Generative Natural Flux

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Preface

I believe to interpret the thought of all the participants to this fourth conference on Generative Art affirming that generative art is a deep creative experience and, somehow, visionary too. This experience, in fact, anticipates the possible evolution of the fields proper of human creativeness, rediscovering paths and approaches to ideation that have been proper of one of the most fertile moments of the human history and culture as Renaissance.

In this paper I would like to deal with some aspects, and also some different approaches of generative creativeness. In particular, the importance to use specific reading keys, both subjective and objective, the possibility to reach concrete and feasible design results entering a complex figuration of possible incoming worlds. In other terms, to reach projects directly interfaceable with productive reality. Lastly, I will evaluate if and how it is possible and profitable to use the random factor in evolutionary processes, investigating on the differences that the use of such factor involves in the creative and design experience and the quality of the obtainable results.

But how can we define generative creativeness?

Generative Creativeness

Imagine to be an artist, an architect, a musician or a designer that has an idea. It is the idea of a work: an architectural space for a museum or an object as a coffeepot to be produced by industry, or a piece of music for a particular occasion.

Imagine this idea to be particularly strong, felt, recognizable, intimately tied up to your personal and professional identity. In other terms, imagine that your idea is able to tell, in

strong and exhaustive way, your point of view on how to interpret the world surrounding us, on how to transform this existing world into a possible one, much closer to your expectations, on how to be creative and designer.

Then imagine that every sketch you trace, every possible result, each form you think of will give you satisfaction, but only partially. Every formalization is not more than one of the possible representations of your idea, but it is not the idea. Your idea is fleeing. Your idea is all the possible, endless formalizations, all together, also the formalization that you have not traced yet but that, however, are essential to represent it.

Imagine that you succeed in finding a way to represent and realize this idea as a concrete, usable and communicable event without losing nothing of its richness and the complexity of its strength: an idea that becomes product without losing its potentialities.

Imagine therefore that you can sell this idea as idea and not as one of its possible results, objects, projects, artworks, music. You can sell it to an industry, as it is usual for any project, and this company will use the idea-product to produce the possible results. An endless number of objects, music, architectural spaces, communications, that you have never seen before but that, also in their difference and unpredictability, won't be a surprise for you: every object will be one of the possible representations, figurations of your idea, each one will be an individual of the species that you have created and designed.

Then imagine that this industry, operating on the market with the actual web technologies, decides to produce every object because it is chosen by a specific final consumer in a way that the oneness of every object find and fit the oneness of every final consumer. Every user has unpredictable and subjective needs that go beyond the standard performances of the object, subjective needs that can be both aesthetical and symbolic, but also further practical possible uses reflecting the multiplicity of subjective ways of life. This operation can fit, as finality, the unpredictable further needs of each final user with the unpredictable uniqueness and specificity of each product.

This is Generative Art: the fitting between the idea of the designer (artist, architect, musician), strong expression of his creative and professional identity and the choice, that is unpredictable, of the final user, strong expression of his personal identity.

Designer/User, the random factor

A first field to investigate is: which is the relationship between these two identities, the subjectivity of the designer and the subjectivity of the final user of the product? And, as a consequence of that relationship, which is the role of random factor in the whole process, and how such factor contributes to determine extremely different conceptual and operational results and how this factor can mine or improve the design quality of the results too.

A first consideration is upstream of generative process. The use of the random factor inside the design path, according to the different uses, can create a watershed between project and unconscious formalism, that is not-project, twisting the mutual roles of designer and client.

The respective roles, in fact, can be identified as follows: the designer defines how to evolve and transform the existing world into a possible better one, the user/client chooses what is better for himself, following his own needs, also the strictly subjective ones.

A possible scenery of unconscious formalism emerges if we assume the possible substitution of the design process with the random act, and we try to do that through the randomization of forms. This hypothesis denies the design act, the idea, and loads the following choice of the user with a value that seems to be a design choice because it gives the user the last word about result, but it is not a design act. The user continues, more concretely, to play the customer's role: it chooses between different possibilities that are offered to him but it doesn't operate as designer because he doesn't define the evolutionary process, he doesn't possess creative idea. The results of this approach are very disappointing, obviously.

One example. I casually take a series of points in the space and I represent them through a curve built with the algorithm of Bezier. If I expect the final project of a coffeepot, or the final project of a vacuum cleaner or of a commercial center to emerge, this is as to expect that, extracting some letters at random, the Divine Comedy comes out. Possible, but highly improbable.

If the goal is the figuration of a not-abstract event, it is necessary to have an objective that drives the process, its increasing complexity, it is necessary to have an idea, it is necessary to design.

Contrary to using random forms, generative design works through the possible randomization of interactions, or better the use of the random factor to make the (virtual) context of reference in the designed evolution of the system unpredictable.

The creative idea, following the trace admirably pointed out by Florensky, is active on three different fields, space-geometry, the time-environment-flow, the object-form. (Florensky pointed out the triad space-environment-thing, where space factor is fundamental). If random factor is applied to the object-form or to the space, the result cannot be a project but only unconscious formalization. The reason is that we cannot define the idea but only the choice of a before-shaped results made by the final user inside the time-environmental flow. Alternatively, and this is my operational hypothesis of generative art, idea can be the idea of a space, whose possible bending are an integral part of the idea and whose organization is the reference paradigm for the not-abstract figuration of each possible results. The time can be the random factor of environmental interaction that activates and clocks possible trans-formations of the system whose generative rule-codes, absolutely not-random, are integral part of the idea in the field object-form.

Generative project as projected evolutionary code that works and generate events inside an environment whose unpredictability contributes to strengthen its possible identity. As in nature. The artificial evolutionary procedures of a generative project recall the natural evolutionary flow. The more the interaction with the(virtual) environment is unpredictable (random), the more the idea (how to transform the existing one in possible) acquires identity, recognizability and strength. As in nature. The more an olive tree is beaten by the (environmental random), the more, twisting itself and growing, it acquires its own identity of species (idea) - the olive tree becomes more olive tree than before - and, in the meantime, it increases its own oneness of individual. And such oneness can fit the oneness of a possible user.

Also appearing as opposite, the two “generative” approaches just delineated, (form-random and interaction-random) are the two extreme of a continuous series of possibilities where, alternatively, it is increased or decreased the hierarchical importance of the casualness in the three fields of the idea: space-geometry, form-object and the time-environment.

What also appeared not-project in preceding example, it appears as project if the design intention is confined in the character-identity of the abstract form that can derive from the use

of particular geometries, relations and logics. It appears clear that the design intention is the character, extremely recognizable, of the curves of Bezier. The idea is Bezier's.

The Generative Design, objective, subjective and adaptive aspects.

If we would really like to trace a possible border between designing and abstract playing with random forms, this border has to refer to the "design intentions" and to all the components that compete to the formulation of an idea.

If the Idea intends to reach a "figured" result, that is a result that defines concrete and possible events as an object of use that can be industrially produced or an architecture in its complex configuration, then we could individualize, for convenience, three aspects in which the design intention is shaped.

Objective aspect. It includes the list of the performances to be carried out whose characters appear broadly sharable and whose evaluation and subjective appreciation of consumers appears univocal and taken for granted.

Subjective aspect. It defines how to reach and to satisfy the objective aspects and, with these processes, it renders explicit the specific characters of the identity and recognizability of the product, of the designer and of the firm that produces it.

Adaptive aspect. It defines how to open to possible performances on practical, aesthetical and symbolic fields. These performances may be requested by unpredictable possible consumers whose subjective needs cannot be listed previously, not being known, but that however must be satisfied. If not, an absolute lack of market for the product wil result.

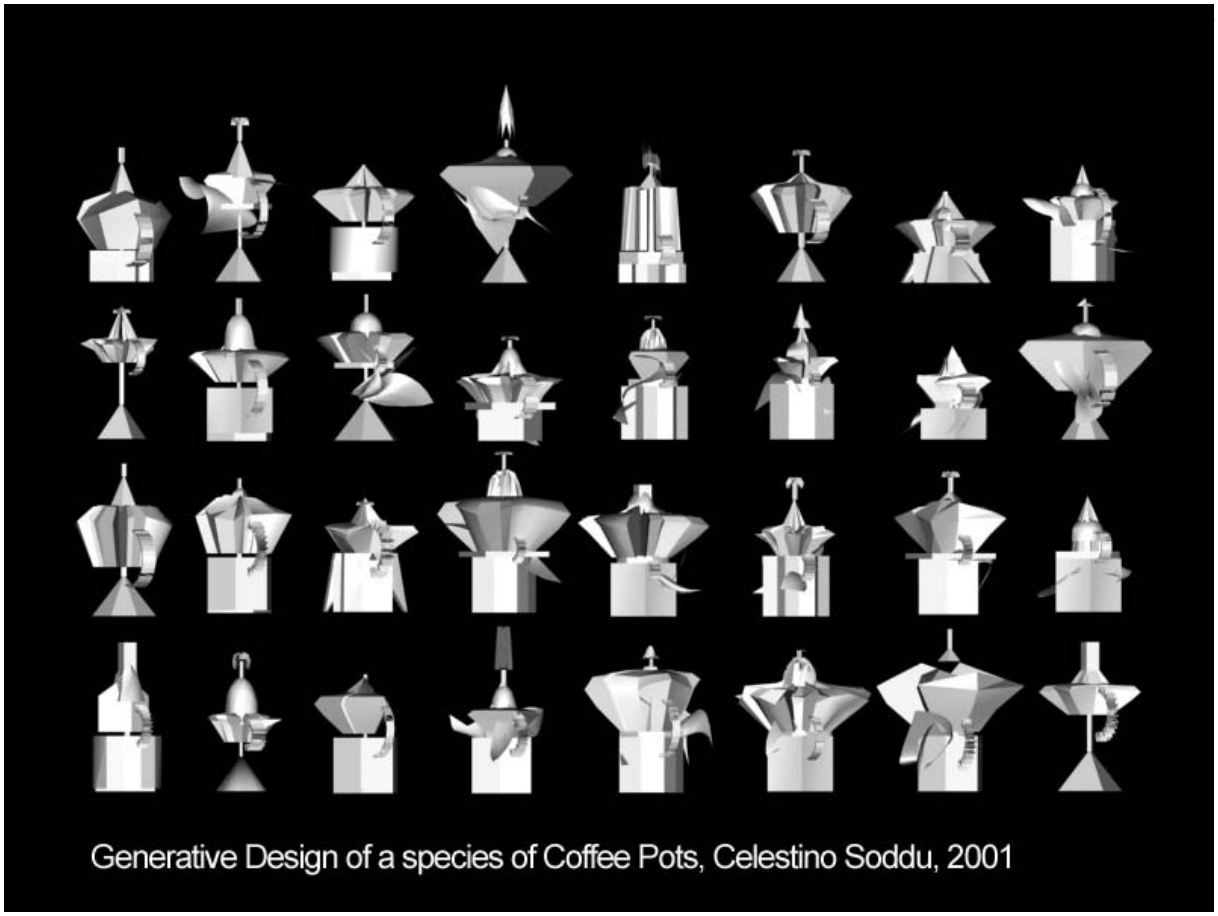
In an architectural or industrial design project, we cannot omit any of these aspects, if it aims at reaching the "figuration" of the result. I would say however that, also in the most abstract field of figurative art or music, these three aspects have to be considered, however, if we intend to reach results whose complexity of performances, intentionality and possible interpretations make the created artworks appreciable.

If objective aspects are missing, aspects that we can also call the theme, the occasion of project, we cannot arrive to not-abstract, identifiable and recognizable results. Such results can be achieved only through the definition and the activation of "how" to manage the process. Hiding or underestimating the choice of how to operate, or to operate this choice

unconsciously, doesn't deny that this choice has been done. Also activating a structure of artificial life that manages and decides “autonomously” the evolution from the idea to possible results implies the existence of the idea as the intentionality of reaching specific objectives. It also implies the design of the artificial life’s engine that defines how to reach such goals.

The adaptivity is a fundamental factor of the quality of the results, and therefore of the idea. It presupposes, in the most banal cases of industrial product, at least the choice of the color or the most proper measure. In the architecture, it presupposes at least the possibility of using/personalizing the spaces where we live and, in art, at least the possibility to choose a painting inside the production of an artist and to choose a context where insert it.

In other terms, I believe that, when we design or use our creativeness, we gather aleatory-environmental input to bring forward very precise objectives. Rather we look for such unpredictable inputs to solicit our creativeness, to look for inspiration. Such aleatory inputs support us to strengthen and to shape our idea. They can help us to verify in progress that the results that we will reach will be appreciable from a multiplicity of different subjectivities.



Generative Design of a species of Coffee Pots, Celestino Soddu, 2001

Generative design experiences

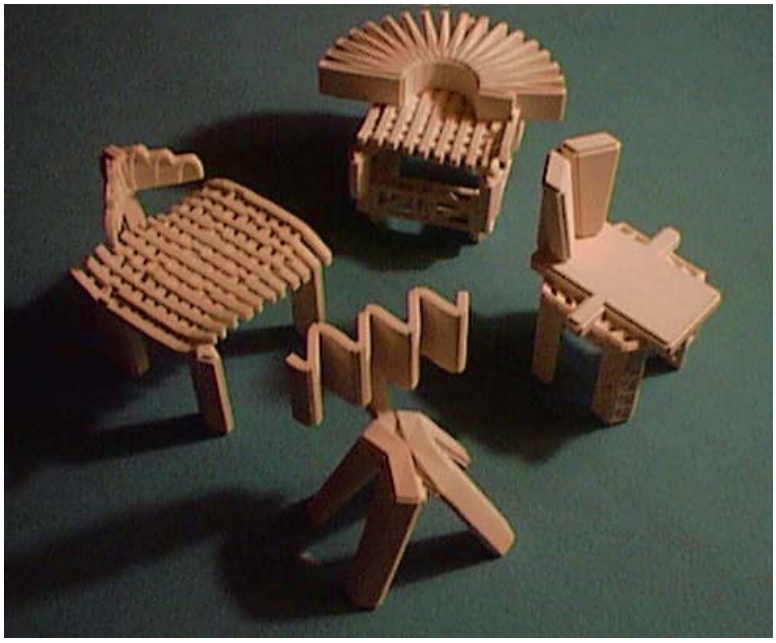
In the generative projects that I have realized, beginning from the projects that had as operational field the transformation-evolution of town landscape, going on with the project Basilica for architecture generative design, continuing with the generative industrial design projects Argenìa for chairs, sofa, lamps, coffeepots and jewels, and ending with the GWP, the generative project of portraits of women, I have been developing this type of approach, confining random in the field of the time-environment flux..

Where and how, in these generative projects, objective, subjective and adaptive aspects are faced and defined?

Objective aspects. They define the theme and the base performances of results. These aspects are so peculiar and referable to a specific occasion that, in my experimentations, I have had to realize a generative project, an original software, for each design theme. I don't believe that it is possible, if we intend to reach and fix final figurations of project, to make a generic generative project, or rather to realize a software able to produce coffeepots, vacuum cleaners, chairs, televisions, cars, rings, lamps and so on. Each theme presupposes specific objective aspects and therefore a different project, a different generative software. In my experimentations it has not been possible, if not in the most banal cases as, for instance, applications on the quantitative plan (a space of defined square meters), to manage the functional applications with interchangeable data. Such performance requests, in fact, must be interpreted by the designer in terms of logics of transformation (algorithms) and of structures of relationship (paradigms). Managing these requests, we enter immediately the field of “how” to operate, therefore the subjective aspects.

Subjective aspects. They define how to reach the objectives of project. A simplification (and an opening to the generic generative project, a tool for designers) could be that we don’t define how to reach the objectives but we identify a series of solutions, a database of random accessible forms that are modifiable and personalizable by the designer using an appropriate interface.

Generative design of a Species of Chairs and Rapid prototyping realization of them.

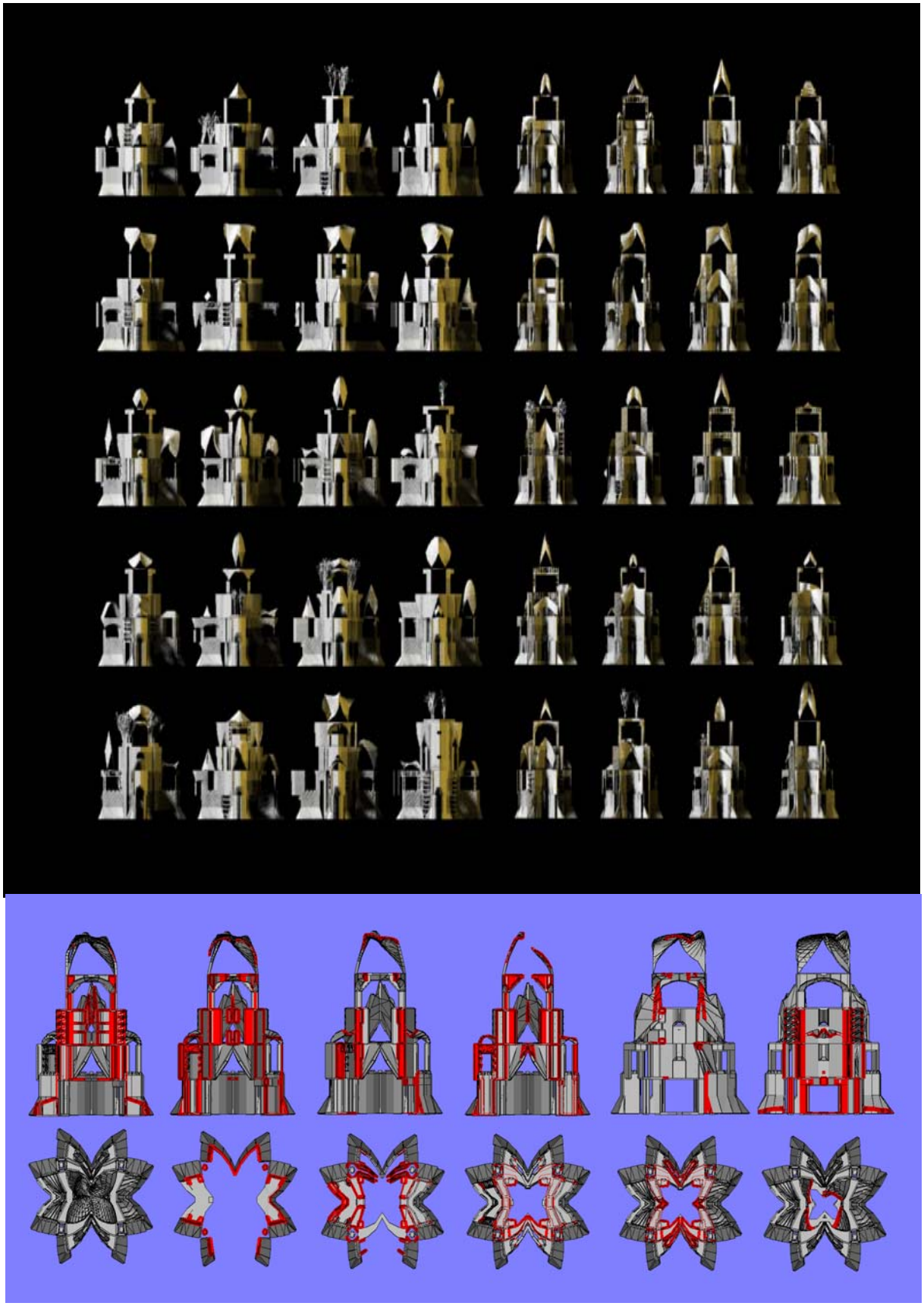


Apart from the conceptual choice that, in my opinion, change the nature of generative design, this is a simplification that makes impossible the attainment of the objectives of performance if these are complexes and multiples. The management of the complexity is in fact one of the strong themes of the contemporary project, in which is necessary to activate a multiplicity of approaching keys, that are often different and belong to various disciplinary fields, and that must be realized by team of experts. Manifold forms for diversified performances are not, in fact, stratifiable and usable simultaneously. It is not possible to pass from complication to complexity, and to synthesis.

Contrarily, the definition of the “how” and therefore the subjective indication of an evolutionary path to follow for the attainment of the objectives, is not the definition of a form but of a process. A process can be used inside a multiplicity of processes in which every output is input for the following one. In this way, we can realize the possibility to increase through an evolutionary sequence of processes, quality and complex performances of possible results. I would also say that the interest for the generative design is based on the multiplicity of the processes simultaneously activable and is really founded on the concrete complexity of the obtainable results.

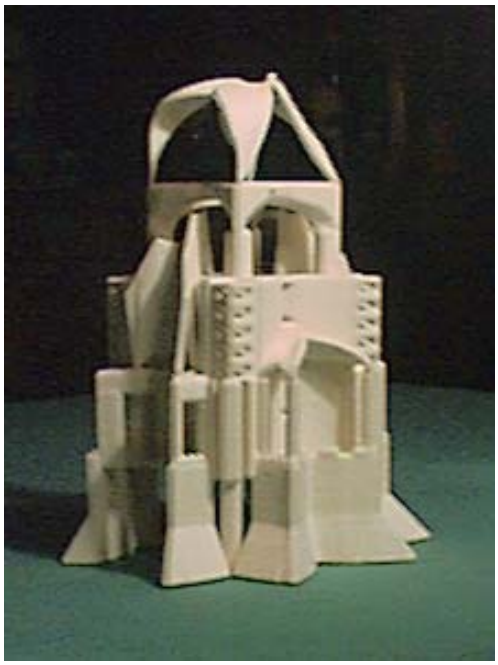
A further field in which we can define subjective objectives, and therefore of “how” to manage the evolution, is the definition of a structure of relationships, an organizational paradigm that defines and manages, in their mutual hierarchy and in mutual resonances and contaminations, how the processes work. We could say that, while the definition of the processes is inside the field identified as object-forms, the definition of a paradigm belongs to the field space-geometry-topology, and its possible bending.

Denying or not taking into consideration the subjective component of the generative projects can mean destroying the only access key to complexity. Although the interest arisen from this possibilities is very high, the experimentations that people have made so far, concerning generative “objective” engines, tools for designers, are confined in the field of the evolution of CAD tools and intelligent interfaces. That’s not a limit, but it’s different from generative projects. If they are “generative”, these projects don't allow, inside the generative process, a progressive growth of the complexity of a multiplicity of results that is acceptable in an object not ”simplifiable” and “reducible” to an single form as, for instance, a bottle or a pendant.



Architectural generative design of castle. The two series are realized with a different geometry curvature. The automatic realization of thickness following the different generated materials,

and a rapid prototyping phisical model.



An exception, even if partial, to the necessity to realize different software for each different design occasion, has been realized in the generative project Basilica. Even if, obviously, Basilica operates always and exclusively in the theme " architecture ".

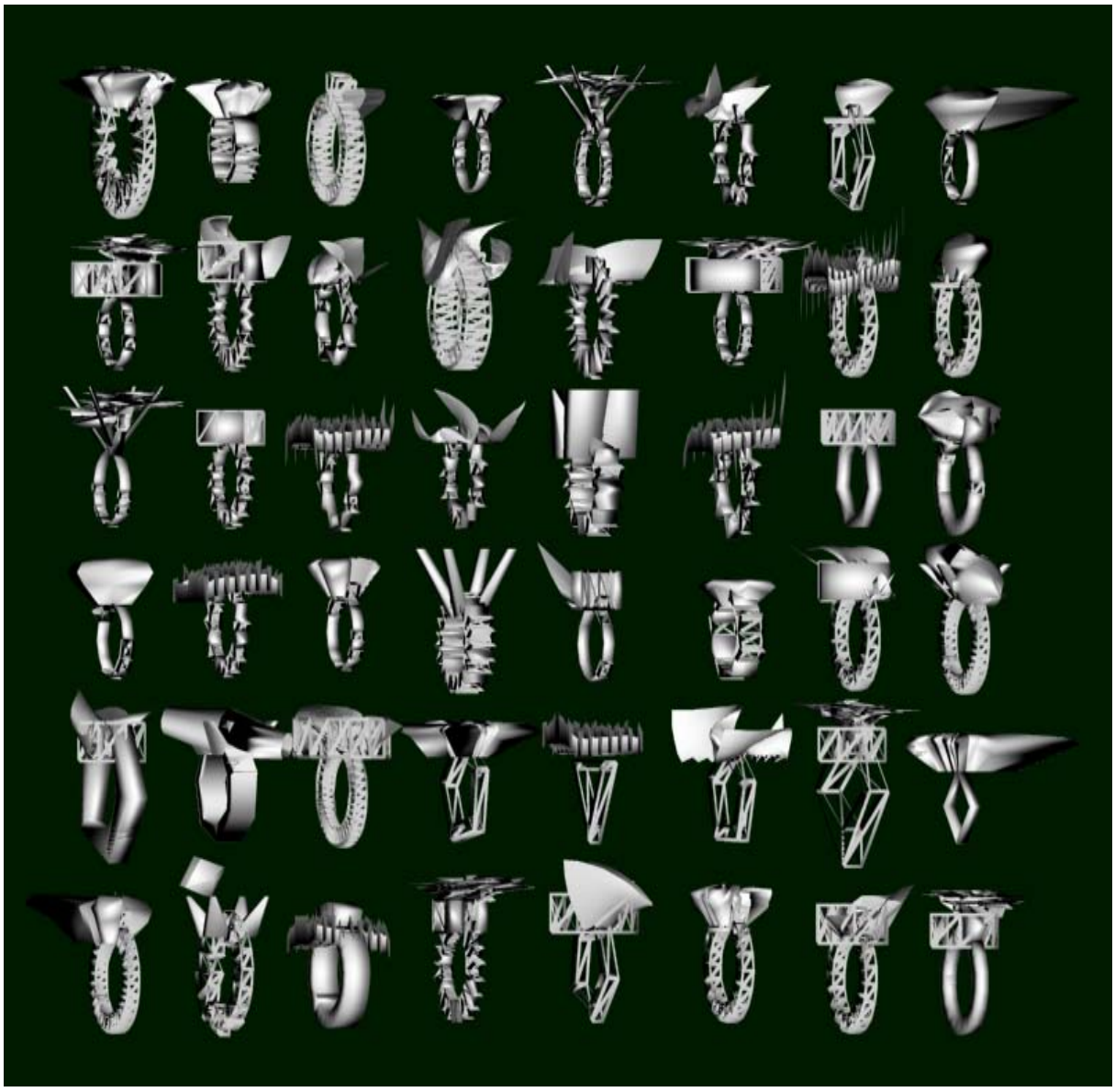
I have built an interface that allows me to manage three aspects that I beleve fundamental in the definition of an idea of architecture: 1. The geometric space and its bending, 2. The specific paradigm of a theme and its net of relationships between spatial events. 3. Some characters of the activated evolutionary processes as the type of usable “cellular automata” and the existence and the topological structure of the exceptions.

However this operational interface doesn't transform Basilica in a do-all tool. In fact, Basilica always realizes architectures and not generic objects and every produced architecture is strongly characterized by my personnel idea of architectural space that is, I think, strongly recognizable. Besides, the idea of space-geometry that I have realized in Basilica is referable to the same concept: a homothetic structure based on precise design choices in which the number 27 is fundamental, as in the Renaissance codes. Every space-event generate 26 things-events, and so on. The evolutionary codes, the processes of transformation of the objects have

always same logics founded on my interpretation and dynamic proposal of the harmonic relationships proper of the Renaissance.

Despite, to face to each design occasion it was necessary to increase and upgrade the generative motor and contextually to evolve the project Basilica in front to realize the architectural " figuration " required by the customer.

Adaptive aspects. They are fundamental for the charm of each results in front of final users. The use of the random factor is essential, to reach this purpose. It creates possible (and not predictable) fields of verification and time-environmental input for possible further keys of



Generative Design of Jewels

reading. If the use of random forms hampers the complex performances of the results, reducing them to a precocious stadium of evolution, the random interaction gets unpredictableenvironmental input that detect and make possible to get results that are fruit of possible

contaminations and resonances between the evolutionary processes activated in series and in parallel. Each of such processess, in its different parallel lives, realizes the attainment of its own objective. But the interactions and interferences concretize, in the flowing of artificial life, the identity and unrepeatability of each produced individual-event.

The random of the time and the mutual speeds create a very sensitive tool able to enter in resonance with existing points of strength, even if not directly anticipated, in the idea. When this happens, it is possible to concretize them suddenly in one of the possible results. As when a subjective sensibility is able to wave and to enter in resonance with natural strengths that, also if existing, until that moment it had not the occasion to be disvelate. As the strength of beauty.

The generative idea: an operational code of a possible natural flow that realizes unique and unrepeatable individuals belonging to the same species.

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