

## Alive Codeness

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### Abstract

*A Vision identifies how to transform the existent, the past into the future. It can be born, like in Renaissance, only from a deep knowledge of human cultural heritage in Art and Science. This knowledge allows us in setting up the rules for shaping the future. Leonardo da Vinci teaches at the best this need to define a code before defining a result, a solution.*

Generative Art refers to this cultural heritage. Generative Art works with transformation rules and not with solutions, as forms.

*Generative Art, as my Argenia soft, defines Alive Codeness. Following a Logical Interpretation of Nature and of great Masters of the Past, I designed a set of rules able of managing the transformations inside creative process. The Alive Codeness, as "artificial DNA", defines a Vision identifiable as poetics. Poetics is the summa of Visions. The result is the generation of endless Variations.*

**# Metodology:** *the creative path is a not-linear sequence of moments of discovery. It is based on a starting moment, not very important for the final recognizability of the own poetic result but important for the individual identity among variations. The discovering path is the flow of subsequent answers to upcoming needs coming from the artist's Vision. Each answer is shaped with the use of transformation rules, strongly linked to the Vision, applied to the precedents.*

**# The starting point of transformations** *is the topological paradigm drawn as catalyst, where the set of transformation rules, the artificial DNA, performing Alive Codeness, will operate.*

**# Complexity** *is the main character of generative processes. It is the result of stratifications, contaminations and iterations that happened during the discovering path. In Argenia the approach to complexity refers mainly to Nature: the complexity of an olive tree comes from its DNA that is able to manage transformations facing different unpredictable events like storms and rain and increasing, with these transforming acts, its uniqueness and recognizability as individual and as species. In imitation of nature I am referring to Baroc for transforming and fractal geometries, to Piranesi for stratification of meanings and perspective points of view and to Gaudi' for complex events like movies of dynamic transformations.*

**# Identity and recognizability** *must be the main characters of generative artworks. There is a strong relationship between a well-identified Vision and the necessary*

*generation of Variations. Identity is defined in the type of path to increase complexity, in the character of the synthesis and in the recognizability of each different variation.*

## **Recognizable Visions**

Vision is the expression of how each artist manages his creative process. : Kandinski, Picasso, Van Gogh, Borromini and Gaudì are recognizable artists and architects. If you look at one of the artworks of Kandinski, Picasso, Van Gogh, Borromini or Gaudì you will identify it as belonging to their own Vision, also if you never have seen the particular artwork that you are looking to.

When visiting cities and architectures and looking at objects and artworks, people appreciate and easily remember their impression, that is their interpretation of the artist vision. People don't remember forms, but Ideas.

Many architects or artists made wonderful artworks and architectures. They reached the beauty but their works are not recognizable as belonging to a vision. May be that they refers only to a collective style or cultural moment or to a fashion moment. But this is not enough. Each person has subjective needs and he likes to identify, interpret and interact with recognizable subjective Visions. If not, it's boring.

## **Designing own vision with generative approach**

My generative approach was ever focused in identifying how this recognizability, how each vision can be expressed in creative processes. Starting from my first generative work, Basilica. It was the software I designed in 1987 to generate endless 3D models of Medieval Italian towns, all different and unpredictable but all recognizable as belonging to this strong cultural identity. But also they are expression of my interpretation of Italian Cultural Heritage. It is not a case that I used, for setting up the transformation rules used in this software, the Giotto frescos and not only the existent medieval towns. Giotto Vision is strongly significant about the identity of these cities than reality. Subjective interpretations are more rich and complex than objective data. Staring from artworks it's possible to go ahead with subsequent interpretation of artist's visions as Picasso made with Velasques, because the Past, the precedents and their interpretations are necessary for reaching complexity.

The following versions of Basilica and Argenia, my subsequent generative software, were written increasing the complexity of their generative engines: each new design occasion was important for creating new interpretation of my cultural heritage, new possible transformation rules linked to my Vision. Now, after 20 years of subsequent increasing complexity made with my subsequent interpretation of Nature and of our Cultural heritage made in different moments, with different moods and facing different needs, my generative Soft reached an unpredictable strenght. It has, inside, the memory of how I interpreted each different architectural project. These codes help to face new projects because they have found, after the contingent use, further roles for increasing the complexity of my architectural Vision and of my architectures. When I work in different contexts of different Cities Identity, I can set up the software tuning the code to my interpretation of the context, performing new tranformation rules if necessary and changing a bit the role of existing rules. The aim is to consider the Identities as the main quality of natural and artificial environment: Identities can be stratified through the design process without loosing them. More, architectural variations coming from subjective interpretations of a peculiar city could increase the

recognizability of its cultural identity.

I verified this possibility in all my generative architectures, from Los Angeles to Chicago, from Rome to Hong Kong, from Washington D.C. to Shanghai.

With my last software I tried to enlarge this generative approach to other designers by creating the possibility to write and develop the own vision.

### **How a Vision can be transferred into a design rule**

Vision is how to approach to existing environment for creating incoming scenarios. The vision of upcoming events can exist only if we refer to the existing events, to our past with the knowledge of our cultural heritage.

Following our interpretation of human cultural heritage in the fields of Art and Science, we can design some rules able to be applied for shaping the future. Leonardo da Vinci teaches at the best this need to define a code before defining a result, a solution. Generative Art refers to the cultural heritage of Italian Renaissance. It works with transformation rules, with codes, and not with the form of the result.

Doing that, Generative approach can define a Vision, it can identify a Poetics



*Renaissance approach to Codeness.*

*In these pages, Leonardo da Vinci, identifies a code from multiple variations of how the water transforms its own form when flowing.*

### **New, Beautiful and poetics**

When people design an object often people search for something "new", for an unusual shape, looking for a new form in fashion-magazines or in unpredictable random events. This is not a generative approach. And this is neither a creative approach, it is only the typical approach of buyers.

*Generative approach, interpreting at the best the creativity, defines a new approach on how to transform forms.* Every form is good as starting point of subsequent transformations but it cannot enter in the final result(s). I identify this starting form as "catalyst": it helps to run properly the transforming path, by using subjective transforming rules, but it cannot enter in the final result, as the catalyst in chemistry. Catalyst can be the copy of something that exists; the copy, the false in front of the truth, but after the generative transformation process, the result forgot the used forms: if the creative process will be successful, *it will be the truth.*

If we use forms without transforming them with our logics and our Poetics, we can reach to something "new" and "beautiful", as happens when we look for the emerging forms in random processes, but these forms will be not recognizable as belonging to an artist. With this approach we forgive our identity. No one will identify

a Vision in these "random" results. They will be "mechanical". Only stuff. We cannot identify the Generative Art as the Art of Buyers, waiting for the random emergence of unexpected and beautiful forms. We can reach only approximately to what is not enough for Art.

### **Argenia, from Forms to Transforming Rules**

*Argenia*, my generative software, utilizes forms only as starting point. At first each generative project, architecture, object or artwork, is defined as paradigm of organization of incoming possible events: as organic system of relationships, not as a form/solution.

This paradigm defines a dynamic topology. The form of the starting events is not important. It's important the identification of their character and of their mutual relationships. In my last *Argenia*, it's possible to identify and define the catalysts (the starting forms for each event), the functional / symbolic / aesthetic character of each event and the rules to be used in transformation processes.

Results will appear after subsequent transformations that happen several times in each event and in the whole system. The rules used for developing the system are a set of logics strongly representing the subjective vision, the identity of the designer.

At the end we can easily identify that the starting forms are not so important to construct the design character like the transforming rules. As normally happens with fractal subsequent processes. So I can say that the set of subjective transforming rules are the operative representation of the artificial DNA of each designer. This is my *Alive Codeness*.

(With my last generative software *Argenia*, opened to different designers, each designer can create his peculiar artificial DNA. I have not yet published a commercial version of *Argenia*. My aim is to use this software in "*Domus Argenia*" the international research centre about Generative Art that we are establishing in Sardinia whose activity is starting from next summer)

### **Generative Art is a Philosophy**

If Generative Art is to design a creative process, to define its peculiarity, identity and recognizability, to set up the generative rules for getting (from 2D-3D-physical and more) scenarios belonging to desired characters and to construct a software as dynamic not-linear system able to generate unpredictable but recognizable endless results. If so Generative Art is, in other words, to discover and design the own poetics: as a philosophy of a creative process.

As a philosophy, Generative Art can define a very useful way to teach design because *it can identify some logics of a creative approach*. Therefore I discovered that, starting from the creation of my first generative software, my teaching activities in the topic of Architectural Design and Industrial Design improved clarity and ability to involve my students. This because the aim was to help students to identify and create in progress their own vision by running on generative creative paths.

I learned that it's possible to teach "how" to interpret their own cultural identity, the surrounding environment and Nature for tracing a vision and generating incoming future scenarios. My last teaching experience was with Enrica Colabella, last August, a travel-workshop around China for teaching to the students of Hong Kong Polytechnic University how to use their Chinese Cultural Heritage for designing the

objects of the future. Following our generative art process.

Architectural and Industrial Design teaching, using Generative approach, could be more full of significance for upcoming architects and designers than the teaching of functional analytical approach.

### **Complexity and Quality**

Complexity is the main character of generative processes. Generative Art shows its power only through complexity because Generative Artworks are processes of self and resonance iteration of logics and complexity is the result of a "long" and repeated not-linear process.

Although beauty can be reached soon, poetics needs an increasing complexity path, using subsequent transforming logics. Only when we define "how" to apply, for example, the golden-rectangle relationship we can define our poetics.

We can reach beauty in two ways. Soon with an existing form or with a minimalist approach: also a natural stone could be used as paperweight. But, in this case, the identification of a vision will be impossible. This quality can be reached only with an increasing complexity process. We need a very long path for arriving to a result, also a "simple" result, where forms are not simplified but distilled into a full-of-sense event. Simplified results, like common results of our era, are not more acceptable.

Full-of-sense results are complex results where we can identify a poetics. And where we can find and identify our possible interpretation of future. Complexity, as endless meanings, defines the best quality that we can reach in the contemporary: the possibility to give focused answers to different unpredictable requests of each-different unpredictable customers.

Simplified architectures had got their time in the last century. They destroyed the cities identity, especially in the surroundings, where equal repeated simplified architectures have constructed new towns and new districts.

We need Baroc approach in our time. We need complexity. We cannot ever more accept minimalism if this is associated with simplification, with no-project, with repetition of all equal, with the obsolete legend of optimization. But we cannot appreciate complexity if it is created with random approach. It's boring. At the best it can be only a decoration.

### **Generative approach and Cities Identity.**

With Generative approach we could support the increasing identity and uniqueness of each city, discovering its poetics, its peculiar vision that we can call its "ideal city". When we have identified this "ideal city", or, better, one of possible interpretation of it by defining a code, an artificial DNA, as its unique way to look at future, we could use this code for the incoming transformations and for managing its increasing complexity.

Architects, by designing many different architectures identified by different recognizable visions of the same "ideal city", can give to each citizen the possibility to mirror themselves in the increasing complexity of their environment, in the multiplicity of possible interpretations of their city, of their cultural heritage represented by the city variations.

My research work is in this direction. I discovered that the transformation rules could be contaminated, increasing their strenght, with the identity of each city. Sometimes

only little contaminations a minimal variation of parameters, could represent own interpretation of the identity of a particular city. Identity of architect and identity of environment are not one versus the other. The best way to get complexity, and to get quality answering to different unpredictable requests of customers, is working by stratifying different identities, even their contamination.

Particularly the complexity is the common table to put together new and ancient. The time patina of ancient architecture came from having lived through different cultural moments and from being contaminated, like happened in Italy. This gave to these ancient architectures the power to have a beauty without-time but in harmony with the flow from past to future. The Piranesi's engravings, representing ruins of classic Roman architectures and their subsequent transformations during the time give us the knowledge of how the time patina is strongly linked to complexity, beauty and recognizable identity.

In my Argenia software I tried to run an increasing complexity path similar to the natural time path of ancient environments. This using stratification of meanings and characters, contaminations of different creative moments, subsequent transformations following subsequent aims, multiple references, also contradictory reference in paradigms and transforming rules. Like Baroc. Or, that's similar, like Nature.

### **Vision generates Variations**

The recognizable Identity of each possible result is the identity of a species of results. There is a strong relationship between a well-identified vision and the necessary generation of multiple variations. A set of variations identifies better a vision than only single results. Variations, like in the history of music, from Bach to Jazz, are strictly linked to a recognizable creativity.

Generative software is like a DNA of a species of possible results. In my Argenia, the variations spring from unpredictable contamination among different transformation engines working together. Contaminations define the identity of each unique result; Logical Transformation Rules define the Vision.

Technically, in my generative software, individuals are defined by the time when the software begins to run. This clock, ever different, defines different speeds of parallel transformation sequences, it creates unpredictable contaminations.

### **Questions regarding the structure of Argenia, my generative software.**

Argenia is my representation of the design logics as path of discovery: a complex non-linear system where many different codes work together. The transformations are controlled by a paradigm that is a topologic system of relationships.

#### **A.Methodology**

*A.1.My approach to design.* I consider the design path as a not-linear sequence of subsequent discovering moments. It is based on a starting moment, not very important for the final quality and for the identity of species, but important for the uniqueness of each result among multiple variations. The path of discovery is developed through the utilization of subsequent transformations strongly linked to the subsequent requests of the client and of my vision, but which results are unpredictable because of unpredictable reciprocal contaminations. The possibility to

have many different alternatives during this process is important because quality springs from creative freedom that is to be free from "only one possibility" when the development process is going ahead.

## B. Topology and Character

B.1. *The use of a paradigm.* In each generative project the definition of the topologic system and of the characterization system is normally not "generative" but is one of the inputs for "generating" variations. Argenia can also generate paradigms using Cellular Automata, but this possibility cannot easily be used if we need to fit exactly the needs of the customer.

B.2. *The paradigm* doesn't define the results but is the creative representation of the system of customer's requests, of their mutual relationships and of functional, aesthetical and symbolic aims. With the paradigms the aims are transformed in an open system of constrains. Constrains don't limit the generation possibilities; they don't fix only one character by destroying the alternatives. Better, constrains increase the number of variations. If the constrains are a lot, the generative system has more matter to explicate and represent its peculiar characted and uniqueness. Constrains are requests and each request asks to the generative path to work for answering, by increasing the complexity of results and, together, increasing the possibility to follow and recognize a Vision.

B.3. *In Argenia* there are two sectors of open system of constrains: the topological, that is the orientation of events and the definition of point of congruence among events, and the field of "open" functions, that is the definition of the role of each event in the global system of the project. Each "open" function defines that an event must have, for example, the role of an "end", like the dome in a space, or the role of "connection able to manage a corner", or the role of "organizing the division", and so on. This constrain asks to the design generation process to use, one after the other, different sets of codes of transformation that are written for managing "how" the event ends, fold itself, is divided, and so on.

## C. Identity

C.1. *The management of the identity of my Vision in the **complexity of details*** is the design of the codes of transformation to be used in all the generative projects because they interpret, in a subjective recognizable way, how each event can manage the design needs. That is, for example, how an event folds itself, how the end of the object could be created, how an event divide itself for creating a sequence of events like windows or columns, how an event could manage the relationship with the ground, and so on. The approach is similar also in a simple generative work for drawing 2D scribbles: how the drawing line fold itself facing the surrounding events, and so on.

C.2. *The management of the identity of my Vision in the **synthesis of the total image of possible different results*** is the design of the codes of transformation to be used for transforming the global system or a significant part of it. These rules define the character of the geometrical system keeping active the topological geometry of each part and their relationships.

C.3. *The management of the **identity of each variation*** works as in Nature, where individual identity doesn't overcome the species identity but, where the difference among individuals increases the identity of species.

C.4. *The management of the **identity of the context** (city for architectures or/and brand for product design)* is the definition of "new" transforming rules focused on each peculiar project by considering the identity of different cities, of different brands, if the project is focused on an industrial design production, or other identities belonging to the market. This management works with little changes of some parameters in the algorithms representing structural transforming rules. Little variations of parameters inside the transforming rules work as "fly effect" in complex dynamic systems. This can change, or better increase, the identity of the results by arriving to represent, in each possible variation, my subjective interpretation of different city identities. I have done that in the exhibitions of my generative architectures where I verified this result by asking to each visitor in which visionary image of architectures he has found the increasing Identity. I.e. regarding architectural future scenarios of Hong Kong, by asking in which one HK seems more HK than before.

#### **D. Complexity**

The philosophy of Generative Art identifies how to design complex systems. In Argenia this aim is reached with three approaches, everyone belonging to the Nature. The first one refers to Baroc, mainly to Borromini; the second refers to Piranesi, the third to Gaudì architectures. Piranesi, Borromini and Gaudì are my masters, my main references for Generative Art.

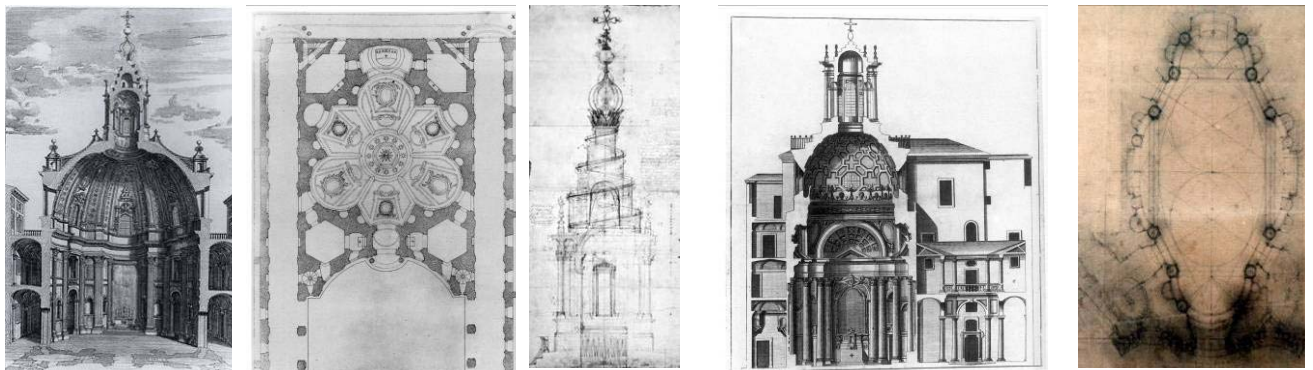
D.1. *Baroc complexity.* Referring to Baroc and, first, to Borromini we can interpret these architectures like the result of a generative process. The paradigm was based on the use of "new" geometries, as a rectangle, a double square, in Saint Carlino and the equilateral triangle in Sant'ivo, that no one used before in the same way. The system of increasing complexity refer to the knowledge and use of classical architecture heritage but, using these unusual geometric paradigms, results are unpredictable and, in the meantime, unique and strongly recognizable. More, the Baroc approach to complexity uses fractal sequences. The omothetic symmetries support the increasing complexity path through detail not by enlarging to the subjective multiplicity of different stonemasons as in Gothic but by using the scaled similarity as in fractal images. In Argenia I used all these possibilities and I like to consider my architecture as Baroc new generative architecture.

D.2. *Piranesi complexity.* When Piranesi have done his more famous engraves, the "carceri d'invenzione" he used the possibility to stratify, one after the other, different moment of interpretation of these visionary environments by drawing again in the same engraved plate. This different-in-time stratifications was realized not only with increasing details and events one over the previous one but, and this is really interesting, also changing the point of view of the perspective system of representation. In Argenia I used this increasing complexity path. Transformation events can be easily stratified, by using the codes of transformation one after the other. This process is impossible if we use forms because we cannot stratify forms. But in generative approach, using transformations, we can stratify all the process by

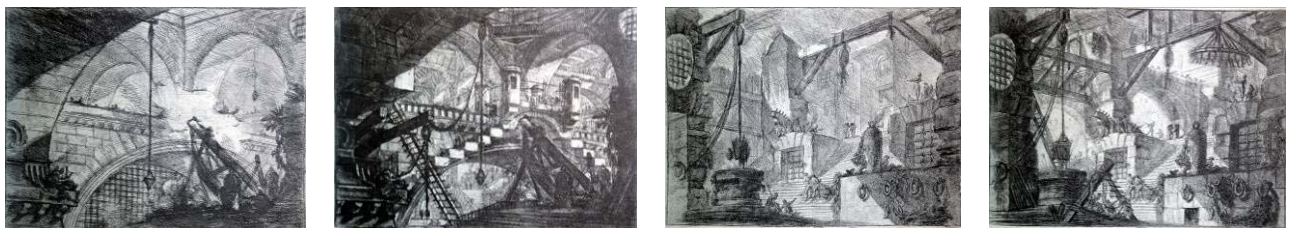


keeping alive the character of each transformation. This is the more interesting process of increasing complexity because it belongs exactly to a generative process and cannot be done if the process is different. Following this important reference I tried to go ahead with this process inside some Piranesi's engravings. (See images)

*D.3.Gaudi complexity.* It was the more complex way to gain complexity, also because this complexity comes directly from a strong creative activity. The complex geometries of Gaudì are the result of contaminations among "structural" geometries like the chain geometry ("catenaria") and dynamic transformations of subsequent sections where each point can run its particular transforming path. In my generative approach singular algorithms managing different entities of the same system easily represented this increasing complexity system. In Argenia these contaminations, that are the main engine of my interpretation of Gaudi' reference, were managed in an unpredictable way by running the different parallel codes of geometrical transformation all together. Results are unpredictable but not random. And I like to think that results belong to my recognizable Vision.



*Borromini, Original Borromini drawings of Sant'Ivo with the triangle geometry of the space and its helical lantern; Saint Carlino, with the double square geometry transformed in ellipse.*

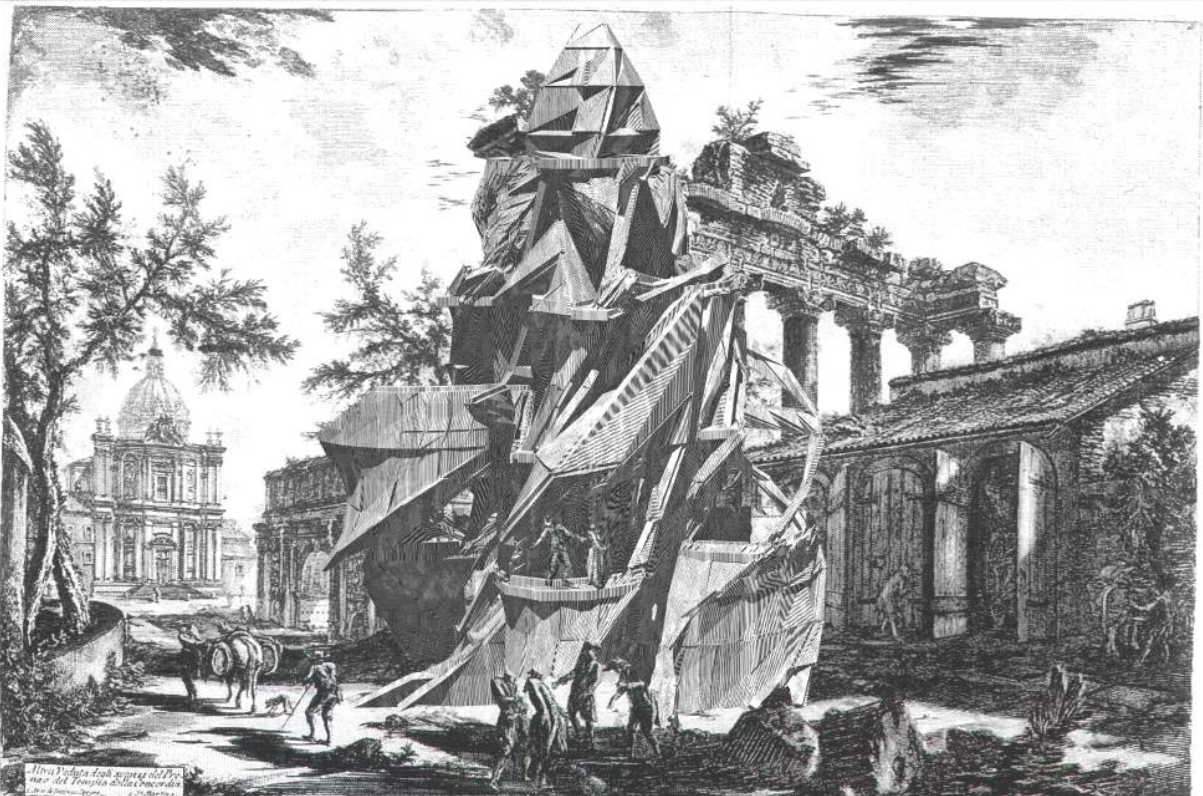


*G.B.Piranesi, the "carceri d'invenzione" engravings. The first artwork and his subsequent increasing complexity in two of his more famous engravings.*



*The original engravings of Piranesi.*

*The "Babel Tower", generated architecture using helical codes from Borromini and The Piranesi increasing complexity. C.Soddu, 2008  
In the image the Variation #1*





*"The Babel Tower", This generative project was made generating 50 different unique Variations. The artworks were given to the 50 participants of GA2008 as gift of Celestino Soddu. In the image 15 variations.*

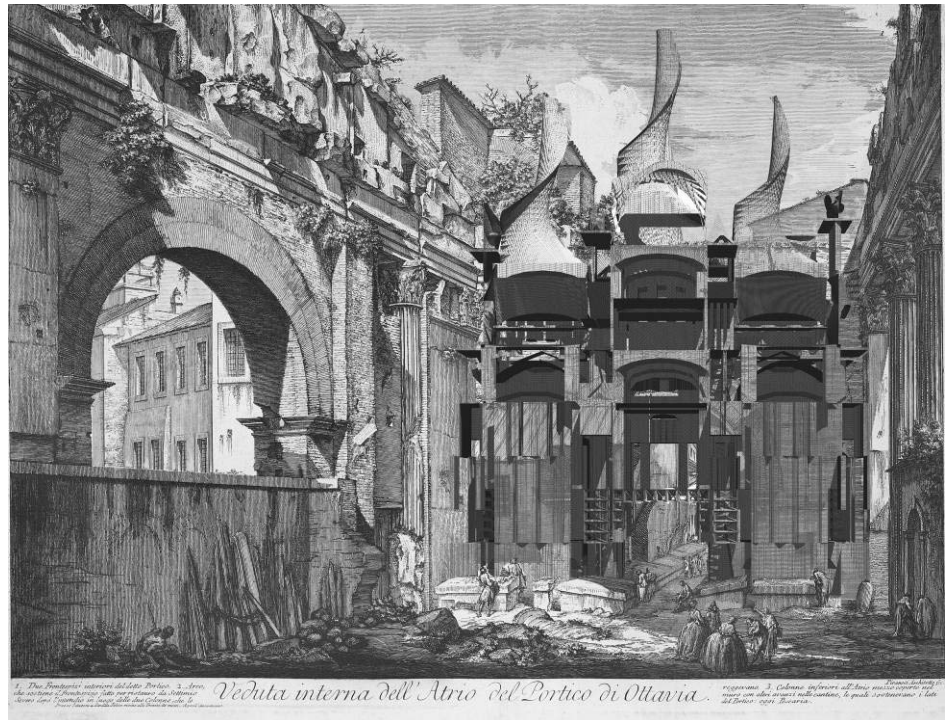


The original engravings of Piranesi.  
Inserting a generated architecture using codes from Gaudi' with the reference of Mila' house and The Piranesi increasing complexity. C.Soddu, 2008

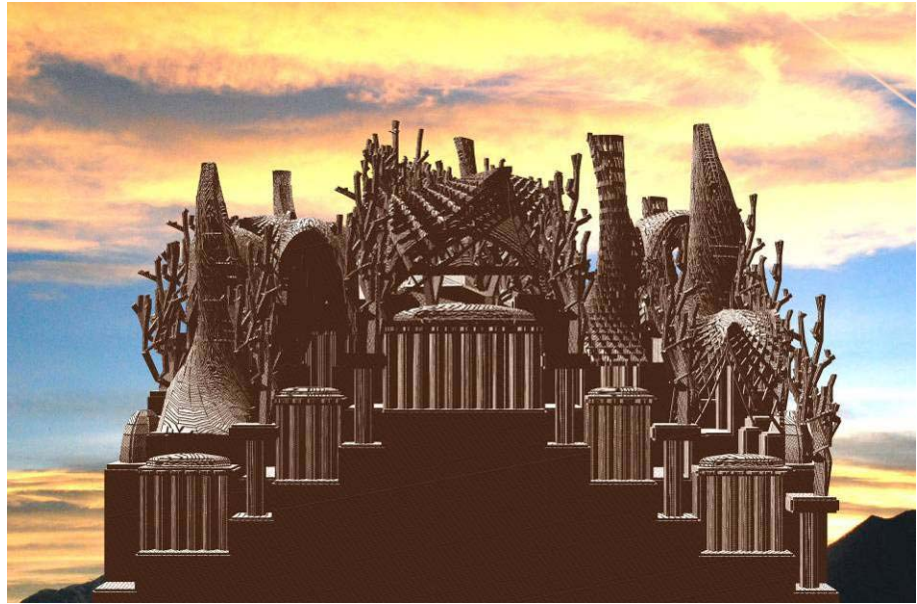


The original engravings of Piranesi representing the "portico d'Ottavia".

Inserting a generated architecture using codes from Borromini' and The Piranesi increasing complexity. C.Soddu, 2008

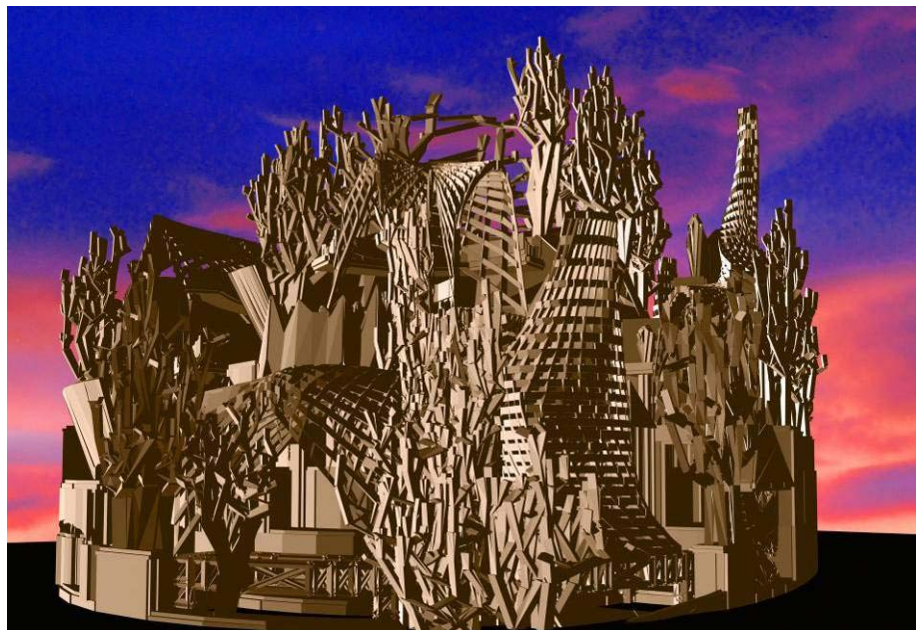


*Italian Garden, var #1*



Italian Garden var #2

*Following Italian Cultural Heritage, two generated Natural/artificial projects.  
C.Soddu, 2008*



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