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GENERATIVE ART – O METODACH KREOWANIA PRZESTRZENI W SZTUCE I ARCHITEKTURZE

GENERATIVE ART – ABOUT METHODOLOGIES FOR CREATING A SPACE IN ART AND ARCHITECTURE

Abstract

This paper tries to identify the creative processes of Generative Art that brings to the construction of dynamic procedures of transformation, generative algorithms, by departing from interpretative logics. This structure becomes possible through a proactive approach to Geometry. In fact, overcoming the logic of the figures and related rules, this approach opens to the logic of the progressive processes and the dynamics of transformation inside the geometric space. This dynamic use of Geometry can be performed crossing the revolution operated by Brunelleschi, by Piero Della Francesca and Leonardo da Vinci again. This Renaissance revolution funds on the convergence of Art and Science and the discovery of the Perspective Logic.

Keywords: *Design Systems*, *Performance-Based Design*, *Generative art*

Streszczenie

Artykuł jest próbą zidentyfikowania procesów kreacji sztuki generatywnej, która oparta na tradycji euklidesowej geometrii wyznacza nowe możliwości interpretacji i kreacji obrazu w sztuce architekturze. Zjawisko Generative Art znajduje współcześnie spełnienie zarówno w sztukach wizualnych – malarstwie, rzeźbie, grafice, w rysunku architektonicznym, jak i w muzyce, tańcu, filmie, grach komputerowych. Generative Art, będąc połączeniem tradycyjnych zasad komponowania obrazu z technikami komputerowymi, wyznacza nieopisany wciąż rodzaj emocjonalnego odbioru i wartościowania sztuki. Opisanie pojęcia Generative Art na tle historycznych, ale jednocześnie naukowych podstaw rysunku klasycznego, daje nam możliwości twórczego wykorzystania całej palety dostępnych środków i narzędzi, których nadrzędnym celem zawsze jest wartościowanie i określenie pojęcia „dzieła". Zakres doboru warsztatu jest w tym wypadku pochodną nauk matematycznych i aktem samego tworzenia bliskiego sztuce klasycznej.

Słowa kluczowe: *zapis projektu*, *algorytm*, *geometria*, *sztuka generatywna*

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Generative Art, art of transformation, variations, performed by the newest computer technology and mathematical theories is connected with the classical design rules approach and composition order. Since last twenty years, the notion of Generative Art became to be a solid part of science and art within developing of computer applications supporting design and art process. Classical geometry is her a base and its methodology is not more than a supporting process to rationalization design approach and creative decisions.

Geometry is one of the main fields in the construction of the generative algorithms for the architecture, design, and visual art, but also for music and poetry. Since Generative Art moves from static forms to progressive transformations, Generative Geometry should be considered as the primary tool for managing dynamic process processes of change. Generative Geometry moves from geometric figures to the representation of dynamic logic processes. Exemplifying, such potentialities could be represented by the passage from axonometric representations to perspective views, the only ones that logically represent the infinity. The construction of generative and geometric algorithms founds more explicitly on logical interpretations by fixing point of view. It is also a way to describe preferred results of the past: the work of chief masters of interpreting them as results of a progressive process of transformation able to perform the quality that we appreciated. The aim is to construct procedures able to bring our design process in reaching such qualities.

Not analyzing these conditions but identifying which quality we like to transfer to our artworks, which quality corresponds to our vision. This goal is performed by clearly identifying the point of view and the objective. Operationally we are not doing copies of forms that interests us for the construction of a code, of a rule that represents our hypothesis: "how" we can construct events with the character that we like. And we will try to use these rules for managing the progression from the existing activities to the possible ones; in other words for designing or making art. The logical-geometric interpretation of our imaginary of reference, of the works of our masters, of what fascinates us, is the core of the construction of a generative engine and creative tools.

As, in Nature, a sequence of very different olive trees are all recognizable as the olive tree. Variations are infinite because there is no limit to variations of individuals belonging to a species, of representations of the same objects belonging to the same logical interpretation but changing the point of view.

We could define the Generative Geometry as "part of the mathematics that studies the dynamics of the spatial transformations and the progression of its figurations".

But Generative Geometry would be a sterile branch if there were not the perspective. It is not a case that the perspective, and its first logical form identified by Brunelleschi, has been a revolution in science. The identification of a logic perspective, or rather of a based logical structure of points of view and observed events, allowed a scientific approach based not only on deductive analysis but also to Logical Interpretations whose multiplicity is based on the points of view. The first and fundamental aspect of this "scientific innovation" has been to discover that these logical arguments can acquire the infinite and "to measure it" giving an essential impulse to the human knowledge.

The valid interpretations of spatial events could use different points of view and different perspective logics. These are not limited only to the perspective of Brunelleschi but they can also involve other perspective logics as the curved perspective, the anamorphic ones

and the inverse perspective of Florenskij, as well as the three-dimensional representations of events with more than three dimensions. We can start from simple examples. The choice of the point of view and the logical structure of the perspective, identifying a peculiar logical interpretation of the space, can define the character of the artwork and the vision of the artist. Two examples are very eloquent. The "Flagellation of Christ" by Piero Della Francesca and "the room" of Van Gogh. In both these artworks, the perspective image is paradoxical, particular and hardly verifiable in the reality. Also, if they both seems to be "normal" at the first sight. In the "Flagellation" the observer is very low, almost to the floor, and he looks toward the direction of the flagellated Christ. From that position he could not see in full the three figures, being these, of a fact, out of an acceptable optic cone; he would see only the low part of the dresses. Instead, forcing the geometric structure of the perspective the three figures are fully represented. The use of this point of view constructed an estranging image but geometrically "correct". And in this it reflects and renders explicit the interpretative logic of Piero. In the room of Van Gogh the perspective seems, at first sight, a reasonable perspective of the room seen by a standing observer. But the vertical lines converge upward. Since the observer is standing, taller than the bed and of the chair, these lines should converge downward instead. This converging is estranging because, to find again this possibility in a correct perspective image, or however in a "photographic" view, we must imply that the observer is, as he appears, more high then the objects but, at the same time, he looks upward. The whole room, therefore, would be seen with the tail of the eye while the observer (Van Gogh) is looking at the ceiling (that is not represented in the artwork) and the whole image of the room would be, in a certain sense, out of a "normal" optic cone. This posture represents, through the perspective logic, the discomfort, the character and the vision of Van Gogh. In the use of an "impossible" perspective image we can find something in common between Piero Della Francesca and Van Gogh. Both have used the perspective geometry clearly to communicate a strong subjective vision of a "normal" spaces. And this has produced a spatial order strongly interpreted but, also if impossible, logically correct. It shows how the perspective science can communicate subjective visions.

The logic to represent the events identifying points of view and observed events has allowed to build different perspective logics. While the perspective of Brunelleschi and Piero della Francesca identifies an observer and an observed point, other perspectives as the cylindrical and spherical anamorphic perspective, identifies one point of observation and a linear (cylindrical) sequence or a surface (spherical) of observed points.

This is the first possibility to go over the Brunelleschi perspective going in an axiomatic visual direction, opening to not Euclidean geometries. But it's possible to go ahead. The inverted perspective, identified by Florenskji in the Russian icons, inverts the direction of observer and observed point. Here, contrarily of the anamorphic perspectives, the points of view become manifold while the observed point returns to be unique. And this is indicative of the peculiar use of Russian icons: a multiplicity of people (points of view) looking at the same event, the face of the Saint. The Saint as we look from the inside of the head, or from the inside of a cube where the image is anamorphically projected. The Inverse perspective is focused by Florenskij saying that we only see the eternal surface of the objects. In this case the image is the same but the cube is inverted and we look to its external surface. This approach using different perspective logics and the related construction of generative

algorithms opened the possibility to "logically" interpret in different way the same event. The different points of view, all together, can refer to possible variations of the same logical interpretation, opening to the generation of endless possible results, endless individuals of the same species, recognizable through the same logical interpretation.

This is a way to collect our creative investigations, making them executable inside our generative software. It is possible to do that without creating a database but with generative algorithms. They, using as input different "points of view" can generate multiple variations. The interesting aspects of this type of the generative approach are two: each result is different, but each result is recognizable by the same logical interpretation, that is by the same "vision". In this way, the "author" can be expressed, and the style too.

This "change of point of view" is generally used by artists, designers, and architects, and it is of great utility in the creative process.

Simone Martini, tempera on panel, 1328 looking at the different buildings it's possible to verify that each building seems to be represented with a different perspective view. This "interpreted" points of view create a 3D line from outdoor to inside the medieval city. We can interpret it as representation of the 4th dimension in the two-dimension image. In the right image two frames of the transforming sequence of the solids following the path of points of view.

Simone Martini used, for drawing his artwork, the Generative Geometry. And it's possible to find this type of approach in Giotto too, and in some medieval artists living before the systematization of the perspective tools made by Brunelleschi. If this process is used in the creation of the space, the form of every three-dimensional solid transforms itself in progress, assuming different results and performing events that have characters fitting the vision of the author. Spatial orders and characters that are logically reproducible through algorithms because the process is repeatable.

This generative process can produce complex solid events that reflect our spatial vision. In that case the results are rounded solids where the curved lines are strongly controlled by an intrinsic harmony, the same harmony of the previous squared solid but different fascinating. Logics are mathematically describable. Therefore the construction of these generative algorithms is easily prosecutable, together with the objectives and to the characters that they intend to pursue. Following the same approach, a reverse perspective of a cube, for example, can be read as canonical perspective assuming that it is a 5 sides prism. The increasing from 4 to 5 sides transform the solid in a generative way moving from a logical geometric interpretation to another one.

This is the Generative Art Geometry. The logical sliding constitutes the hard core among different representations, among different spatial dimensions. In fact, another possibility can be performed by sliding from a dimension to another. The base is moving from two dimensions to three reading a two-dimensional image as was three-dimensional and vice versa.

The creative world of Generative Geometry is extremely wide, and above all it can fit the own vision. It can logically reflect our uniqueness of creative people, it is the logical world where we can identify and develop our vision as our style.
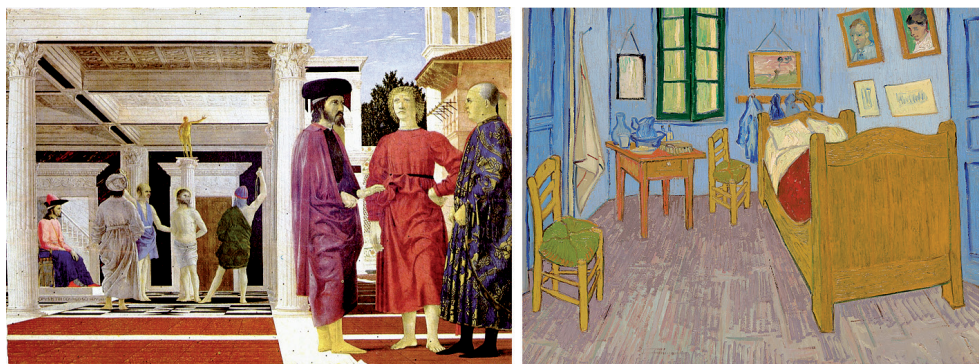
Ill. 1. "Flagellation of Christ" by Piero Della Francesca and "The room" by Vincent Van Gogh
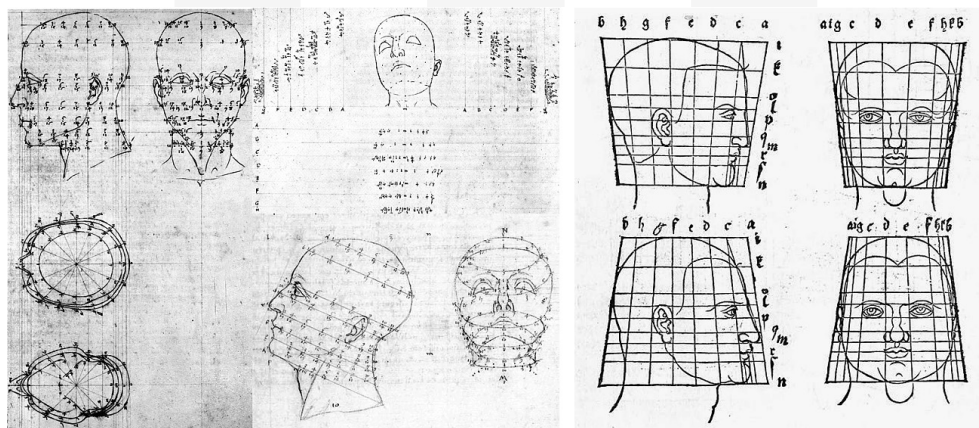
Ill. 2. Piero Della Frncesca, visionary definitions of quality versus Durer Albrecht – analytic definition of quantity – for human head sample

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