, and sonority—must be present and contribute 42 percent of the total. Twelve are nonessential—line, volumes and light composition, correctness of drawing, poetic quality, decoration, tonal values, simplicity, sensibility, subject, perspective and pictorial matter—and can even be absent without causing much loss of quality. The 12 nonessentials contribute 43 percent; while the remaining 15 percent is awarded to the coefficient of sympathy ("I like it or I don't" is actually a subjective attitude, not a quality). The first seven attributes listed above are vital, essential, and drive the overall outcome; they are the de facto gauge of artistic quality.

MATHEMATICS AS AN ART INSTRUMENT

What can be more lasting than algorithms and equations? "Mathematics is nothing more, nothing less, than the exact part of our thinking. . . . Mathematics is an activity. It may be

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any arbitrary game one cares to dream up, and played with any object or mathematical block" [4]. It can be retraced, verified and objectively shared. Moreover, "mathematical reality (in the modern sense of the term) distinguishes itself from physical reality" as long as there is "rigor in reasoning and coherence of theory" [5]. Mathematics is therefore an independent creative mental space that invites invention. In Intrinsic Art, all graphics involved (numbers, letters, function signs) are simultaneously code and fine art initiators, for example:

37, *37* or ***37***

COMPUTER TECHNOLOGIES

The implementation of Intrinsic Art's algorithms and equations reaches, sooner or later, high levels of complexity in calculation, requiring repetitive operations and chains of abstractions and execution. Hence the need for computer technologies: hardware, software, script and peripherals. The work is computer produced and evolves in stages: linear drawing followed by shape and color redistribution. Being mathematical in nature, the linear part is program ready. But uninterrupted automation by program cannot foresee artistic fine-tuning called for unexpectedly. Therefore the script has to provide stops for nonautomatic actions following artistic evaluation, thus making the implementation a hybrid process. Instead, and to retain creative momentum, I placed side by side, on the same page, computer-executed graphs explaining the mathematical process and as many artistic alternatives obtained from it as are likely; the result is visual sentences that speak for themselves.

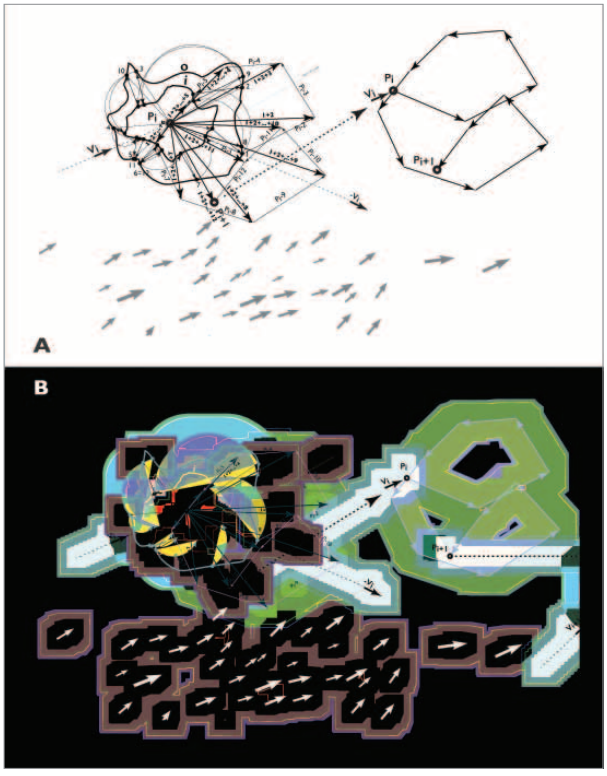

Fig. 1. Meta-Phorms: (a) The vector V_i collides with the point P_i; these coordinates mark the position in space of a potential black box endowed with correlated input, output and feedback behaviors; at each input, P_i is set into motion and assumes new positions until it reaches a stable one in P_{i+1}. Other incoming vectors then set the point in motion again and again. The entire geometrical buildup is used as the basis for further artistic development. (b) Art alternate derived from the geometries in Fig. 1a. (© Sherban Epuré)

WORLDVIEW

The use of mathematics and emphasis on perennials and fundamentals lead to an exploration beyond the relativity of the moment. It invites revisiting philosophies and scientific facts and drawing conclusions about life, which, in turn, necessarily reorient the creative choices. I was most interested in all-inclusive, nondogmatic and scientific approaches. The most rewarding answers came from the scientific coincidence between Vedic wisdom, astrophysics, quantum physics and synchronicity; how the universe writ small is but a local manifestation of the universe writ large; how invisible causes turn into visible effects: the universality, power and creativity of the mind. This is Intrinsic Art's area of interest.

I have initiated three strands of works since 1969 as parts of Intrinsic Art: Meta-Phorms, S-Bands and Protruded Sculptures. The third reunites the first two in a shared format.

The Meta-Phorm (derived from *meta* + *metaphor* + *form*) [6,7] (Article Frontispiece) is a visual representation of mathematically described behavioral interactivity used as a theme for artistic expression. A generic "story" (scenario) inspires the Intrinsic Art work, broadly described as follows: Let's imagine innumerable vectors crisscrossing space along various curvilinear trajectories. Let's also assume there are innumerable drifting points where passive "behavioral potential" exists. Vectors and points may sometimes collide. The incoming vector can be viewed as an "input cause" that will trigger a reactive behavior, or "output," in the collided point. All these participants and events are described with the mathematical models considered appropriate (algebraic, vectorial, trigonometric, geometric, cybernetic, etc.). Their parameters are random by choice or definition. The randomness accumulates at each executed step and is inherited by the next one. "Behaviors" (inputs/outputs) are developed by algorithms of one's choosing. The algorithms execute themselves by automation in steps and layers. Most often, cybernetic mechanisms are emulated. Each incremental result must comply with the artist's aesthetic expectation, message, philosophy and emotional level. If not, corrections are required immediately, because errors at one level are passed along to successive levels. The anticipated artwork will be the sum of all lines, shapes and colors used to visually describe feedbacks, loops, transformations, positional mutations and, in general, reconfigurations of space due to and following collisions. Everything translates into unexpected and intricate designs (see Fig. 1).

The S-Band [8] is an art machine intended to create a large variety of unique nonrepetitive artworks from the same method and algorithm. They derive from interactivity between the artist and geometry (as a form of cybernet-

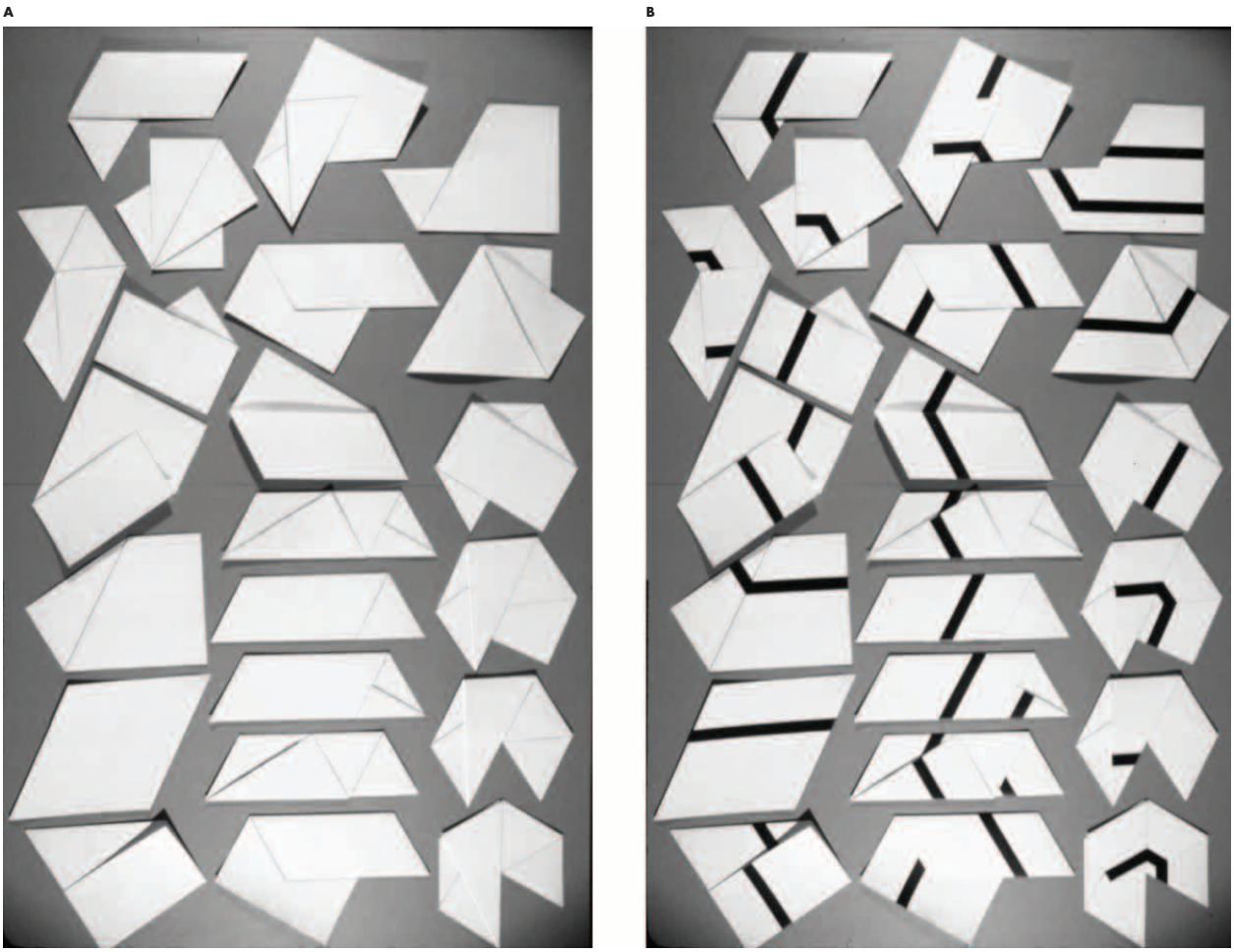

Fig. 2. S-Bands: (a) Flat sculptures created by manipulating the S-Band (carrier) only; (b) intertwined final composite art (carrier and carried art, compounded in one single obtained object). (© Sherban Epuré)

ics) and are principally suited to environmental aesthetics: wall art, paintings, indoor/outdoor installations, site-specific sculptures, design, animations, projections, etc. S-Bands are rooted in Romanian folk art, using some of its traditional modalities as inspiration for contemporary practice.

The band is a "long" two-dimensional master structure the length of which, *L,* significantly exceeds its width, *w*; it is intended to be folded while its ends on the long side typically remain loose. This ensures unpredictability of result and avoidance of symmetry, although, for some spatial S-Bands, the ends are joined together in specific ways.

The analogue S-Band is composed of two parts: a material component called the "carrier" that stands for hardware and incorporates the "software" and a "carried" visual message affixed to its sides. To avoid kitsch, the carried visuals must derive from the band's geometry.

When the material (e.g. heavy paper, metal, thick plastic, etc.) allows, the carrier may assume fixed folded positions, therefore evincing a memory of sorts provided by the material: + = folded up, — = folded backwards, o = flat or unfolded. The band symbiotically imparts its folding algorithm to the art affixed to it, and while the carrier and carried images display independent looks, once they are finally folded, they remain intertwined as one single-end composite object (Fig. 2a and b and Fig. 3). For these reasons, the S-Band may also be referred to as a machine that generates art in which software, hardware and art are simultaneous.

The creative handling of the band relies on intuition and imagination. For the artist, each work session is triggered by curiosity, i.e. anticipation of the next visual result. A working session evolves algorithmically. As in a movie, each frame builds upon the previous one while adding new elements, thus resulting in a fresh entity. Each new configuration has to be aesthetically evaluated in the context of the previous one and in anticipation of the one to follow. Therefore, the operating software is partly its geometrical structure and partly the mind, which drives the process from one step to the next.

The exchange of information between the artist and this dynamic process—leading to back-and-forth adjustments or aesthetic choices—can be looked upon as a cybernetic relationship.

The software is a geometric grid (Fig. 4) to which the physical part is accommodated. It defines the band's dimensions and divides it in successions of modules in the form of parallelograms, which, together with their diagonals, form the blueprint, or algorithm, for all subsequent folding

(Fig. 5a). Thus the modules undergo rotations, reflections, overlaps, jumps and translations. The structural condition that defines an S-Band is that the parallelograms must always be contiguous and parallel to each other.

The defining attributes of an S-Band are the angles α and θ (Fig. 4), which are connected to the other dimensions of the band in an equation with five parameters:

$$ctg\ \alpha - ctg\ \theta = L / (n \times w)$$

and $\varphi = 1/n$ is the frequency of the modules.

The parameters α, θ, L, n and w are subject to free choice (variable) until the design is decided; afterward they become embedded in the "carrier" and are transformed into what may be called *imprinted* software, making an algorithmic machine out of the band.

As a set of n modules, the band can be folded in one or several places at once. Therefore, the total number A of obtainable alternates will be the sum of all combinations made by groups of 1, 2, 3, or f (f = possible, simultaneous folds allowed by the material limitations and in various places of the band). In other words:

$$A = 6 \times (nC1 + nC2 + nC3 + \ldots nCf)$$

in which nCf designates the number C of combinations of f possible simultaneous folds with a band of n modules, and each module has two triangular submodules, each able to assume three possible positions (+1, 0, –1). Since each module provides one edge, and two diagonals along which a fold may occur, there are six folds obtainable per module (Fig. 5a).

When material limitations do not disallow folding, a module falls completely flat over its neighbor, thus forming a "flat two-dimensional sculpture" (Fig. 2a). If this is not the case, a module may remain "hanging in space," forming three-dimensional alternatives sustained by the "memory" of the band's material.

ASSESSMENT

While for the mathematician all alternates obtained in the analogue space are legitimate, this may not be true for the artist, because many may be redundant or artistically irrelevant. Even so, the number of significant results will still be very large.

Computer-generated S-Bands are the replication of material alternates in electronic format. The digital transfer (replication) always preserves the condition in which the structures remain S-Band, i.e. contiguity and parallelism of the modules. On the other hand, in the digital format the modules lose their material attachments (Fig. 5b); they become independent units. Thus the band can be explored as a complex combinatorial object and the number of obtained alternates becomes infinite.

Protruded Sculptures

Both S-Bands and Meta-Phorms are visual messages; they are communicated with the help of redundant sustainers. However, if at the receiving side we retain the redundant part as a standalone artistic entity and display it alongside the

Fig. 3. S-Bands in preparation for the Edinburgh Festival, 1970, <www.demarco-archive.ac.uk>. (© Sherban Epuré)

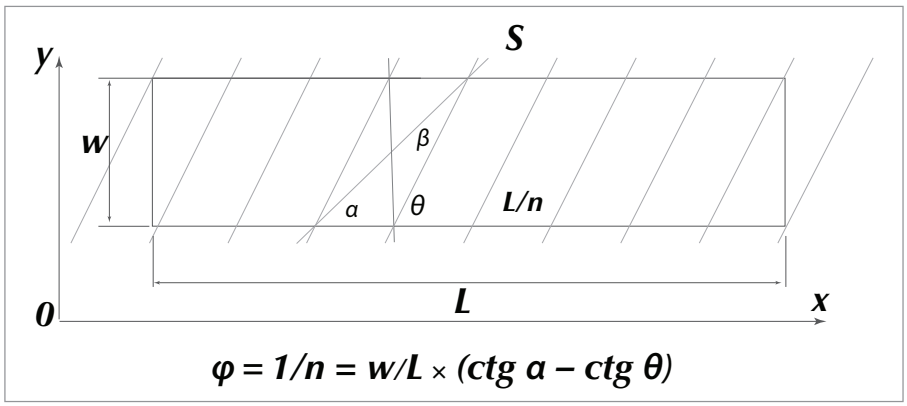

Fig. 4. S-Band geometry. (© Sherban Epuré)

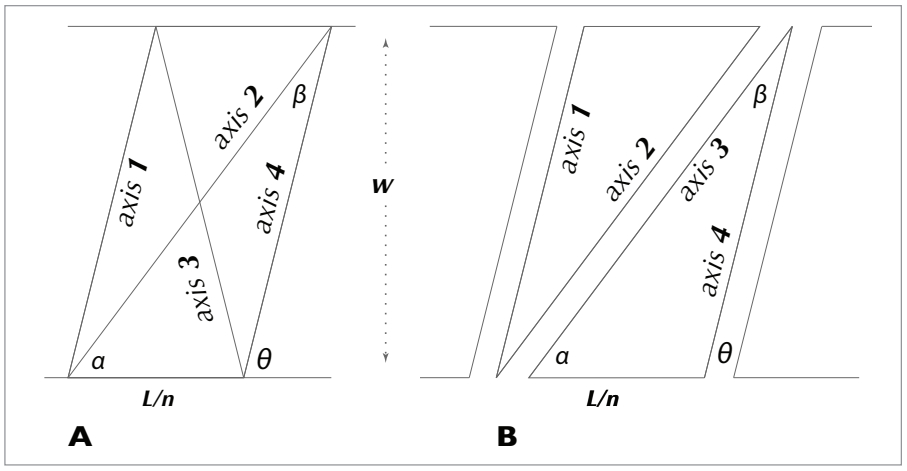

Fig. 5. (a) Analogue S-Bands, with material limitations, and (b) digital S-Bands, without material limitations. (© Sherban Epuré)

main message, a three-dimensional structure can be achieved (Color Plate B). Through comparison and differentiation, the entire process turns into a more complex experience. Since Intrinsic Art is an inclusive platform for all its developments, the protruded sculpture is its stylistic unifier.

SOME HISTORICAL CONTEXT

Beginning in 1968, during a short period of liberalization, experiments compatible with contemporary European art took place in Romania. Artists in this period included Bertalan, Bitzan, Grigorescu, Nadin, Neagu, Pavel, the Timisoara School, myself and others. In this context the French art critic Jacques Lonchampt suggested that I show my work to Frank Malina, publisher of *Leonardo,* one of the few persons in the world genuinely interested in promoting art-science relationships.

Acknowledgment

I wish to acknowledge Letitzia Bucur for her contributions to the Intrinsic Art project over a 40-year period, in personal time and opinions on art—a rare artistic collaboration.

References and Notes

1 Martin Gardiner, American recreational mathematician (1914–2010).

2 George David Birkhoff (1884–1944), *Aesthetic Measure* (Harvard University Press, 1933).

3 Armand Drouant, *Traité de la Peinture* (Pierre Cailler, Gènève, 1960) pp. 17–134.

4 Michael Holt, *Mathematics in Art* (London, Studio Vista, New York, Van Nostrand Reinhold Co. 1971) p. 83, on Dutch topologist Luitzen Egbertus Jan Brouwer (1881–1966).

5 Georges Ifrah, *Histoire, Universelle des Chiffres, L'intelligence des homes racontée par les nombres et le calcul.* (Paris, France, Éditions Robert Laffont, 1981, 1994) Vol. 2, p. 69.

6 See also Sherban Epuré, "An Artist's Journey in Art and Science: From behind the Iron Court to Present-Day America," *Leonardo* 39, No. 5, pp. 402–409 and p. 436 (2006).

7 See <http://sherban-epure.com/Meta-Phorms-A/Home.html>.

8 See <http://sherban-epure.com/S-Bands-A/Home.html>.

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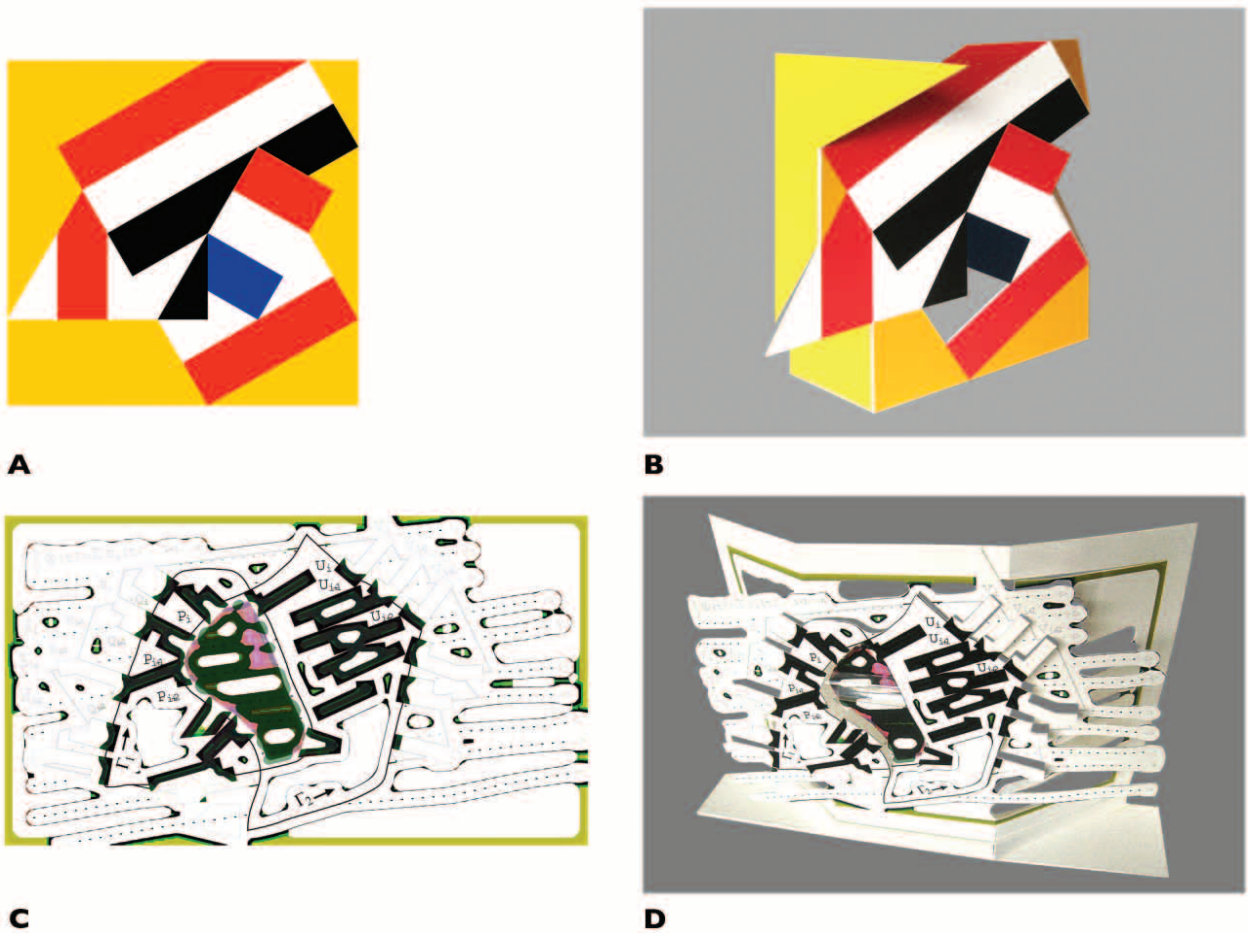
SHERBAN EPURÉ *is a Romanian-born American artist, trained in painting and electronics, who emigrated to New York in 1980. He creates images representing cybernetic interactions. Epuré has exhibited in many venues; he lectures and writes to promote the application of science to art.*

COLOR PLATE B: **INTRINSIC ART**



Examples of Sherban Epuré's three strands of works as parts of Intrinsic Art: S-Bands, Meta-Phorms and Protruded Sculptures. The third reunites the first two in a shared format. S-Bands: (a) flat and (b) protruded; Meta-Phorms: (c) flat and (d) protruded. (© Sherban Epuré) (See article in this issue by Sherban Epuré.)