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# Waldemar Cordeiro: Computer Art Pioneer

*Annateresa Fabris*

In his presentation at a conference on the relationship between the rational and the irrational in contemporary visual research (in June 1973 in Zagreb [1]), Waldemar Cordeiro proposed the reduction of the equation constructive art/computer art/conceptual art in favor of a “non-antinomic dichotomy of computer art/conceptual art.” Despite once having been the principal theoretician of Concrete art [2] in Brazil, Cordeiro no longer had anything to do with the past experience, to which he referred as the “paleocybernetic era” of art history. The artist also questioned the conference’s main premise. He regarded conceptual art and computer art not as integral parts of the traditional dialectics between rationality and irrationality, but as each embodying a different structure, the roots of which are in physical-analogical theory (conceptual art) and in logical-mathematical theory, i.e. in digital theory (computer art) [3].

For a long time Cordeiro, whose earliest experiments with computer art dated from 1968, had been a highly demanding critic of traditional art processes. Against them he posed the need for a direct relationship with the new rhythms and visual possibilities introduced by the technological revolution.

The Constructivist experience, which Cordeiro rejected at the 1973 forum, had propped up the definition of industrial art, making it possible to establish a fruitful relation between new technological achievements and artists’ contributions toward the building of a new perception of art. All developments in contemporary art should veer toward industrial art, i.e. toward a type of experience completely devoid of any personal traits. Throughout his career, Cordeiro presented analogies between the processes of industrial production and Concrete art production. In 1958 he wrote:

With pre-established movements, the so-called executive operations obliterate all personal initiative. The manufactured object results directly from this process, without undergoing alterations during manufacturing—exactly as in the case of Concrete art, in which harmonizing-regulating guidelines establish an analogy that correlates all elements on an equal basis. . . . Where the visual element is concerned, Concrete art presents yet one more factor of identification with manufacturing. The perfectly characterized element abides by a few types that correspond to elementary geometric forms. The trend calls for element standardization. . . . Conceptions of color and texture assert process identity, i.e. the morphological identity between Concrete art and manufacturing. Vanguard artists accept the rigor and responsibility that result from a rational language and adapt themselves to working conditions similar to those of blue-collar workers. They become the mythological “art laborers” of one hundred years ago. After so many “Saint-Simonist” [4] utopias and apologies, it appears that the industrial art issue has found a real, artistic solution at last [5].

In an interview given in 1970, Cordeiro proposed a new scope for the art/industry relationship, always grounded on a Concrete praxis. He presented Concrete art in a Utopian manner as an experience that had sought to solve communications problems of the industrial society:

This means that it [Concrete art] conducted an in-depth research of machine language, that is to say, the so-called artificial languages. Concomitantly, it researched the multiplication of artworks . . . and, the moment it introduced art issues in the environment of machine language, the artist’s communication and creative skills evidently were discovered. . . . The utilization of artificial, electric media ends up offering a different perspective and a different value of physical equipment, i.e. physical reality [6].

In spite of the apologetic language of various interjections, Cordeiro was aware of the actual limited reach of Concrete art with regard to industrial production. In 1965 he referred to the relation between Concrete art and industry as “Platonic,” because “notwithstanding the appearance, everything is made by hand or at least as a single object, rather than as a series.” If, on the one hand, the productive relation had not been satisfactorily resolved, on the other hand, the art/industry relation had been quite fruitful on the formal plane, where it led to a “radical renovation of visual media” [7].

Cordeiro attributed this renovation to an increasingly greater utilization of electricity and electronics. Among their potential applications he emphasized the “artificial channels” proclaimed by Abraham Moles [8], capable of switching various functions of social life, particularly culture, from the physical plane to the immaterial plane [9]. Excited about the possibilities of communication and broadcasting introduced with the use of electronic instruments, Cordeiro set up a counter-

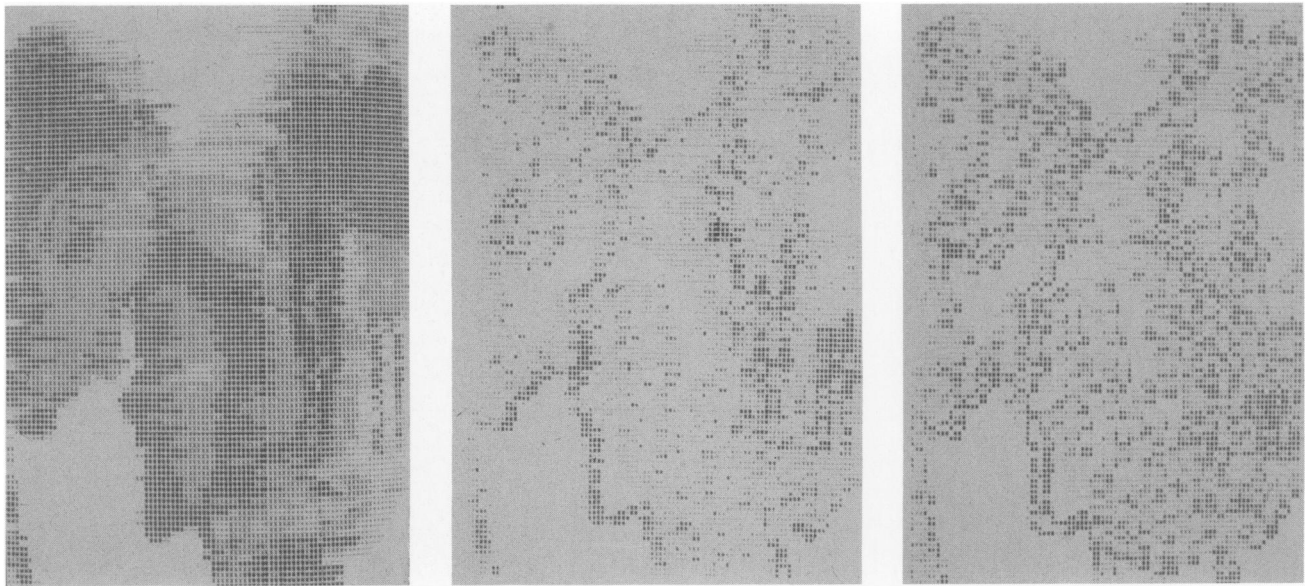
## ABSTRACT

Originally a member of the Brazilian avant-garde scene which developed Concrete art in Brazil in the 1950s, Waldemar Cordeiro abandoned paint and canvas in the late 1960s to become one of the international pioneers of computer art. His achievements, interrupted as they were by his sudden and premature death in 1973, still rank among the most important early contributions to computer art. The author analyses Cordeiro’s work and highlights his late philosophical views, revealing that through his computer pieces and writings he raised many social and aesthetic issues that are still of great significance today. This article is complemented by a translation of Cordeiro’s *Arteônica* manifesto, written in 1971.

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Translated by Izabel Murat Burbridge. This paper was originally presented at the forum “Artmedia V” held at Salerno University, Italy, 23–25 November 1995.

This article is part of the *Leonardo* special project entitled “A Radical Intervention: The Brazilian Contribution to the International Electronic Art Movement,” guest-edited by Eduardo Kac. The project consists of a wealth of information in the form of a gallery, chronologies and a series of articles published in various issues of *Leonardo* and on the Leonardo World Wide Web Site (<http://www.mitpress.mit.edu/Leonardo/home.html>). For more information on Cordeiro’s work in Portuguese, including reproductions of his computer art, please see <http://www.impa.br/visgraf/Gallery/waldemar/waldemar.html>.



**Fig. 1.** Waldemar Cordeiro and Giorgio Moscati, *Derivadas de Uma Imagem* (Derivatives of an Image), the first visual computer artwork made in Brazil, 1969. (a) Degree zero, 47 × 34.5 cm. (b) Degree one, 47 × 34.5 cm. (c) Degree two, 47 × 34.5 cm. For this work, Cordeiro used as a starting point a photographic image of a young couple expressing mutual affection through physical contact. The rational approach implied in digitally processing the image was balanced by the personal and emotional content of the picture.

point between traditional art and electronic art. Because of its own communication system, traditional art implies a limited consumption that does not correspond to the real cultural needs of contemporary society. While presenting a serious problem in itself because it restricts the fruition of art to a certain environment, traditional art suffers from another great limitation: rather than being seen in a straightforward manner, art is disseminated mainly through processes of mechanical and electronic reproduction that impoverish it in terms of perception and information.

If the division of traditional art into sectors conflicts with the new world culture, itself open and interdisciplinary, Cordeiro set it off against electronic art, which he called *arteônica* in Portuguese (arteonic). This “arteonic” not only transforms the nature of the transposed image, but also exposes it to a much more ample and refined fruition. The review of various possibilities offered by the computer did not turn Cordeiro into an acritical partisan. As a keen observer of an occurrence he called sophisticated hedonistic demonstration, the artist recognized, however, that the skillful utilization of the computer had the great merit of

demystifying traditional art and contributing toward the analysis of mental processes in artistic activity. . . . Should we handle artistic issues either with machines or with teams in which the computer is a partner, we will learn more

about how individuals handle artistic issues. Simulation efficiently and promptly duplicates traditional art production, which it drains and exhausts, thus issuing a death certificate to misoicism [10].

If the first type of computer art was limited, Cordeiro remarked that a second possibility, with emphasis on visual syntax and based on Concrete art, was capable of producing interdisciplinary works based on findings in the fields of gestalt and neurology. Cordeiro was a political supporter of the Italian Communist Party (he lived in Rome from his birth in 1925 until 1945), who shared Gramsci’s notion of culture. He discerned in electronic art the possibility to form, in a country of continental dimensions such as Brazil, an artistic culture of national and international reach. He wrote:

In the past, culture faced physical limits resulting from the settlement of national territory by different-sized communities located thousands of kilometers apart. Some of these areas of extremely low population density were virtually uninhabited and lacking modern conveniences. On the other hand, in other communities, the population’s coexistence in excessively close proximity ended up downgrading living conditions and jeopardizing potential communications. Electronic media could correct these two anomalies and promote a greater environmental balance between physical factors and communication itself [11].

While attributing to art the function of “communication of communication,”

Cordeiro regarded the computer as an instrument for changing society through its capacity to translate reality into digital form and its ability to offer developmental alternatives through simulation processes. To Cordeiro, a modern artist is

an individual who is able to create new communication techniques. Thus, art’s interdisciplinary nature is absolutely up-to-date because it no longer depends solely on criteria acknowledged by and large as exclusive of academic art. The latter has lost its meaning and *raison d’être* because it cannot survive in a society where transmission and reception of communications are instantaneous. Here the computer appears as the common denominator of various trends, or yet the multidisciplinary nature of trends, and creates conditions for a new Humanism! [12]

In his quest for a precise, “self-conscious” art capable of responding to the technical issues raised by technological advancement as well as by the cultural status of mass society, Cordeiro detected in computer methodology the accomplishment of a series of digital processes introduced by Seurat and subsequently developed by analytical Cubism, Suprematism, Neoplasticism, Constructivism and Concretism [13]. The common element to these trends is found in the notion of an extremely intellectual art that counters any direct, phenomenological experience. The distinction between “creative art” and “expressive art” as proposed by Fiedler [14] led

Cordeiro to fiercely defend the need of a new art canon based on a “repeatable relation, a mechanism for integrating the object in the outer world,” with accurate meanings that do not exist in conventional and subjective formulas of traditional aesthetics [15].

The relation Cordeiro established between the inherent possibilities of electronic art and the democratization of art reception—thanks to mass media and the reproducibility of new esthetic messages—confers him a unique status in the realm of Latin American experiments. The artist—who conducted research with the collaboration of university faculty members in Campinas and São Paulo, including Giorgio Moscati, Ernesto Vita, Jr., José Luiz Aguirre, Estevam Roberto Serafim, Raul Fernando Dada and J. Soares Sobrinho, N. Machado—believed that the use of computers could turn art into a popular achievement easily reproducible through software and transmissible overseas by telephone. However, this Utopian perception was not shared by theorists such as Jorge Glusberg, who wrapped up the introduction to a 1973 exhibition of Latin American computer art with a very bitter diagnosis:

This doesn't mean that the computer as an instrument of production is too expensive for us, Latin Americans, or that it is too sophisticated. Basically, the question is its unavailability for artists to express their own issues, including ideological content and share of contribution to the society in which they belong [16].

Although Cordeiro attributed great importance to the intellectual and rational aspects of computer art, Abraham Moles described Cordeiro's technical pictures in terms of exerting “fascination” or “allure.” Such fascination and allure originate from an integral scheme—that is to say, a regulatory order of dots, blots and colors, and from a quest for form, all of which set their roots in the notion of example rather than in the old concept of artwork [17].

Cordeiro used an IBM 360/44 computer at the Universidade de São Paulo School of Physics to conduct, in 1968, his first computer-art experiment, with the assistance of Giorgio Moscati. The experiment produced the series *Beabá*, also known as *Conteúdo Informativo de Três Consoantes e Três Vogais Tratadas por um Computador* (Informational Content of Three Consonants and Three Vowels Processed with a Computer). This series, based on probability and combinatorial grouping, yielded a 10-page booklet fea-

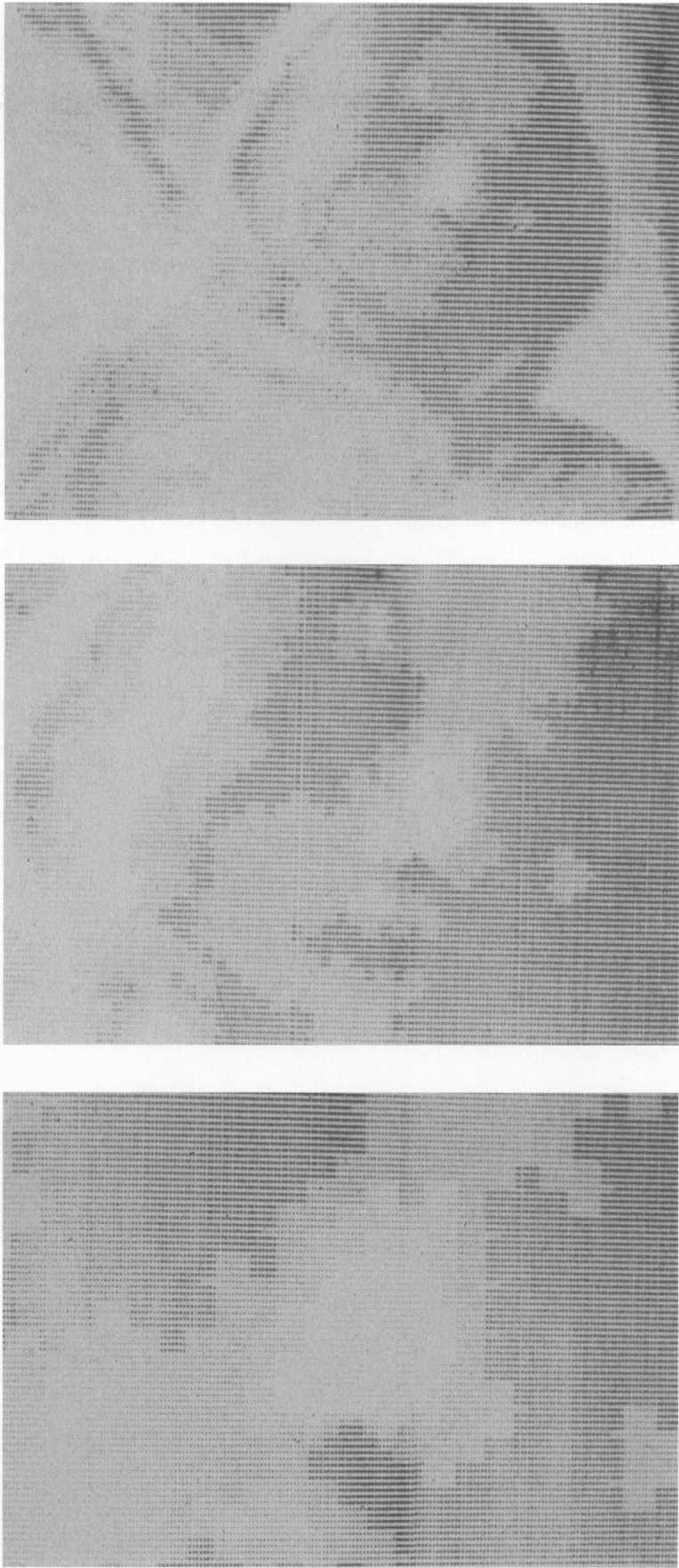


Fig. 2. Waldemar Cordeiro and Ernesto Vita, Jr., *Retrato de Fabiana* (Portrait of Fabiana), three of a sequence of four images, 37.5 × 50.5 cm each, 1970. In this portrait of a little girl, the artist zoomed in on an area of the girl's face, losing the original reference and revealing the basic elements that construct the image.

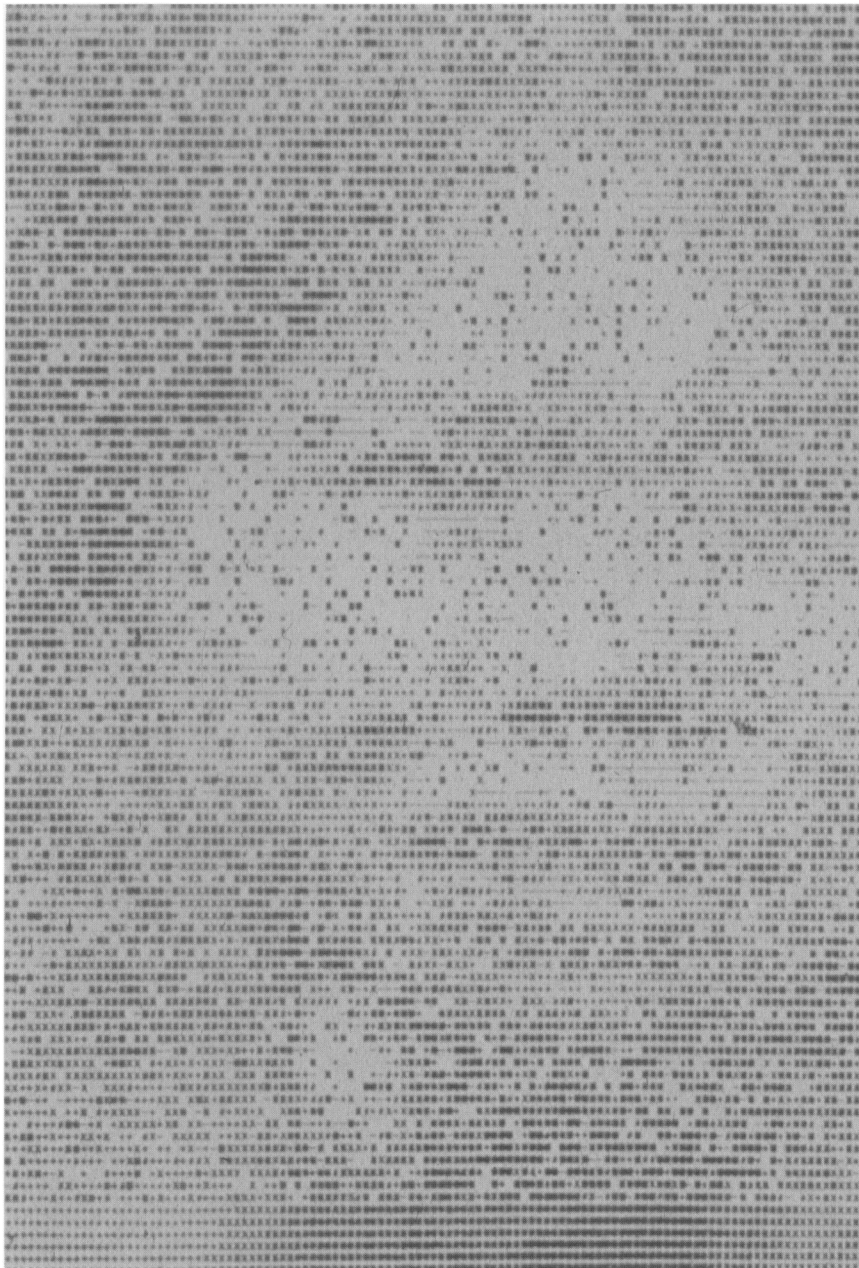


Fig. 3. Waldemar Cordeiro, José Luiz Aguirre and Estevam Roberto Serafim, *A Mulher que não é B.B.* (The Woman Who Is Not B.B.), 61 × 44.5 cm, 1971. In this work, Cordeiro referred to Brigitte Bardot, the French actress. The image of a Vietnamese young woman in distress, processed digitally by the artist, has clear political overtones, as it contrasts the glamour of cinematic spectacle with the horrors of another form of contemporary spectacle, the war.

turing various sets of three vowels and three consonants that were progressively changed to cover the entire alphabet in proportional rate to their occurrence in Portuguese usage.

He next produced *Derivadas de Uma Imagem* (Derivatives of an Image) (Fig. 1), the first computer-generated drawing made in Brazil (1969). In this experiment Cordeiro resorted to manual graphic operations and utilized the mathematical concept of derivative function [18] to transform a photo image

into a set of dots. This transformation of a photographic image was also utilized in *Retrato de Fabiana* (Portrait of Fabiana) (1970) (Fig. 2) and *A Mulher que não é B.B.* (The Woman Who Is Not B.B.) (1971) (Fig. 3) [19]. The original reference in each work was decomposed into a set of dots; in the latter picture the dots originated from a computer program set at 30% random occurrence [20].

All these experiments as well as one entitled *Gente* (People) (1972–1973) (Fig. 4) are close to the logic of photog-

raphy, which they corroded to highlight the structural makeup of the picture itself. Although in 1972 Cordeiro introduced a new type of research for which he utilized a four-color plotter, only a few images were produced before his premature death in 1973. One of these pictures, entitled *Pirambu* (1973) (Color Plate B No.1), became emblematic for combining the artist's esthetic and political concerns. The representation of a low-income home painted in typical colors, which is rational in its simplicity and formal economy, may be seen as a sort of synthesis of Cordeiro's goals. In his work, an archaic Brazil and a modern Brazil meet and combine thanks to the technology designed, in a utopian manner, as instrument for swift changes, but not indifferent to the artistic values that the artist adopted for building a new visuality.

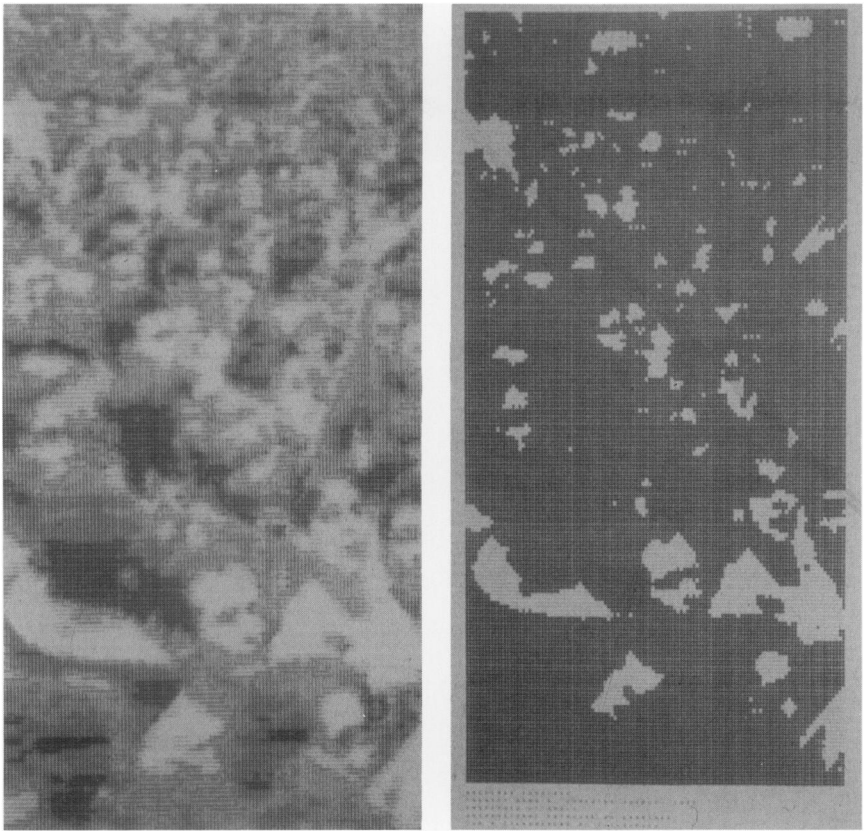
The review of Cordeiro's pictures leads to a better understanding of the difference between example and artwork as stated by Moles. If the greatest part of Cordeiro's results remain associated with the more traditional languages—from the older ones, such as drawing, to the more recent ones, such as photography—what counts above all is the desire to establish new possibilities for the picture in consonance with a society that the artist views as transformed by mass media and information technology. This status explains the Cordeiro's detachment from his previous Constructivist experience; although Constructivism was the predecessor of digital art, Cordeiro felt the two disciplines nonetheless do not share any heuristic and structural attributes.

Cordeiro did not regard the contribution of electronics only in terms of art, as he clearly stated on several occasions when he sought to focus the center of reflection on a new urban awareness. For example, in 1970 he wrote:

Will the nucleation around railroad stations and the urban linearity originated from rubber tires survive the hegemony of electricity, or will urban morphology present new characteristics? This issue addresses a crucial problem shared by the metropolis of São Paulo as well as other large cities: centrality. Other authors have alluded to metropolitan macrocephaly without ever as much as having requested an electroencephalogram. . . . The problem resides in finding out to what extent the city needs—and will still need, twenty years in the future—its downtown district, and whether the term "downtown" will support its traditional semantic denotations and connotations.

Without any doubt, some roles played by the city center will remain, while others will be replaced by elec-





**Fig. 4. Waldemar Cordeiro, images from the series *Gente* (People), 1972–1973. (a) Waldemar Cordeiro, Raul Fernando Dada and J. Soares Sobrinho, *Gente, Grau 1* (People, Degree 1), 63.5 × 30.5 cm, 1972. (b) Waldemar Cordeiro, J.L. Silveira, and Carlos A.T. Pulino, *Gente, Grau 6* (People, Degree 6), 126 × 61 cm, 1972. This work shows a multitude of individuals agglomerated into a jumbled mass, revealing the faceless anonymity typical of large urban environments. The series of image transformations further emphasized this idea, since the images became less discernible as the artist processed them digitally.**

tricity. In agreement with the previous notion, the question is not to check whether the face-to-face condition at the “meeting point” . . . is more informative than the messages received by other channels, but to figure the price paid (in a global, broad sense) by the population to keep alive—or quasi-alive—the image of a downtown district. . . . Historical evolution is being regarded as the development of quantity of a same quality. Could we legitimately trust that the future will bring a new quantitative development of the currently prevailing quality, or would it be better to believe that the future will bring the (already past) advent and maturity of a new quality? [21]

The city devised by Cordeiro is yet to come about. The “maturity of a new quality” has not found its place in a city like São Paulo, where the notions of rubber tire and urban nature of “physical transportation” still prevail [22]. Nonetheless, this fact does not lessen the importance of his considerations on the relationship between production structure and communication media, of

great importance in the current political and cultural debate.

**References and Notes**

1. *Editor's Note:* Congress of the International Association of Art Critics, Zagreb, Yugoslavia, 1973. The congress was accompanied by a homonymous exhibition, “The Rational and the Irrational in Visual Research Today,” which took place at the Contemporary Art Gallery.—*E. Kac, Section Editor*
2. Concrete art is “art composed of simple, non-representational visual forms, linked to the notion of structure as a continuous organizing principle. The name was chosen in preference to *abstract art* on the grounds that the artist’s activity is the reverse of a process of abstraction. Max Bill defined concrete art as the effort ‘to represent abstract thoughts in a sensuous and tangible form.’” Edward Lucie-Smith, *Dictionary of Terms* (New York: Thames and Hudson, 1991) pp. 56–57.
3. W. Cordeiro, “Arte analógica e/ou digital,” in *Arte: Novos Meios/Multimeios. Brasil '70/'80*. (São Paulo: Fundação Armando Alvares Penteado, 1985) pp. 191–192.
4. *Editor's Note:* Here Cordeiro is making a reference to French political reformer Claude Henri de Rouvroy, Comte de Saint-Simon (1760–1825), one of the founders of socialism, who would later influence socialists and Marxists, as well as advocates of the modern capitalist state.—*E. Kac, Section Editor*

5. G.S. Wilder, *Waldemar Cordeiro: Pintor Vanguardista, Difusor, Crítico de Arte, Teórico e Líder do Movimento Concretista nas Artes Plásticas de São Paulo na Década de 50* (Waldemar Cordeiro: Vanguard Painter, Promoter, Art Critic, Theoretician and Leader of the Concrete Art Movement in the 1950s) (São Paulo: Escola de Comunicações e Artes da Universidade de São Paulo, 1982) pp. 83–84.
6. Wilder [5] pp. 93–94.
7. W. Cordeiro, “Realismo: Musa da Vingança e da Tristeza,” in Ana Maria Belluzzo, *Waldemar Cordeiro: uma Aventura da Razão* (São Paulo: Museu de Arte Contemporânea da Universidade de São Paulo, 1986) p. 130.
8. Abraham Moles is on the faculty at the Université Louis Pasteur, Strasbourg, France, and Director of the Institute of Social Psychology of Communications. Moles was one of the first aestheticians to deal with cybernetic issues. Moles has published a number of books, including, in 1958, an influential book entitled, *Theorie de l'information et perception esthétique*.
9. W. Cordeiro, “Uma Nova Variável para o Modelo de Organização Territorial: a Evolução dos Meios Eletrônicos de Comunicação,” in Belluzzo [7] p. 161.
10. W. Cordeiro, *Arteônica: o Uso Criativo de Meios Eletrônicos nas Artes* (São Paulo: Editora das Américas/Editora da Universidade de São Paulo, 1972) p. 4.
11. Cordeiro [10] p. 4.
12. Wilder [5] pp. 260–261.
13. W. Cordeiro, *Computer Plotter Art* (São Paulo: USIS, 1969).
14. *Editor's Note:* At the end of the nineteenth century, Conrad Fiedler emphasized intellectual justification in art. His doctrine of art focused on formal knowledge.—*E. Kac, Section Editor*
15. Wilder [5] pp. 85–86.
16. J. Glusberg, *Arte y Computadoras in Latinoamérica* (Buenos Aires: CAYC, 1973).
17. See Cordeiro [3] pp. 192–193.
18. *Editor's Note:* The *American Heritage Electronic Dictionary* thus defines this mathematical concept: “a. The limiting value of the ratio of the change in a function to the corresponding change in its independent variable. b. The instantaneous rate of change of a function with respect to its variable. c. The slope of a graph of an equation at a given point. Also called differential coefficient, fluxion.”—*E. Kac, Section Editor*
19. *Editor's Note:* In the title of this piece, *A Mulher que não é B.B.* (The Woman who is not B.B.), Cordeiro alludes to Brigitte Bardot, the French actress. The image of a Vietnamese young woman in distress, processed digitally by the artist, has clear political overtones, as it contrasts the glamour of cinematic spectacle with the horrors of another form of contemporary spectacle, the war.—*E. Kac, Section Editor*
20. Belluzzo [7] p. 33.
21. W. Cordeiro, “Uma Nova Variável para o Modelo de Organização Territorial: a Evolução dos Meios Eletrônicos de Comunicação,” Belluzzo [7] pp. 163–164.
22. Cordeiro [21] p. 164.