

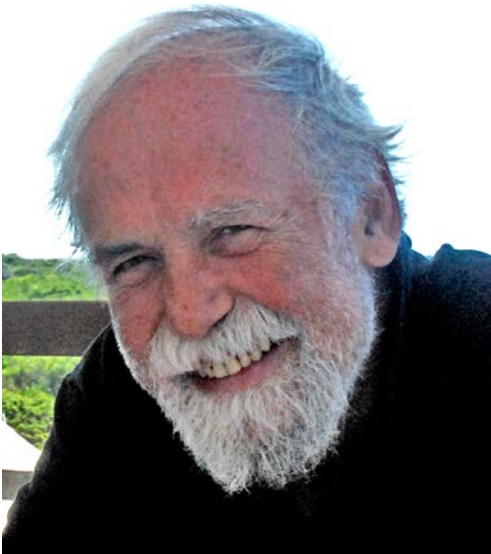
Generative Art & Design. Visionary Algorithms for a Natural Complexity

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Premise

Generative Art, a field defined by a precise creative approach, has in the last two decades become synonymous with digital art. And this has been greatly augmented by the emergence of NFTs that presuppose the creation of digital events that are all different but identifiable in a recognizable collection. This is a definition that echoes that of Generative Art.

With this paper, I would like to clarify the identity of Generative Art not as a

technique but as a creative logic that cannot be associated with specific technologies.

GENERATIVE ART
NOT TECHNIQUE | BUT CREATIVE LOGIC

Generative Art can use a variety of tools, including non-digital tools, but it is strongly characterized by the creative logic of creating artificial species. In this paper, I would like to focus on the use of Artificial Intelligence, which is the tool I have developed in my creative history, and I would like to clarify the possible role of AI in the artistic approach.

Emerging issues in Generative Art are:

1. How to support creativity with AI.
2. How to succeed in being creative by managing complexity, understood as a Nature-like system.
3. How to generate results that have the character of uniqueness and complexity but that reflect the artistic approach, i.e., tell an idea, a recognizable vision that belongs to an author's identity.

Creativity and Artificial Intelligence

First, it should be clarified that AI cannot be creative by itself. Creativity can only belong to the person who wrote the software. The AI system can implement the author's creative ability, so it can be a tool that supports the author in his ability to create. Specifically, the ability to generate, in parallel, multiple and different events as are, in Nature, individuals of the same species.

HUMAN BEINGS

with AI:

- 1 - INCREASE CREATIVITY
- 2 - RESULTS → COLLECTION OF RESULTS
LIKE SPECIES IN NATURE

It needs to be clarified how, at the base, this is achieved, whether through randomness to generate forms or by building and structuring a possible vision that is intended to be achieved in the results. In the latter case, randomness is confined to creating an occasion to activate the author's vision.

It is indeed possible to use randomness in such a way as to have results that may even be surprising, but this should not be confused with creativity, which, as in the case of architecture, design, art, and music, involves imagining a system of events that are topologically connected in a way that fits the expression of one's poetics.

Randomness can be used only as an emulation of the unexpected

The random factor, then, can only be used when choosing between parallel processes already structured as possible alternatives, each of which still represents a facet of one's poetics.

Technically, the random-based process and the creative process may seem

similar even in possible outcomes. But while the former does not express poetics, the latter does, and it is, precisely because of this identity each result is strongly recognizable as an artistic expression of an author.

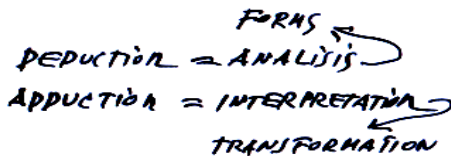
RANDOM → SURPRISING
CREATIVITY → POETIC

In the case of the use of AI, where does the subjectivity of the author and thus the ability to produce creative and recognizable events intervene? Certainly not only in the basic AI system but also and especially in the database that is used to build, in progress, the identity of the system, its singularity.

In the case of my Argenia software, this database is not a collection of data but of algorithms. Moreover, this collection is always growing and is essentially composed of "memories" arising from years of creative design work. These memories are not forms used in previous projects but geometric logics of progressive transformations used to generate multiple forms, always different but strongly characterized by my recognizable poetics.

In Argenia, therefore, the database of singularity is formed by a collection of strongly characterized geometric transformations: geometric algorithms, which constitute a universe of options, among themselves different and sometimes conflicting. These algorithms represent my design history and creative identity. They are visionary algorithms. They do not define a form but how a possible geometric input could be transformed. It may be used at any point in the creative process. It is transformed to increase its specific character. It performs the responsiveness to the idea not yet made explicit in a final form.

Whenever I start a new project, I often add some new algorithmic event to the previous transformation logic. Adding it does not mean using it directly but inserting it into the sea of already existing and operational options. This insertion enables it to be used in the progressive logic adopted by Argenia. Argenia's logic is based on the framework of geometric transformation algorithms themselves, visionary algorithms, which have an additional option over shapes. While the forms are alternatives one to the other, the transformations can act in succession, layered in parallel, and contaminated with existing or forthcoming transformation logic.



Thus it is always possible to reach a further level of complexity that increases the recognizability of the results. It is possible to verify this if we read the difference in the level of complexity between the first generative projects I developed in the 1980s and the current ones.

Complexity and the reference to Nature.

Complexity is one of the goals that I have set for myself from the beginning and that has Nature as its main reference, but also the complexity in progress of some "historical" cities that, while maintaining their specificity and recognizability, have increased over time, managing to transform each new event into a further

representation of their identity.

Generative Art tends to achieve a complexity of a natural kind. So it happens in Nature where external events, even traumatic ones, collaborate to increase species and individual recognizability. The clearest example is the olive tree, which the more it is scrambled by the wind, the more it acquires the recognizable appearance of an olive tree, increasing, in addition, its recognizability and individual uniqueness. The complexity achievable through the generative approach does not tend to reduce the recognizability of the idea but tends to strengthen it. This is the role of the AI generative system.

Wind and forms are random and unexpected. The random parameter to simulate environmental unpredictability can be, as in Argenia, a progressive parameter number representing time. And it is, like time, always different.

Argenia's ambition is to emulate Nature. The fundamental contribution is made by a parameter representing time, as is also the case in historic cities. Indeed, it is not possible to represent a historic city by design except through a path of temporal growth. The experiments of Piranesi, who layered successive creative actions in the same plates over time, are very instructive in this. The search for (natural) complexity can only happen through time and the operational memorization of the transformation logic adopted in the past. In my case, the visionary algorithms reflect more than fifty years of generative design work, which began already as a student during the last works developed at the Faculty of Architecture in Rome in the 1960s..

The Idea of Species and the Topological Paradigm.

Emulating natural complexity in the creation of artificial events has always been one of my design goals. The most difficult aspect has been to imagine this complexity as an open category (it can't be otherwise) that embraces all possible events that match the character sought. It means defining a process that can generate them all within the boundary of recognizability of the character sought, the recognizability of my poetics. In other words inside the recognizability of an evolving species, as in Nature.

The imagining of these categories, not yet associated with a form, is the starting point of Generative Art. The way I chose was to describe the idea of a species and its possible evolutions by identifying an open, fractalized structure, a paradigm that traced in progress its topological characters. A dynamic paradigm that would define the rules of its possible evolutions while maintaining the distinctive characteristics of the idea.

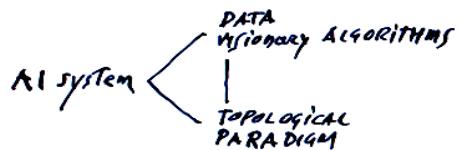
The rules of this idea-paradigm, then, define only the vision of the possible traced through the relations between the parts and not their respective possible forms. The theoretical and operational reference is the essential structure of creativity as defined by Poincaré: to create is to define visions of new possible relations between existing events, without entering into the merits of their respective forms. The concept of interchangeability of forms within the same idea and its recognizability enters strongly into the logical structure of my generative approach.

The dynamic structure of this topological paradigm is similar to a logical fractal. Indeed, it is about maintaining the recognizability of the idea from the total down to the details that have not yet been outlined. My idea for architecture has always been to use the same

creative logic from the door handles down to the overall volume arrangement. For example, going into a building the identity might be being able to know the location of the stairs from the door configuration.

The components of a generative project

We thus come to identify the three components of a generative project as Argenia: the AI engine, the database of visionary transformation algorithms that represent the singularity of the generative process, and the starting idea of each generative project realized through a topological and dynamic paradigm.



The latter, which can also arise from the topological interpretation of an existing event, including a natural one, is the human contribution to each generative process, is the creative idea, and cannot be realized by the machine.

Given the human aspect of the formulation of the idea and the in-progress construction of the logic of transformation, one would think that the AI body would be greatly reduced in both size and function. Nothing could be more false. The structure of AI is the result of a dynamic representation of the design process realized through its compositional logic. This structure is a highly subjective system that is capable of navigating the labyrinth of transformational logic, of visionary algorithms that tell a way of seeing the

possible. The system is configured as a topological ship, a highly discontinuous and nonlinear system that maintains the direction of the recognizability of the poetic matrix despite the possible and unpredictable layering of events.

Each navigation is always an exciting adventure leading to surprising results but all are characterized by the recognizability of species, thus the recognizability of the author's vision.

Above all, year after year, the use of this AI structure leads to results whose complexity turns out to be more and more natural, as are the events that have lived through time and now while being current, preserve the traces of their history.

Transformations and Forms, Copying and Interpretation, Deduction and Adduction.

The power of transformation and topological logic over the direct reference to forms has undoubted advantages. For example, it is not possible to "copy" a design but only to interpret it. The act of interpretation occurs precisely when a reference is taken into consideration and a possible logical transformation is adduced that can generate the required character. This is an operation that is never deductive, and in fact cannot be because within the interpretive process the nodal element is the discontinuity, the logical jump between the topological arrangement of the reference and its interpretation.

Even the evolution of a project is the result of the progressive interpretation of the topological paradigm and the endogenous processes of discontinuity in the system. This is made possible by the fact that transformation logics are, by

nature, freely associative generating results that are nonlinear but capable of representing one of the facets of one's vision.

The 3-D scenarios generated by Argenia in recent years have so increased the processes of contamination of progressive transformation logics that, unlike the first generative experiments of the 1980s, the resulting complexity is not at all decipherable through analytical readings operated a posteriori on the generated model but is only assessable in terms of identity and recognizability achieved.

The complexity of these scenarios is thus decipherable as "artificial naturalness," and this was my goal from the beginning of this work..

The functional aspects and the multiplicity of possible design themes

The basic AI system in Argenia is thus not creative by itself. This system operates by systematizing the possible use of logical transformations as they are progressively created and structured in a database of visionary algorithms suited to progressively increase the singularity and uniqueness of the results.

The "functions" that are identified for each logical transformation are abstract functions: how it ends, how it folds, how to divide, etc., and are not related to specific shapes or dimensions but only to the relationship between the various elements considered. The symbolic function is naturally made explicit by the topological relationship with other events, and the aesthetic function is due to the progressive contamination and layering of the transformations made, each of which carries with it the underlying

poetics.

With Argenia it is possible to generate very different events, from architecture to cities, from objects such as chairs to three-dimensional portraits, from fantastic animals to jewelry, artificial flowers, etc. This is due, fundamentally, to the idea that is made explicit in a topological paradigm that abstractly tells the symbolic structure of the event that can then be filled with functional connotations. But also by the construction of geometric transformation logic created following specific visions. The surprising and exciting fact is that these transformation logics do not remain confined to the generation of the same specific object, in the specific function that was the occasion of their creation. These logics expand using the specifics of Argenia's structure and are used, often in contamination with existing others, to generate events at another scale and with different functions. This is possible because of the formal neutrality of the logic included in the singularity creation database. For this reason, I like to identify them as visionary.

Conclusion

In conclusion, Argenia is not a creative software but enhances the creativity of its user. Subjective creativity is explicit not only in the design logic adopted to create the AI system but especially in the initial topological paradigm that characterizes each generative project and in the progressive increase of data algorithms of visionary transformations that build the singularity of the system over time.

Argenia, focusing on my generative approach, is the active and progressive memory of my design creativity, capable of generating new and unpredictable variations of each of my design ideas

stored with a topological paradigm open to the possible.

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