PO.EX

ESSAYS FROM PORTUGAL ON CYBERLITERATURE & INTERMEDIA

BY PEDRO BARBOSA, ANA HATHERLY, AND E.M. DE MELO E CASTRO

EDITED BY RUI TORRES AND SANDY BALDWIN

Computing Literature, the Center for Literary Computing, Morgantown, WV 26506

Published 2014 by the Center for Literary Computing.

Cover image by César Figueiredo.

ISBN-13: 978-1-938228-74-2 (pb)
978-1-938228-76-6 (elec)
978-1-938228-75-9 (pdf)

GENERATIVE AESTHETICS AND THE STANDARD FOR COMPUTER GENERATED TEXT[133]

PEDRO BARBOSA

1. Generative Aesthetics in the Computing Age

Within the framework of modern aesthetics, the generative is associated with the semiotic and informational. This considers the branch of generative aesthetics as more openly directed towards an application of art to the computer. Aiming at the generation of artistic products through programming techniques, Max Bense defined (in 1965) generative aesthetics as the "sum total (*Inbegriff*) of all operations, rules and theorems that applied to a repertoire of handling material elements may create a conscious and methodical aesthetic state" (135). This first definition, although very general, already included the possibility of admitting mathematical and machinic procedures.

Bense's generative aesthetics is, therefore, a theoretical-informational aesthetics intimately connected to Moles' Information Aesthetics, which is defined as follows:

> From this theory [information theory] was born a new application of cybernetics to these particular systems studied by science in the sphere of the artificial composition, and there is now an informational aesthetics. From constraint rules, duly established in the assembly of signs, the aesthetician may have a computer storing pieces of information, then using a program we call algorithm, gathering them in a certain order more or less subtle, and finding the possible variations (combinatorial) (218).[134]

In the arts that allow an immediate formal representation—such as musical or pictorial production (electronic and stochastic music, industrial design,

133 Pedro Barbosa, "A estética gerativa e o modelo geral da criação computacional" (From *A Ciberliteratura: Criação Literária e Computador*, 1996, pp. 69-78). Translation by Isabel Basto.

134 See Appendix 12 for original Portuguese.

creation of image synthesis, or cinematographic animation)—astounding results have already been achieved. Why not, then, in literary production?

Here the plot thickens, partially due to the intimate nature of the verbal sign, which is composed of an indissociable pair of signifier and signified, without which the verbal sign loses its peculiar linguistic functioning. This sometimes occurs in the so-called visual poetry, as in sound poetry, where the word is taken essentially in its material, graphic, or sonic dimension. The verbal sign always assumes a dimension that transcends it as pure sound or visual material, designating a real or imaginary space with its own rules and peculiar demands.

Such semantic halo concerning words, when they emerge from the spew of the machine, have constituted one of the major obstacles both to the abstract radical formalization of language and to its purely material treatment. The machine may work on language in its phonetic or lexical status, as well as in its morphosyntactic functioning. However, its total blindness regarding semantics—its complete awkwardness regarding the world of meaning—is perhaps the limitation that has chiefly affected or impaired research in this domain.

Generative aesthetics, by definition, aims to achieve products through computer programming techniques. In its objective and in its method, it diametrically opposes traditional aesthetics (analytical and descriptive). Traditional aesthetics elaborates on created aesthetic objects, studying them a posteriori, in order to detect in them the general laws of artistic creation. Whereas generative aesthetics proceeds through anticipation, aprioristically, researching creation models able to generate new aesthetic products. Both lines of work are complementary, but whereas one approaches the performed work, the other turns to the work to be performed. Generative aesthetics is, therefore, a virtual aesthetic, essentially fulfilling a heuristic function. It is not merely a philosophy of beauty but also an experimental science founded on a theory of creation.

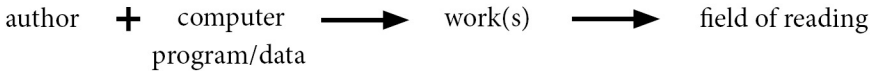
In *Gramática da Fantasia*, Gianni Rodari adapted Nake's formula from computer graphics and proposed this: the set of the three elements (S, R, I) will schematically represent the aesthetic program. Where S is a finite repertoire of signs, R is a finite number of rules to combine those signs among themselves, and I is a finite intuition to establish which signs and which rules to apply to S and R.

2. Standard for Computer-generated Literary Creation

From the previous definition, the idea emerges that artistic creation—while incorporating electronic computing systems—needs to unfold in two distinct operations: conception and performance. The conception phase, which includes the elaboration of a repertoire of data and the invention of an algorithm (or generative model) to treat it, is the human part of the process. The performance phase will then be executed by the machine. This way, the aesthetic product will firstly depend on the material elements supplied to be used as signs. That is, it will depend on the kind of repertoire, to the extent it may be constituted of graphic signals, words, sounds, lines, forms, or colors. This will determine the kind of aesthetic performance to produce, whether it is a text, a melody, a drawing, or a colored image. Secondly, the aesthetic product will depend on the work model (algorithm) introduced in the program. The computer will obey the program's directives.

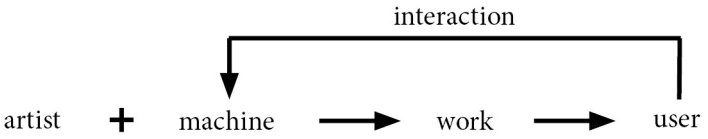
At this stage, it becomes clear to what extent the human decision will affect the product, as well as the machine labor. The artist-programmer then commands two fundamental fields of intervention: at the repertoire level and at the algorithm level. Through the repertoire (according to the physical nature of the signals fed to the machine) the artist-programmer will determine the type of aesthetic object to perform (text, graphic image, music, etc.). According to the sign selection, he/she will determine in variable degree the very scope of meaning. Through the algorithm of creation embedded in the program, he/she can influence the model, the structure, and the composition of the aesthetic products to be obtained.

At any rate, computer generated artistic creation intertwines a new element—an interactive cybernetic machine—within the communication circuit between the artist and the performed work(s):



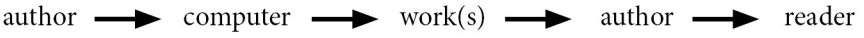
What is fundamentally new in computational art is this interposition between the

author and the work of a cybernetic machine—a machine with a relative autonomy or machinic freedom, defined by the indetermination parameters and the retroactive variation contained in the program itself. If the device is also equipped with interactivity (as discussed next), it partially transfers the ability to influence the resulting

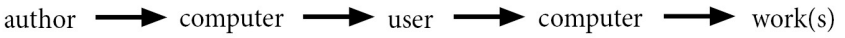


work to the user, while attaining its freedom to decide:

Actually, the field of reading that is widely provided by the machine in its variety of multiples can be exploited by the author directly, who will select the results obtained in symbiosis with the machine and deliver them to the reader. A printed book is a perfect example. It can also be exploited by the end user of the potential work: the reader/user, who is directly using the program and running it in his/her own personal computer. In fact, at the time of the great computers from the 1970's, literary mediation was usually made through written text (book, magazine, green bar paper, etc.), implying that the field of reading was previously exploited by the author according to the scheme:



Nevertheless, with the widespread use of the domestic microcomputer, the vehicle for literary mediation became the program, remaining the field of reading to be exploited directly by the software users, as end readers. With some fluctuations, the mediation scheme has become:



The computer (or program) intervenes in this second mode at two stages. This allows the degree of openness, which was previously restricted to the structure of the texts, to become inherent to the program itself. This allows for an

interactive dialogue between the program and the user, in other words, a dialogue between the computer and the reader, and subsequently a more active participation in the final making of the work(s).

Interactivity (proven to be the most exploited resource over recent years in literary computing) allows the program to reserve a margin of freedom that is increasingly larger when the user is requesting data, or when the user introduces other elements by their own choice. These new indications are afterwards manipulated by the program that had previously left them out in the open. In such case, a real interactive dialogue between the program and the reader is established. The resulting texts will now depend not only on the program's author, but also on the elements partially provided by the reader. The program's degree of openness thus leads to an active participation (user/reader) in the making of the text.

3. Fundamental Creativity and Variational Creativity

The term creativity—as noted by Melo e Castro in his book *Poética dos Meios e Arte High Tech*—tends to lose certain metaphysical connotations that were once part of the very concept of creation.

Regarding this subject, Abraham Moles' distinction between absolute creativity (or fundamental creativity) and variational creativity (secondary creativity) seems useful.[135] Absolute Creativity (or transcendental) is exclusively human, and we will name it fundamental creativity (or primary creativity) because it creates from the root, determining the foundations of Variational Creativity itself, which is a derived (or secondary) creativity regarding the former. The latter may be perfectly executed by a computer, which reveals a tendency to systematically exploit the entire range of possibilities inside the module determined by the program. In turn, the program configures the result of an act of fundamental creation. And, therefore, all combinatory creations are no more than derived creations of a fundamental model.

Human creativity—which in computer creation will be expressed in the algorithm's conception (more or less potential, with a larger or smaller degree of freedom reserved to the user)—is, therefore, an essential or ontological creativity. Only the human mind may invent or originate literary models.

135 This is an adaptation of Moles' work by Barbosa.

The computer is supposed to develop and apply this fundamental creativity in its multiple variational scopes. The computer will, therefore, operate in the field of this variational creativity, exploiting it to exhaustion (combinatory case), or through partial choices (randomly extracted) when the combinatory reaches endless results at the human or machine time scale. It is, therefore, always a derived or secondary creativity.

Let's say that the primary creation is the abstract conception of an object or artifact (for instance, the design of a house, an automobile model, or a simple shoe), and the variational creativity is the one the architect, the engineer, the industrial, or the artisan develop afterwards around that matrix (of the house, automobile, shoe) exploiting the unlimited amount of possible concrete objects. In the first example, each resulting house may differ from the others in its accessory and adjective features (wall paint, doors, positioning of windows, roof shape, orientation of verandas, etc.). An automobile factory, in turn, applies a standard for a motorized vehicle—considering not only its shape but also its function. Within that standard, an indefinite amount of concrete units are generated, all more or less different from each other.

Fundamental (human) creativity will then correspond to the conception of that abstract model of an object—which may be, in the present case, a textual model to exploit. The computer will receive the task of exploring and eventually updating (depending on the sort of peripherals employed) all possible variational units in accordance with the parameters defined by the potential model the program formally contains.

Computer use introduces a cleavage between those two types of creativity in Art: the creation of models (in fact, the authentic creation reserved to the artist) and the variational creation (reserved to the machine). With superhuman precision and speed, the machine may explore and eventually execute all or most of the concrete applications of that abstract model—its variational multiples.

The choice between these multiples may be subject to rules defined and filtered by the program itself, but it may also be made by the author, who in a posterior phase will analyze and select—according to his own criteria—the wide range of materials provided by the machine. Presently, in the age of the personal computer, this choice may be otherwise left to the end user of the program: the real substitute of the book reader in the computing age. All of this implies a concept of potential literature, which is open in its concrete results to the user or

reader, and a concept of variational art, whose invention was actually far previous to the computer appearance (Moles 97–134). The structure of both concepts is intrinsically tied to Umberto Eco's notion of open work.

4. The Limits of Artificial Imagination

We expect to have reasonably clarified the limits of machines' creativity and, at the same time, the scope that, according to our point of view, may attain the so-called Artificial Imagination.

Obviously, in the present computing scenario, the Artificial Intelligence domain is not consensual. It has originated diametrically opposing attitudes—from a discouraging skepticism (the weak AI hypothesis), to a perhaps sometimes unrealistic optimism (the strong AI hypothesis). We believe this is due, in both cases, to a different use of the term intelligence, and also to the difficulty in reaching consensus regarding the concept of intelligence. Therefore, the expressions "creative computer" and (even if metaphorical) "Artificial Imagination" are defined cautiously with a limited scope.

Ultimately, it seems legitimate for us to accept that the computer generated artistic creativity, or the use of creative computer (at least in the present state of Computing), will for now remain limited to the exploit of that secondary creativity, derived or variational.

But the computer is not undervalued. As a machine, it is placed at the status of precious auxiliary to the artist (not his/her replacement), collaborating with him/her in the exploit that, at the human scale, may be infinite of the countless variational possibilities of one same matrix.

The computer, benefiting from extreme working speed and precision, may function symbiotically with the artist and become a real extension of his creative and executive potential.

Of course, this new line of artistic work (made in collaboration with the computer) seems justified only in the cases demanding or allowing the application of potential algorithms. It is within them that the machinic freedom (cybernetic or interactive) will operate. And, concerning the law of the large numbers, it is easy to conclude that the computer may best perform its mission of sign manipulator within the scope of a combinatory art.

After all, every artistic choice inevitably implies an implicit combinatory, which is more or less possible to formalize or achieve. Even language can be construed as an endless hierarchic combinatory of a quite restricted number of signals.