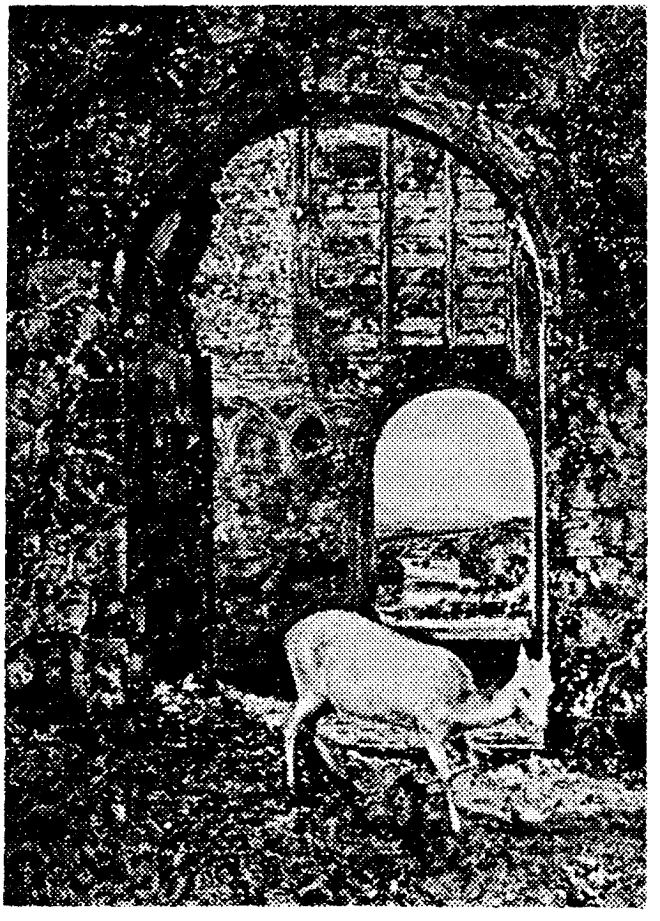

MUTATIONS OF THE WHITE DOE:
an algorithmic gestation

An installation proposal by
Nicolas Reeves and the NXI GESTATIO Design Lab

October 1997

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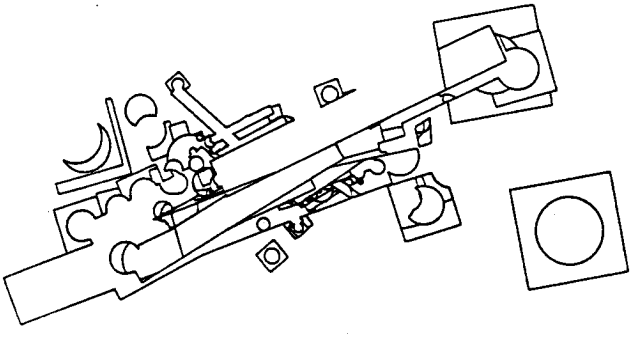
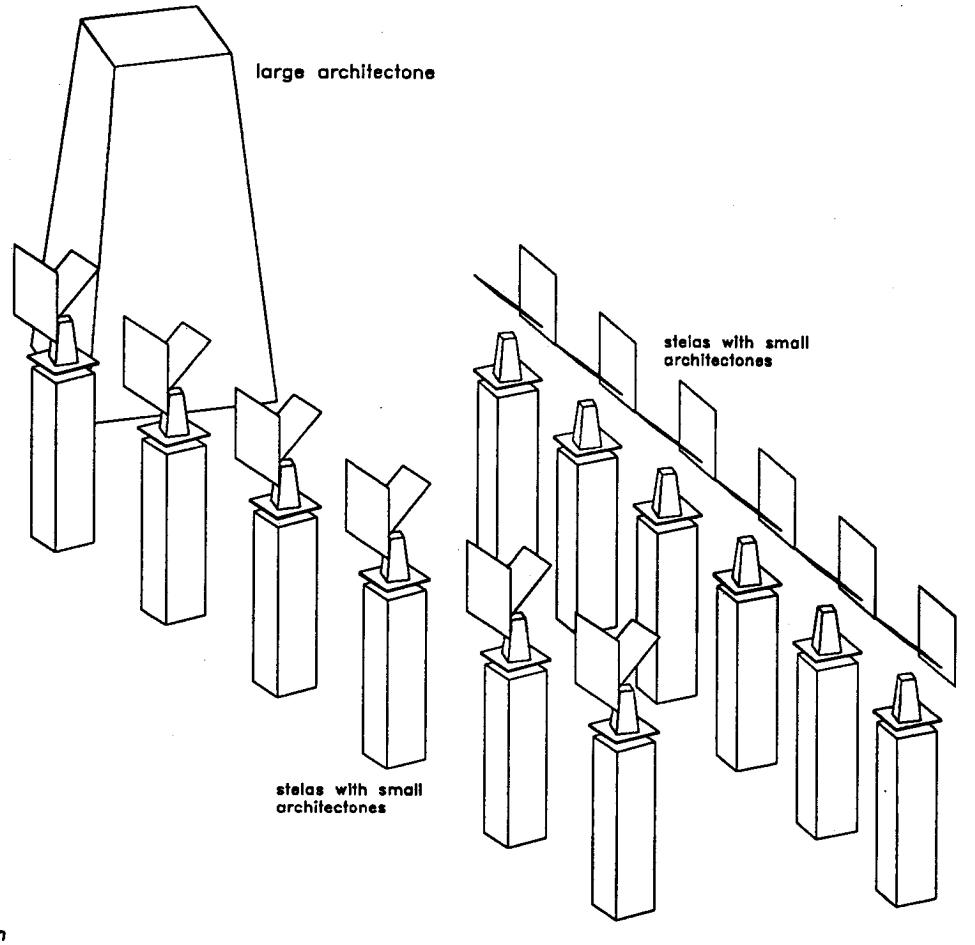


DESCRIPTION OF THE INSTALLATION

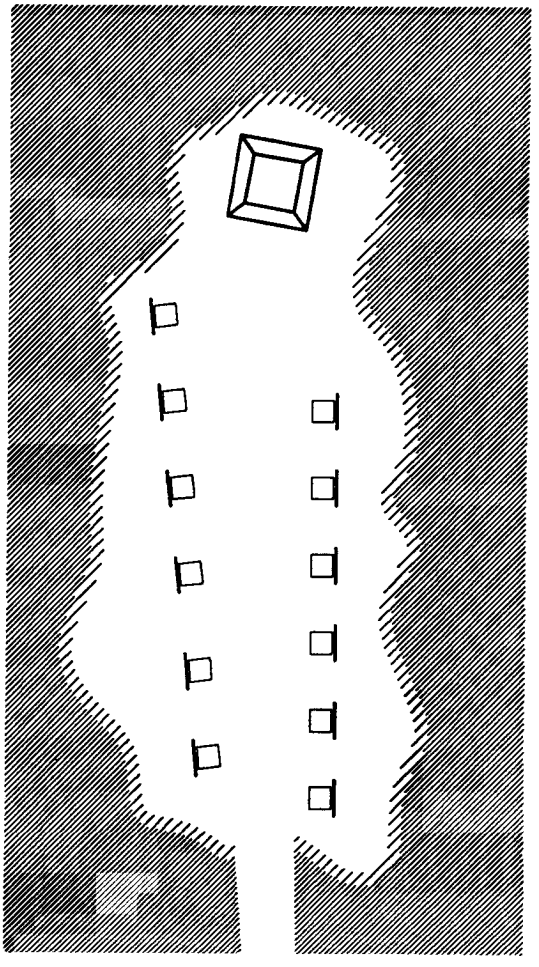


Axonometry of installation

I - VISUAL

Twelve small complex architectonic sculptures made from a translucent photopolymer stand on twelve stelas, lit from underneath. Twelve small reflecting panels allow the audience to see them simultaneously in plan and elevation. The stelas are aligned in two slightly divergent rows of six in the middle of a rather large room. They define an alley at the end of which stands an enlarged fragment of one of the structures. This fragment is made from construction materials (wood, glass, steel).

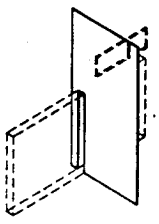
The space around the stelas remains dark; the walls of the room are barely visible. Since the sculptures are translucent, the light coming from underneath reveals their internal structure and makes them look like little organic lanterns. In each sculpture is hidden a little stainless steel capsule which contains the secret of the origin of its shape.



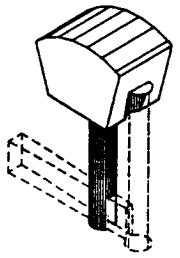
Plan of installation

The overall dimensions of the installation are somewhat flexible to provide for different room sizes. The optimum setting requires a rectangle of 12m x 6m, surrounded by a clearance area of about 2m, and a 4m ceiling height. The size of each stela is L: 0,35m x W: 0,35m x H: 1,50m; the architectones are inscribed in 0,30m cubes. The large architectone fragment is about L: 1,30m x W: 1,30m x H: 3,00m.

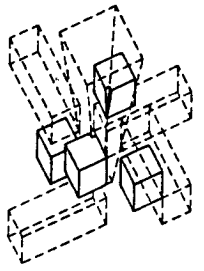
The twelve architectonic sculptures, called " Computer Architectones " and " Surrational Morphologies ", are grown from the evolution of artificial life systems, using computer methods known as "cellular automata", "genetic algorithms", "neural networks". In such systems, which can be compared to virtual biocultures, a large number of numerical organisms live, evolve, cross-breed and die. Different kinds of organisms exist, each of them being characterized by a particular behavior. Their social universe is governed by strictly deterministic rules: chance plays no role in the process.



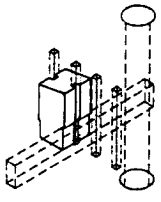
Ovothée est composée d'une lame verticale pleine et de deux barres horizontales vides. Ses proportions sont déterminées par l'endroit de la ville où il se pose, et il tourne le dos au groupe de personnes le plus rapproché de cet endroit.



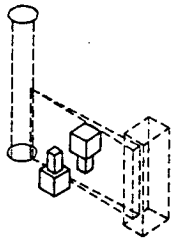
Hysephlure possède deux éléments pleins et deux éléments vides. Ses proportions sont déterminées par l'endroit de la ville où il se pose, et il se tourne vers le groupe de personnes le plus rapproché de cet endroit.



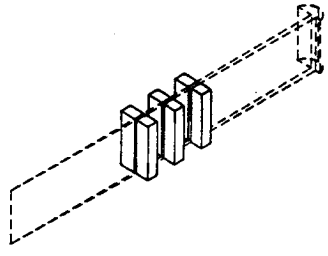
Rune «B» se compose de cinq blocs d'espace et de quatre blocs de matière. L'un des blocs vide est un coin vertical qui ouvre un puits de lumière à l'adresse où s'installe le personnage. Ses proportions sont déterminées par son adresse. Son orientation dépend de la distance du voisin le plus proche.



Épérie comporte un bloc plein, et cinq puits verticaux dont quatre carrés et un cylindrique. Il se tourne légèrement vers le groupe de personnes le plus rapproché de l'adresse où il se pose.



Anaclone comporte quatre petits cubes pleins et deux puits verticaux connectés par une lame de vide effilée. Il se tourne aproximativement vers le groupe de personnes le plus rapproché de l'adresse où il se pose.



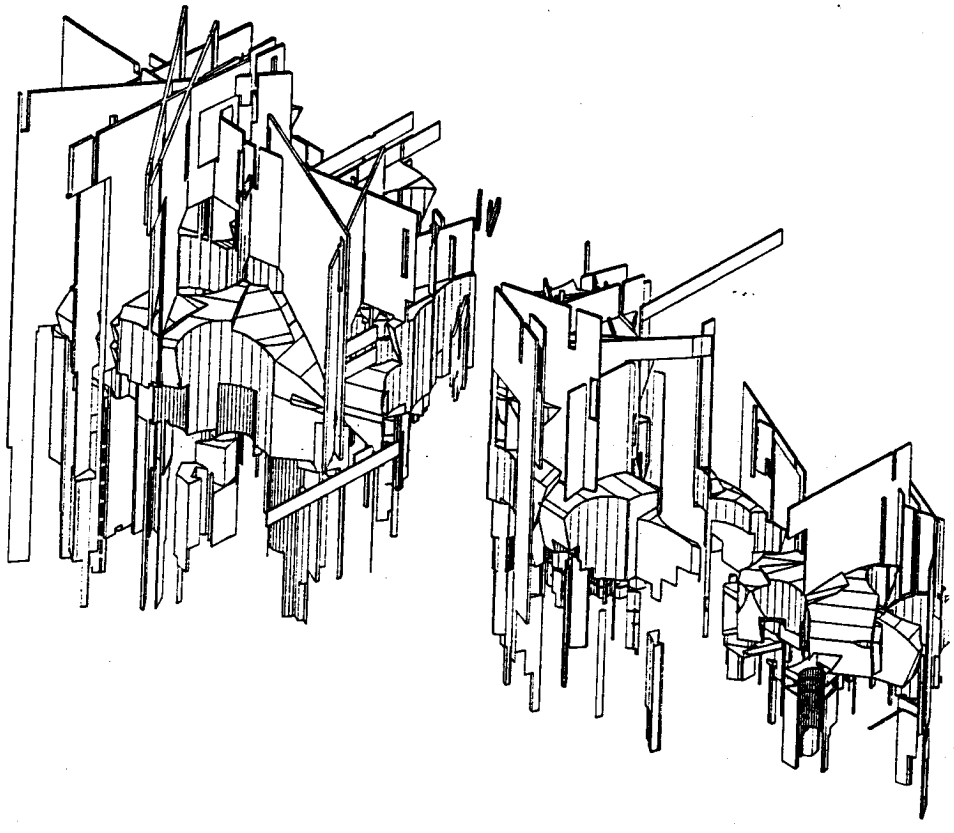
Multeïse est composée d'une lame vide très effilée qui traverse trois petits blocs pleins et mène à un fragment de cercle également vide. Ses proportions sont déterminées par l'endroit de la ville où elle se pose. Son orientation dépend de la distance du voisin le plus proche.

Basic blocks for the construction of a computer architectone.
In this model, all blocks are characterized by a specific «behavior»: they react to each other, and each «character» has its own set of reactions. The gathering of these blocks create a «society of objects», whose geometry is somewhat analogous to locally-assembled urban environenments like medieval villages, slums or medinas. Dashed lines represent volumes of empty space.

In certain circumstances, these organisms are able to build. They secret geometric blocks that are installed on the " floor " of the bioculture. The blocks are stable: once a block is installed, it is very difficult to remove it. From the process, a construction progressively rises, like a coral reef or an anthill, except that the elements are deliberately architectonic.

The building blocks can be " blocks of mass " or " blocks of space ". When a " block of space " appears in and empty space, it remains invisible; when it appears inside a " block of mass ", it carves a space into it.

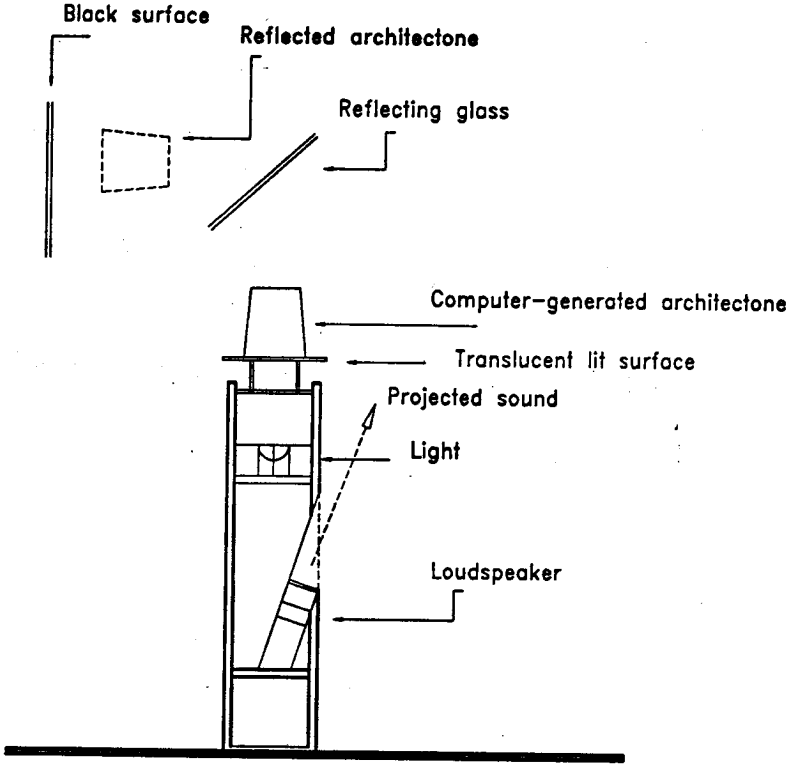
« Computer architectones » *are so-named in reference to Malevich's architectones: " a formula from which, given a program and a function, a shape can be extracted to generate an architectural structure ".* ***« Surrational morphologies »*** *refer to the blind rationality of the computer: a single computation is strictly logical. Repeating billions of times the same logical operations is not anymore. Extreme and radical rationality leads to craziness. The result of a numerical gestation can be compared to a computer's dream or delirium: it goes far beyond the rationality inherent to the processes going on in the microcircuits, and is the only possible escape from it. It emerges as a floating image over the computer's physical structure.*



Morphology of the Bulgarian Solitaire. *Axonometry. The Bulgarian Solitaire is a game which has been played for millenia, in about every region of the world. This Computer Architectone has grown from a cellular automaton. The starting seed is a representation of the rules of this game. The population of this "society of objects" is made of charcaters like the ones represented on page 5.*

The blocks also have a specific behavior, which manifests itself at the time of installation. When a block is produced, it probes its environment. Its reaction then depends of its own " personality ". A misanthropic block will turn its back to every other block. A fussy one will never land at a place where another block has already been installed. A social one will turn itself in the direction where it sees more people. A spawning one will proliferate if its universe is not very populated, and limits the size of its family in a packed universe. A block appearing at the very same place than an existing one will, depending on its personality, crush it and replace it; land on the top of it; or move a little and land just besides it.

Each inhabitant of this " society of objects " can be made unique and singular. Groups of inhabitants can adopt the same behavior. All these behaviors can also change with time to simulate a kind of obsolescence. The number of possible rules is infinite.



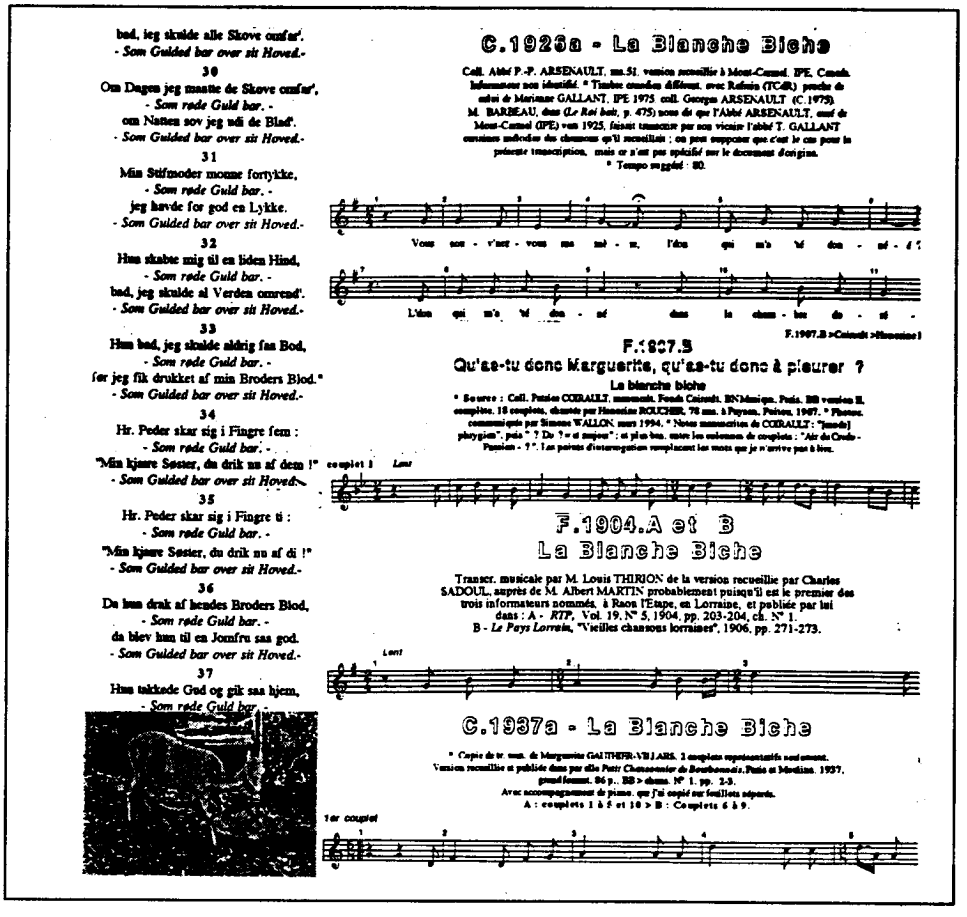
Transversal section of one of the twelve stelas.

II - AUDIO

Each of the stela emits an audio/acoustic sequence, at low volume. This sequence comes originally from a very old traditional song transformed by the very same processes that created the computer architectones. To create the architectones, the virtual organisms transform and assemble architectonic and geometric shapes; to create the audio sequences, they transform and assemble sequences extracted from this old melody.

In both case - architectonic and audio/acoustic - the generating process is analogous to a numerical bioculture or fermentation. The initial phase is the preparation of a substratum of numbers (an environment with " nutrients "), and the definition of a set of evolution rules. As long as the substratum remains untouched, nothing happens. To start the evolution process, one must drop a germ in it, like a yeast particle or a bacteria.

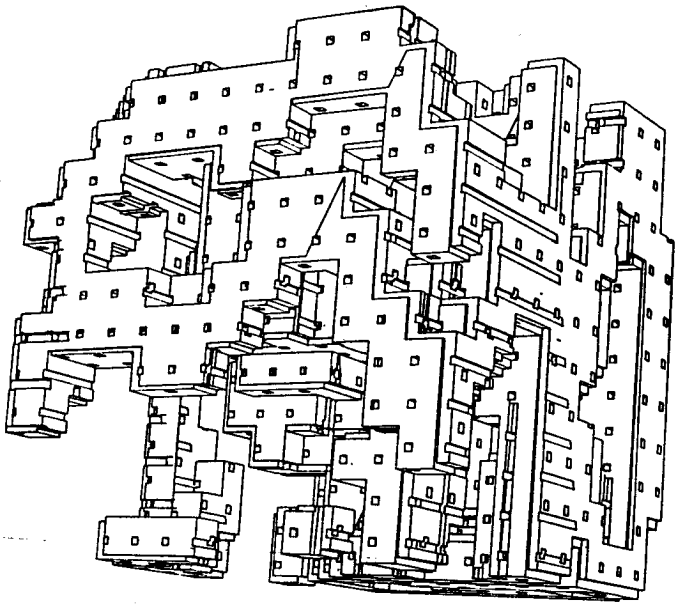
Being in a numerical universe, this germ must also be made of numbers. Any properly formatted list of numbers can do. This means that one can perfectly choose a list of numbers representing something real. For example, a list of numbers representing the structure of a cloud; or the fluctuations of the stock exchange; or the numerisation of a poem; or a choreography; or the melody of a song.



A few canadian and danish versions of ***the song of the White Doe.*** *Note than the Danish version (on the left) has been collected in 1844 in Roskilde.*

It is this last example that is used here. Each of the stela will emit a sequence coming from different versions of the same traditional song. This song, called " ***The White Doe*** ", is one of the most intriguing songs of all times. More than 80 versions have been gathered, mainly in Scandinavia, France and Quebec. Some researchers think it can be traced up to 8000 years back, since it appears to have some Sanskrit roots. It is still sung today. It constitutes the memory of a unified origin for many different societies through history, up to the edge of prehistory. As a reminder of the contact established between Quebec and Scandinavia during the Amos Symposium, the twelve architectones and audio/acoustic sequences will be generated by twelve variations of that song coming from Denmark and Quebec.

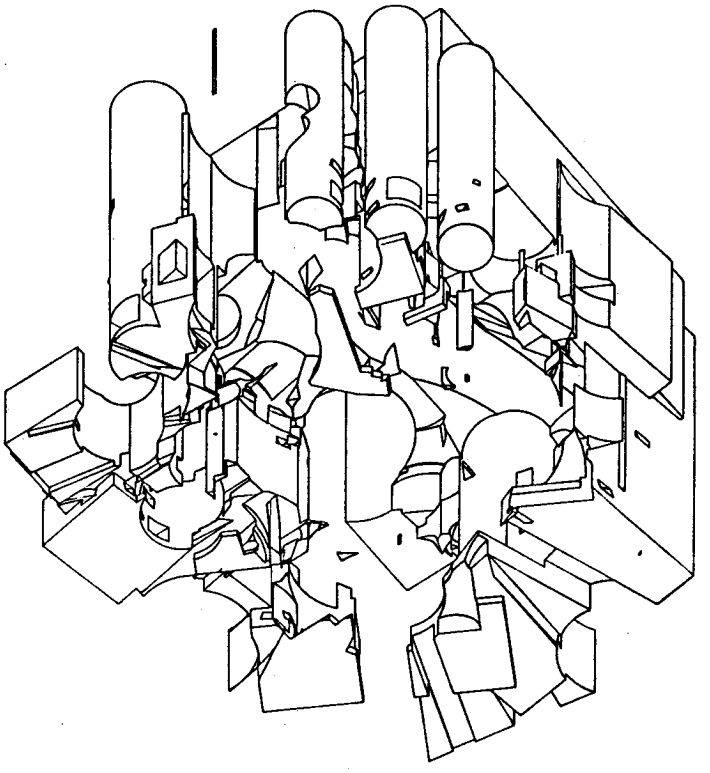
It would be a mistake to consider the architectone as a kind of tridimensional score for the music being played. The music and the architectones are two distinct, formally unrelated, individuals. In an analogy with genetics, one can say that the same " genotype ", as defined by a common numerical gene, has led to two different " phenotypes ", depending on the universe where the gene is " expressed ". In a musical universe it will (hopefully) produce musical individuals; In an architectonic one, it will produce architectonic ones; in a lexical context, it will produce textual ones, and so on. The question of knowing what is transposed from the song in the architectone is a very intriguing one, that puzzled even scientists working in artificial life: everyone knows that *something* is preserved during this kind of evolution process, but *nobody* knows exactly *what*.



Niwaminato checkpoint *(the checkpoint of total harmony). Computer Architectone grown from a random seed. Perspective.*

Each stela will play sequentially its basic melody and the sequences resulting from its numerical evolution. It will return to its original melody at intervals of about 30 to 40 minutes, after what a new evolutive sequence will take place. Close to a stela, the spectator will hear mainly the music coming from it. Walking along the alley, he will hear a low-volume mix of all the sounds, a quasi-musical and quasi-rythmic environment, from which, from time to time, will emerge an organized fragment of music, a percussive sequence, or a melody. This establishes an analogy with fractal and chaotic systems, seas of disorder from which, here and there, emerge islands of organized structures.

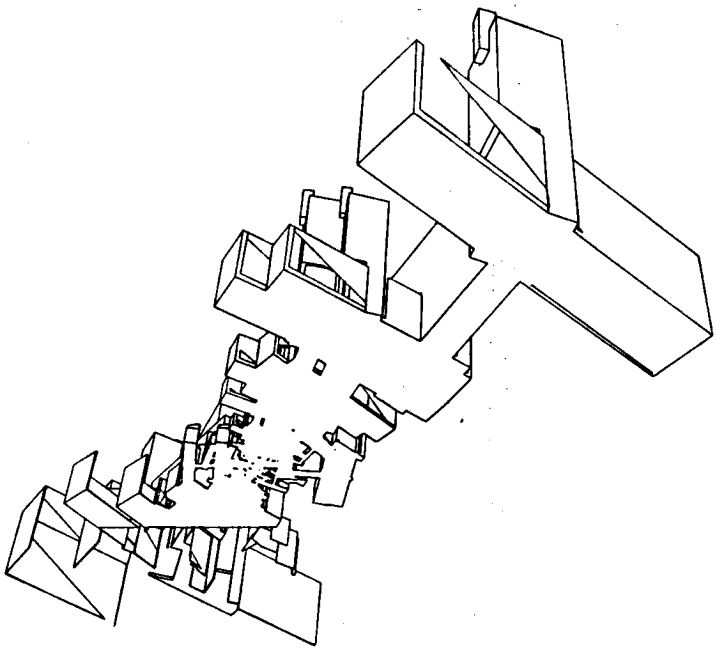
This by no way means that quasi-musical sequences are randomly arranged and cacophonic. They can actually product a wide variety of atmospheres. It means that the way they are assembled by the system does not allow the listener to predict them in advance. Like the symphonies of natural noises that can be heard in Japanese sound-gardens, they are made of separate sounds that must be listened to in a local manner, in a contemplative way, without any expectation for the note or sound that will follow, or for a more general structure, like would be the case in, say, classical music.



Tars cis-quadruscate. *Computer Architectone grown from a numerical seed representing the* ritornello *of Monteverdi's «Orfeo». Perspective* "à la Choisy".

III - ORIGIN OF THE PROJECT

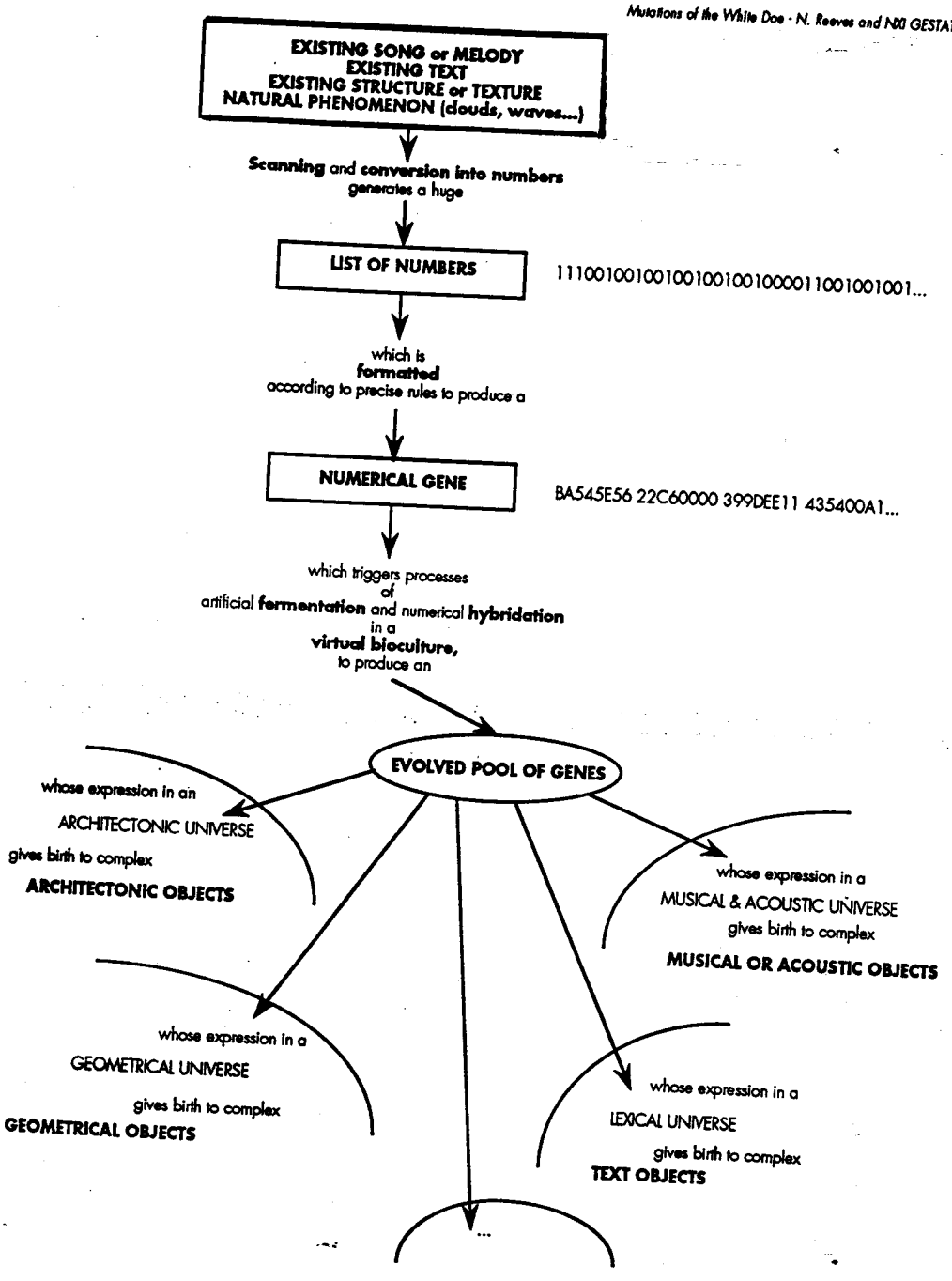
The complexity of the computer architectones presented in this installation sometimes evokes complex urban environments, such as traditional or medieval cities, medinas, slums or squatter settlements. This is no coincidence, since this work originates from an exploration of geometries characteristic from these places. The geometry of slums and traditional cities is a fascinating kind of organization. It has hardly been explored despite the fact that it incorporates a tremendous amount of informations about the relations between space and societies. Without elaborating on this vast question, what is important here is to realize that these environments have been for decades considered as ill-arranged and disorganized. The advent of recent computerized analytic methods revealed that they are in fact higly structured environments, whose geometry is locally controlled by rules of community life, of coexistence of activities, of symbolic relationships. This is turn is connected to a recent paradigmatic change in which the related concepts of order/disorder, organization/randomness, are systematically put into question and reconsidered; it is impossible, just by looking at a chaotic system, to say if it is or not controlled by a hidden order.



Vusque Toponautive. *Same evolving system as on Page 7, but following a different evolutive branch. Perspective.*

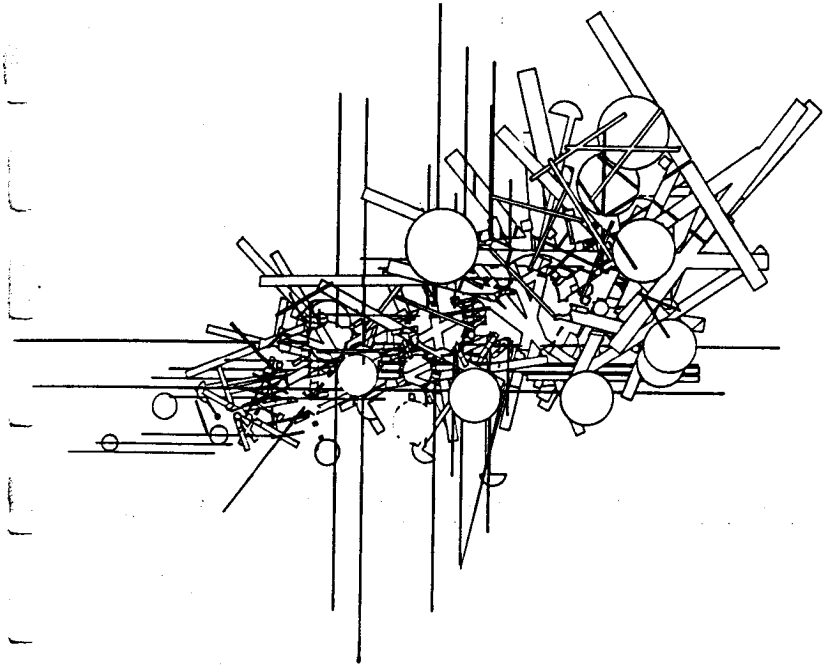
This is of primeval importance for many creators, and especially for those whose creation has been resting for centuries on pre-established structures - namely, music and architecture. The questioning on these structures is nothing new. But the broadening of the concept of order brought about by these new computer methods now broadens more than ever before the concept of order and shows that it can manifest itself in innumerable and unexpected ways; the explorer who ventures in them has to define new *categories* and *families* of order not to get quickly lost. The invention and exploration of these categories now become a legitimate and never-ending part of an artistic practice. This is not a small paradox for the computer which, originally designed to become a servile slave for mankind, now reveals whole fields of research and opens the doors to totally new territories both for artists and scientists.

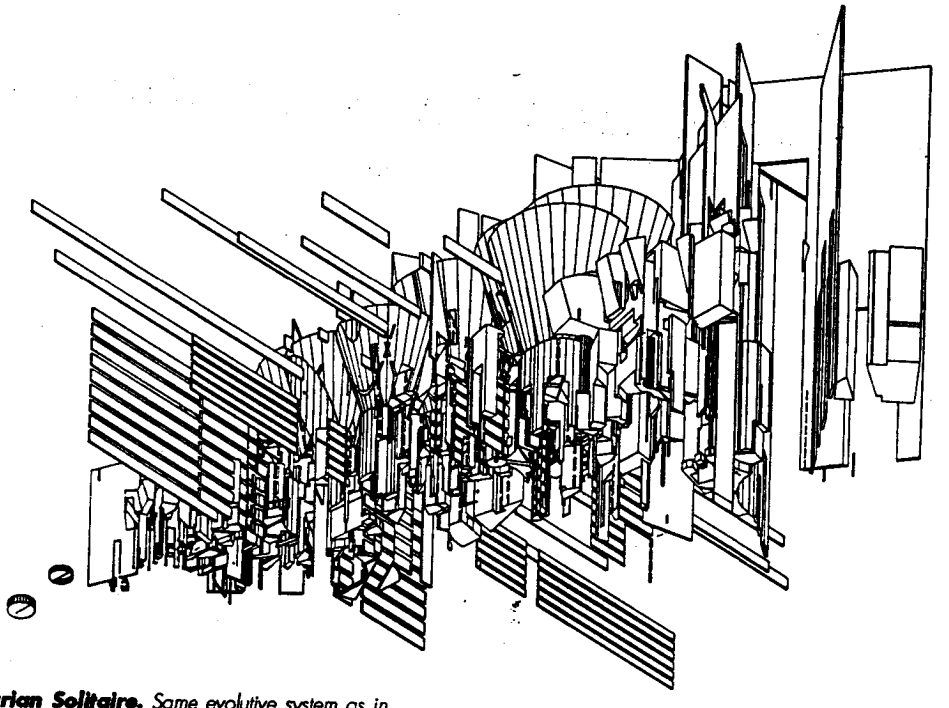
The " *slum/medina* " category of order, explored through this project, is fascinating in many respects: it is based on the iterative application of many local rules; it is evolutive; all the parts of a " *slum/medina* " system do not evolve at the same rate; it is open to singularities; it has not been invented, but slowly developed along the first millenia of urbanization; it does not originate from an individual, but from evolving communities of people; it translates into matter the social structures of these communities; deeply rooted in it is something that we still ignore, but that is essential in the way people grasp and understands space, in order to be able to live with other people; it is the pivotal point between individual and social life, between house and city...



How to make a computer dream.
Numerical gestation system for growing unpredictable forms.

Obviously, the point here is not to enable a single person to mimic the work of whole societies or groups of persons; such an attitude would contradict the very premises of the exploration, and result in mere simulacres. It is rather to see how these very particular kinds of order can be explored and used, what are their consequences in different realms of design and art, and how they can enrich, through their infinite complexity and variety, the catalog of images, forms and structures available to artists, architects and designers.

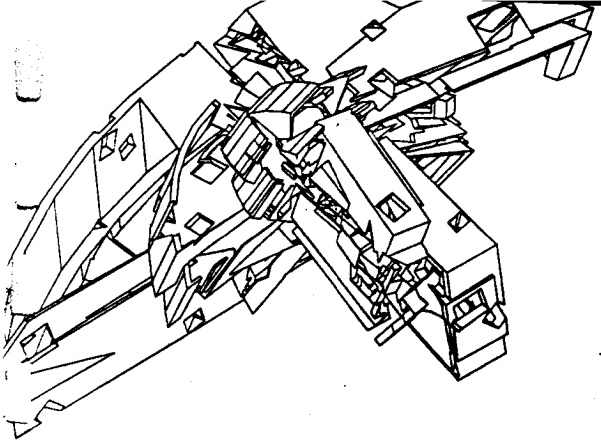


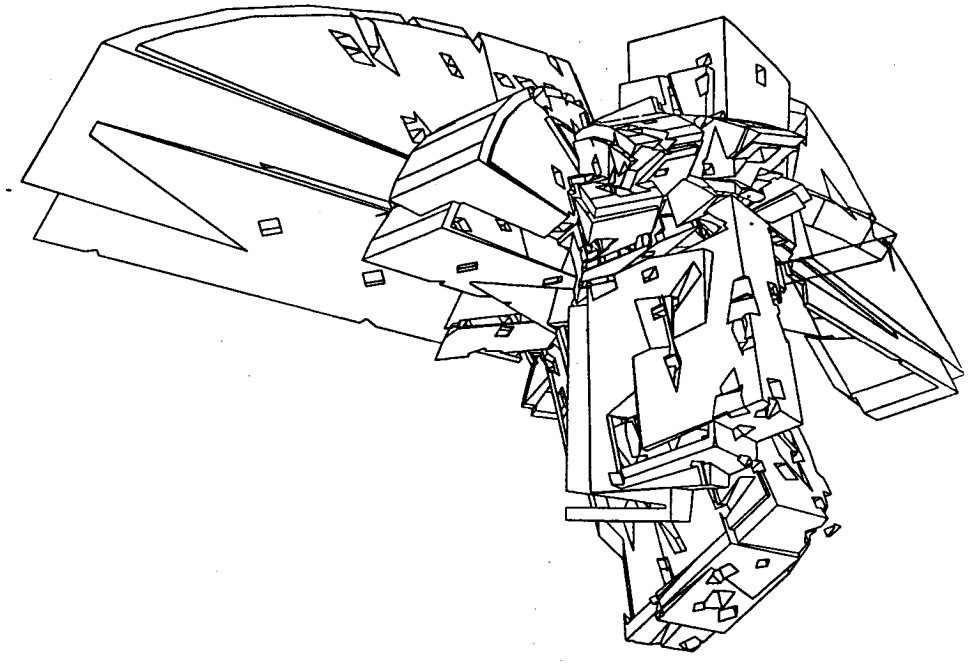


Morphology of the Bulgarian Solitaire. *Same evolutive system as in page 6. Intermediate step of the evolution. Plan and axonometry from below.*

IV - IMPLEMENTATION

The passage from a computer architectone to a material one is impossible or totally unpractical by traditional means like carving, sculpting or assembling. It will be made through a stereolithographer, an apparatus that can be seen as a 3D-printer. The stereolithographer solidifies the object from a liquid photopolymer. It allows the materialization of extremely complex shapes, with internal cavities, like sponges or cauliflowers. The resulting sculptures are made from a translucent resin, which allows the audience to see partially through them, and to grasp the complexity of their internal structure.





Ader's plane or the Crucifixion of Hybrids. *Surrational Morphology generated from the 3D-graph of a protein fragment. Two perspectives.*

It is to counteract the high-tech sophistication of the whole gestation process that the installation will be sober in its presentation, and serene in its atmosphere. The architectones are born from the ebullition and effervescence of numerical fermentation processes, but bear no trace of them: they just stand still in dimmed light, slightly glowing from inside, with a low-volume audio background. What must appear to the audience, beyond the interest and fascination of impossible 3D-labyrinths, is this kind of mythical pottery which can produce material objects directly from intentions and ideas, with no contact with materials; and that computer technology is now at a point where computers can produce totally unexpected and unpredictible results, forcing empirical explorations and opening the door to what could legitimately be called " algorithmic art ".