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Theatre Journal, Volume 73, Number 3, September 2021, pp. 339-357 (Article)

Published by Johns Hopkins University Press



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# Scripting Control: Computer Choreography and Neoliberal Performance

Douglas Eacho

In a double-length 2019 *Dance Chronicle* article, Francisco Sagasti surveys a history of what he calls “computer choreography”: uses of computers for staged dance, with a particular emphasis on the use of computers to *choreograph* dance through rudimentary types of “AI.”<sup>1</sup> Moreover, he submits, in 1968, he led such a project at Pennsylvania State University (where he was pursuing a doctorate in operations research), writing software that scored a student-performed dance. Sagasti expresses boundless faith in computers, predicting that “interactions between human and machine intelligence will bootstrap each other, opening new and extraordinary opportunities for joint advance.”<sup>2</sup> As suggested by his sanguine tone, Sagasti is no typical performance scholar. He may not be the first engineer to write for *Dance Chronicle*, but I expect he is the first former chief of strategic planning for the World Bank, first former chairman of the United Nations Advisory Committee on Science and Technology, and first sitting deputy of the Congreso de la República del Perú to have done so. In fact, one year after the publication of his article, Sagasti, as the intellectual leader of the center-right technocratic Purple Party, assumed office as president of Peru in the aftermath of a failed far-right coup. Could this singular career inform a general study of digital performance? What links computer choreography to the World Bank structural-adjustment programs that Sagasti led from 1987 to 1992? How does the digital governance of bodies on a 1968 stage connect to a 2021 plan for “a strong economy propelled by diversified production, support

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I would like to thank Kellen Hoxworth, Rebecca Chaleff, Rebecca Eacho, Selma Odom, E.J. Westlake, Sean Metzger, and the two anonymous reviewers for their responses to earlier drafts of this essay. Sidney Skybetter and Seika Boye helped this research meet its first audiences at the Conference for Research in Choreographic Interfaces at Brown University and at the Institute for Dance Studies at the University of Toronto. The archival research was made possible by Stanford University’s Graduate Research Opportunity Grant in Modern British History and its Pigott Scholars fellowship. My particular thanks to Branislav Jakovljević, whose questions prompted this inquiry.

<sup>1</sup>Francisco Sagasti, “Information Technology and the Arts: The Evolution of Computer Choreography during the Last Half Century,” *Dance Chronicle* 42, no. 1 (2019): 1–52.

<sup>2</sup>*Ibid.*, 34, 41.

for entrepreneurs, and the use of information technology”?<sup>3</sup> To answer, this essay will consider computer-scored dance as part of the aesthetic project of neoliberal thought.

The practice of *computer choreography*, here defined as the production of staged dances through the generation of choreographic scores by digital computers employing software written for this purpose, extended far past Sagasti’s single experiment.<sup>4</sup> Dozens of such dances were performed between 1964 and 1978 across the United States, Europe, and South America, with films of the work shown at major museums, universities, and dance conferences, largely under the direction of three fascinating artists. Yet the genre has received little attention from historians of theatre, performance, or dance.<sup>5</sup> The current *Oxford Dictionary of Dance* entry for “computer dance” reads:

In the 1980s choreographers began using computers as an aid to making work. For some it was simply an economic and efficient way to sort out their movement ideas before going into the studio but for others, such as Merce Cunningham, who pioneered the use of the Life Forms software programme, it became a radically creative tool. . . . More recent developments include Wayne McGregor’s work with cognitive scientists, developing a software programme capable of making its own choreographic decisions.<sup>6</sup>

According to this entry, computational dance evolved from use as a compositional aid to an ability to generate choreography of its own.<sup>7</sup> It suggests that the intersection of computers and performance began in the late 1980s, that such a relationship naturally progresses with the march of time, and that men initiated this progress. Yet computer choreography was a genre of the 1960s and ’70s.<sup>8</sup> Two women and one man led its development.<sup>9</sup> And the role of computers in dance did not evolve from tool to choreographer; on the contrary, the *first* role of the digital computer in dance was that of the choreographer. Indeed, automated writing supplied the first use of digital computers for cultural performances in any capacity.

As I will argue, this practice developed a neoliberal performance aesthetic. While performance scholars have attended to performances that resist neoliberalism and to

<sup>3</sup> My translation of Partido Morado, “Nuestros Objetivos” (2021), available at [partidomorado.pe/#objetivos](http://partidomorado.pe/#objetivos).

<sup>4</sup> I adopt the term “computer choreography” from Beaman’s published essay on the topic, “Computer Choreography,” in *Anthology of Impulse: Annual of Contemporary Dance 1951–1966*, ed. Marian Van Tuyl (Brooklyn, NY: Dance Horizons, 1969), 62–64.

<sup>5</sup> A survey can be found in the excellent Centre Pompidou catalog essay by Olivier Zeitoun, “(Dé) coder la danse,” in *Coder le monde* by Frédéric Migayrou (Orléans: HYX, 2018): 128–43; see also Sagasti, “Information Technology and the Arts.”

<sup>6</sup> Debra Craine and Judith Mackrell, “Computer Dance,” in *The Oxford Dictionary of Dance* (Oxford: Oxford University Press, 2010), 104.

<sup>7</sup> McGregor, like Cunningham, has never used his software to choreograph an entire staged dance. Even the practice of a choreographer using the proposals of computer software as a compositional aid dates earlier than is credited here, as choreographer Jean Babilée initiated this practice in 1971 for his ballet *Temps-partagé*. See “Comment le Time-Sharing Vient aux Danseurs,” Dance Notation Bureau correspondence, box 1, file 3, in Jeanne Hays Beaman Papers, (S) \*MGZMD 376, Jerome Robbins Dance Division, New York Public Library, New York City (hereafter Beaman Papers).

<sup>8</sup> From 1980 to 2010, excepting Cunningham, artists lost interest in the practice. Contemporary examples include the work of *Le Principe d’Incertitude* (Liz Santoro and Pierre Godard), Kate Sicchio, Pontus Lidberg, and as discussed in Ellen Pearlman’s “AI Comes of Age” (*PAJ: A Journal of Performance and Art* 42, no. 3 [2020]: 55–62), Daito Manabe.

<sup>9</sup> A marginal case is provided by A. Michael Noll, a Bell Labs engineer who created computer-choreographed and computer-animated “ballets” for stick figures in 1965; see Noll, “Choreography and Computers,” *Dance Magazine* 41, no. 1 (1967): 43–45.

the performing arts' fate within neoliberal conditions, less attention has been paid to performances that uncritically embody neoliberal theory.<sup>10</sup> As Shannon Steen has emphasized, we scholars need to "see performance *as* neoliberalism"; following Jon McKenzie's discussion of "high performance organizations [as] decentralized, flexible, dynamic, open, and 'naturalistic,'" she notes that "performance tempts us with visions of organizational efficiency, personal achievement, and cultural dynamism and vigor."<sup>11</sup> For Steen and many others, the type of worker that neoliberal policies have promoted—mobile, affective, and spontaneous—suggests the theatre *actor* as its paradigm.<sup>12</sup> This important approach leaves aside potential analogies between theatre *production* and neoliberalism. Indeed, neoliberal theory, distinct from its various associated political movements and managerial methods, locates its aesthetic investments in the productivity of systems rather than human effort.

To simplify a notoriously heterogeneous term, *neoliberalism* will here name a political philosophy, primarily that of Friedrich Hayek (1899–1992). For him, the unrestrained market is an object whose emergent properties of self-organization deserve aesthetic fascination—and state maintenance. In contrast to classic liberalism, Hayek underlines that the state must use game-like regulation to cultivate a market in which individuals will compete with one another rather than unite, and that the state must actively insulate the market from the "totalitarianism" of democratic will. Only then, he claimed, could a free individual be produced. Hayek's major works, published from the 1940s to the '70s, provided a philosophical basis for the political "revolution from above" executed by 1980s leaders such as Ronald Reagan, Margaret Thatcher, and Augusto Pinochet, in which social institutions like health care or education were transformed into markets, states were transformed into juridical-carceral guardians of increasingly centralized capital allocation, and international nondemocratic institutions were constructed to ensure an unequal and open global economy. As Wendy Brown has observed, the resulting unstable and stagnant world does not resemble that of Hayek's dreams; nevertheless, his dreams have helped bring our present into being.<sup>13</sup>

This essay traces the profound isomorphism between this theoretical model and the project of computer choreography, facilitated by the influence of cybernetics on both. These artists did not read Hayek, yet I contend that their work took part in a broader discourse of which Hayek is paradigmatic. As has been explored by art historian Pamela Lee, the far-reaching, midcentury inter-discipline of cybernetics informed an aesthetic that closely paralleled Hayek's own use of cybernetic theory; Philip Mirowski

<sup>10</sup> See especially Patricia A. Ybarra, *Latinx Theater in the Times of Neoliberalism* (Evanston, IL: Northwestern University Press, 2018); J. Harvie, *Fair Play: Art, Performance and Neoliberalism* (Basingstoke, UK: Palgrave Macmillan, 2013); and Lara D. Nielsen and Patricia A. Ybarra, eds., *Neoliberalism and Global Theatres: Performance Permutations* (Basingstoke, UK: Palgrave Macmillan, 2012). Where Ybarra's case studies argue that their audiences are "spectators of neoliberal capital as a (dis)organized performance" (*Latinx Theater*, xii), computer choreography is a performance of (dis)organization.

<sup>11</sup> Shannon Steen, "Neoliberal Scandals: Foxconn, Mike Daisey, and the Turn Toward Nonfiction Drama," *Theatre Journal* 66, no. 1 (2014): 1–18, quotes on 2, 3; Jon McKenzie, *Perform or Else: From Discipline to Performance* (London: Routledge, 2001), 73.

<sup>12</sup> As surveyed in Michael Shane Boyle, "Performance and Value: The Work of Theatre in Karl Marx's Critique of Political Economy," *Theatre Survey* 58, no. 1 (2017): 3–23, esp. fn16.

<sup>13</sup> Wendy Brown, *In the Ruins of Neoliberalism: The Rise of Antidemocratic Politics in the West* (New York: Columbia University Press, 2019).

has likewise traced the intertwined origins of cybernetics and neoliberal economics.<sup>14</sup> Notably, all of the artists discussed here began this work at institutions of higher education, underlining these dances' material reliance upon machines used predominately for the complex formal modeling through which cybernetics was exported into disciplines like economics.<sup>15</sup> Performance, in which bodies represent their method of organization, offers a privileged site for understanding this intellectual revolution. By focusing on political theory, I diverge from the posthumanist orientation of canonical work on digital performance, and join recent scholarship that urges attention to the market metaphors latent wherever computers are staged.<sup>16</sup>

This essay focuses on the three central artists, drawing from their archives. Computer choreography began at the University of Pittsburgh with Jeanne Beaman (1920–90), a professor of dance who developed a 1964 experiment into the bulk of her practice until her 1976 retirement. I then turn to the work of John Lansdown (1929–99), a London-based Welsh architect and institutional node in the networks of early computer arts who committed himself to computer choreography while lacking any personal dance training. Despite the many differences of their backgrounds and practices, Beaman and Lansdown both share a techno-utopian project of applying cybernetic theory to the performing body. This affective attraction to computation's futurity was rejected, however, by Analívia Cordeiro (b.1954), whose work anticipates the argument offered here. Cordeiro's four dances, made in São Paulo from 1973 through 1976, perform computers not as liberatory managers but as repressive tools, translating automatic writing into the appearance of automatic control. Early computer choreography therefore suggests that AI-authored performance, when set out uncritically, models and promotes the political ideology that drove so much investment in computational development in the first place. Yet just as AI appears as a spectacle of neoliberal governance, so too can it become a prime object for examining neoliberal theory's contradictions.

### Jeanne Beaman: Automated Chance

Appropriately, the story of computer choreography begins with chance and coincidence. In 1963, returning home from a Cunningham workshop, Beaman was rolling dice attempting to create chance choreography of her own—a process she found “intriguing although time consuming. I began to wonder if a computer could not be used to gain this random mix of choreographic elements with all the tremendous speed of automation.”<sup>17</sup> Shortly after this scene of impatience, Paul Le Vasseur, a newly hired computer scientist and avid “dance buff” walked into Beaman's office to inquire about the local dance scene. Beaman seized her opportunity, and soon she, Le Vasseur, and engineer Dale Isner developed a basic dance-randomization program in the university's proprietary code language (Pittsburgh Natural Language Process, or, PENELOPE) for its IBM 7090 mainframe computer.

<sup>14</sup> Pamela M. Lee, *Think Tank Aesthetics: Midcentury Modernism, the Cold War, and the Neoliberal Present* (Cambridge, MA: MIT Press, 2020); Philip Mirowski, *Machine Dreams: Economics Becomes a Cyborg Science* (Cambridge: Cambridge University Press, 2001), esp. chaps. 4–5.

<sup>15</sup> I am grateful to an anonymous reviewer for this insight.

<sup>16</sup> Ulf Otto, “Theatres of Control: The Performance of Algorithms and the Question of Governance,” *TDR: The Drama Review* 63, no. 4 (2019): 121–38; Harmony Bench, *Perpetual Motion: Dance, Digital Cultures, and the Common* (Minneapolis: University of Minnesota Press, 2020).

<sup>17</sup> “Workbook for Computer Generated Choreography,” 1, box 2, file 5, in Beaman Papers.

The program generated a fifty-line dance that listed moves, positions, and counts on individualized printouts. Each line was built from three variables, which randomly selected from respective lists of twenty terms each: "movement" ("fall / 2 hops / gallop / plie in 2nd position / rise"); "space" ("forward / diagonally rt. bk. / zig zag left"); and "duration" ("6 triplets M / 9 beats S / 15 from S to F").<sup>18</sup> Beaman's frustration with the painstaking nature of a dice-based process was very much resolved, as the computer printed seventy dances in four minutes of computation. Cunningham responded admiringly in a 1965 letter: "70 dances in four minutes; it's better than the four-minute mile."<sup>19</sup> Enthusiastic about the scores, Beaman proceeded to stage them with her students. Each dancer obeyed her personal printout without emendation ("Five fast beats, Rotate right shoulder clockwise, Arc side right / Six medium beats, Clench fist, Diagonally right forward"), with Beaman arranging small numbers of such dances into groups of overlapping, distinct sequences. The resulting 1964 "Computer Dance" appears to have been the first work of theatrical performance created by a digital machine.<sup>20</sup>

Her students' responses, documented in written surveys, varied from bafflement and frustration to fascinated enthusiasm. The dance was "annoying," "rigid," and "especially difficult to remember."<sup>21</sup> It also was "wonderful," "modern," and "tremendously interesting." In a retrospective essay, Beaman would nevertheless recall their reactions as "100% negative!": "'Dance is for human beings.' 'We already have too many machines at our throats.' 'Dance should be about something meaningful.' 'Whatever will you use for a title, your Social Security number?!' . . . Remember the year? That was in 1964. Hippie culture was in full bloom. Any intellectual approach to dance was anathema."<sup>22</sup> Beaman places the students' objections within the broader context of campus counterculture, aligning their pleas for expression, significance, and humanism with their rejection of computation as a tool for state-sponsored alienation, while aligning computation with rational "intellect."<sup>23</sup>

Aside from Cunningham's admiration, the responses of her dance colleagues seemed to her "equally negative."<sup>24</sup> Computer choreography was received as "a repulsive proposal at best."<sup>25</sup> She attributed this opposition to a wide cultural prejudice:

Most of us do not even want a machine of any kind to succeed in conceiving any art form at all. The arts are usually presented as our last refuge from the onslaughts of our whole machine civilization with its attendant pressures towards squeezing us into the straitjacket of the "organized man." We are suspicious enough already that a machine will make us

<sup>18</sup> Ibid., 2–3.

<sup>19</sup> Correspondence from Merce Cunningham to Jeanne Beaman, March 23, 1965, box 2, file 6, in Beaman Papers.

<sup>20</sup> I say "theatrical performance" to exclude Lejaren Hiller's 1957 computer-scored "Illiac Suite" for string quartet. For Hiller and other early computer-produced artworks, see Hannah Higgins and Douglas Kahn, eds., *Mainframe Experimentalism: Early Computing and the Foundations of the Digital Arts* (Berkeley: University of California Press, 2012). For early computer-produced visual art, especially on its 1980s decline, see Grant D. Taylor, *When the Machine Made Art: The Troubled History of Computer Art* (London: Bloomsbury, 2014).

<sup>21</sup> "Questionnaires," box 2, file 2, in Beaman Papers.

<sup>22</sup> "Workbook for Computer Generated Choreography," 3–4, in Beaman Papers.

<sup>23</sup> See Fred Turner, *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (Chicago: University of Chicago Press, 2006), 11–40.

<sup>24</sup> "Workbook for Computer Generated Choreography," 3, in Beaman Papers.

<sup>25</sup> "The Computer Giant and its Dances," 4, box 2, file 2, in Beaman Papers.



obsolete on our jobs without happily enduring any further suggestion that it may also take over our function as artist. . . . [F]ollowing the old adage that "if you cannot lick them, then join them," . . . [we] have undertaken to find out what help a machine may actually be in choreography.<sup>26</sup>

Beaman eagerly presents herself working in the face of technophobia, pursuing the automation of the work of the artist without fear of the inevitable march of progress.<sup>27</sup> Fear of technological unemployment was indeed widespread: congressional hearings and popular magazines obsessed over "automation" (a 1952 coinage) as an impending threat to labor's humanity.<sup>28</sup> Computerized automation was supposed to replace both mental and manual work, leaving obsolete humans in a state of maximal alienation from production. In the pages of *Tulane Drama Review*, for example, the automation-enabled "present upsurge of world prosperity" was predicted to lead only to "smooth, repetitive, endless, purposeless jobs"; to counteract this horror, the world needed a *performance*-imbued society to de-automate and re-enchant work.<sup>29</sup> Although she overstates her students' antagonism, Beaman's project of automating performance production was likely "repulsive" to the period's dance world and the broader American humanist imagination.

She countered with a vision of computation as a positive force. *Cluster at the Center* (1971), a work for ten dancers, represents the peak of Isner and Beaman's collaboration. Their program could now model many figures' movements around a stage, distributing each dancer's blocking and tracking entrances and exits. The stage was dominated by a translucent inflatable plastic dome. Photographs of the performance offer a mood of play, grace, and delight. All dancers begin in a different position within the dome, proceed to move around, and exit with little order among one another, before all returning into the dome as the piece reaches a close: a dramaturgy of order emerging out of an apparent lack of coordination. In the final segment of action, every dancer but one dances inside the dome. That last dancer exits to the side, "bend[s] from waist and straighten[s], side right."<sup>30</sup> While the movements themselves appear to have been fully random, these beginning and ending positions are not. Scripted by Beaman herself, they provide channels within which sheer randomness can appear to achieve a level of form. The dance's title emphasizes that these sequences progress individually, yet naturally emerge into a rough order. "Computation" gathered them together within a symbolically potent scenography. As Fred Turner has written, "the dome's ferociously efficient management of surface tension modeled a world restored to energetic homeostasis . . . [and] the sorts of collaborative, distributed power arrangements" that communalists borrowed from cybernetic theory. The implication of that loan here became explicit: computation as a model form of governance.<sup>31</sup>

Responding to the widespread fear of technological unemployment, Beaman shifted the role of the computer from one of a worker-performer to that of a manager-chore-

<sup>26</sup> Ibid., 1.

<sup>27</sup> Another instance of this dynamic is discussed in Fred Turner, "Romantic Automatism: Art, Technology, and Collaborative Labor in Cold War America," *Journal of Visual Culture* 7, no. 1 (2008): 5–26, esp. 19–23.

<sup>28</sup> Amy Sue Bix, *Inventing Ourselves out of Jobs? America's Debate over Technological Unemployment, 1929–1981* (Baltimore: Johns Hopkins University Press, 2000), 237–75.

<sup>29</sup> Henry Adler, "To Hell with Society," *Tulane Drama Review* 4, no. 4 (1960): 53–76, quotes on 63.

<sup>30</sup> "Cluster at the Center," box 2, file 2, in Beaman Papers.

<sup>31</sup> Turner, *From Counterculture to Cyberculture*, 94.

ographer. There is little need to worry about automation, when automation produces a crowd of engaged, purposeful, human dancer-workers. But midcentury humanism's anxieties around computation and cybernetics reached past the scene of employment. The hippie-culture conviction that the performing arts should defend ideas of vitality, chance, and spontaneity threatened by modern mechanism was no innovation of the 1960s, as any reader of *R.U.R.* or *Machinal* knows. This opposition had been a staple of labor movements and avant-garde aesthetics in the early twentieth century.<sup>32</sup> Modernist attacks on this opposition focused on the actor's body: for the Symbolists, an eternal puppet-like figure; for Meyerhold, a tool for industrial development; for the Bauhaus, an organism revealing latent abstractions. The postwar "interdiscipline" of cybernetics, by contrast, promised to supersede the spontaneity-mechanism opposition by turning from the body to *bodies*.

Thanks in part to computation, the mathematical properties of vast systems could now be rapidly modeled and appreciated. Such research demonstrated, cyberneticians argued, that spontaneity and mechanism could be integrated at the level of statistical population. Unpredictable outcomes, even with aesthetic form, could emerge from systems following deterministic rules. Humans may not *be* like machines, Norbert Wiener freely admitted, but they can both be *modeled* as "locally anti-entropic processes"—and from the managerial vantage of cold war strategists and large corporations, that was what mattered.<sup>33</sup> The crisis for midcentury humanism was thus not the long-promised collapse of spontaneity and mechanicity, but rather cybernetics' particular vision of flat patterns and networked articulation, leaving no room for the exceptional, autonomous deciding subject.<sup>34</sup> Cybernetics had won a synthesis between machine and man by giving up the liberal individual. It also captured *chance*, now the very property that joined live organism with numbers, software, and rolls of war-game dice. The hippie counterculture that Beaman attributed to her dancers attempted to guard liberal humanism from these moves. Staging not a model but human bodies, however, Beaman's work stepped past cybernetics toward a *new* liberalism.

Beaman's written theorization of her practice describes it as a chance procedure just like those of Cunningham and John Cage, now made more efficient.<sup>35</sup> The details of her account, however, attend far more to the question of the dancer as *individual* than is typical of Cage's ecological, strictly nonsubjective aesthetics. Chance-derived scores, Beaman claims, "stimulate the dancer" and "expand the imagination."<sup>36</sup> In a remarkable passage, she inverts the metaphors governing her entire process:

More than muscles are programmed by dance training. The whole thinking acting process is programmed. Previous training in dance and choreography builds a memory bank within us. Try as hard as one will to break out in order to undertake some other quality of movement or timing, the difficulty is extreme for the muscle/mind set holds us firmly. Anxious

<sup>32</sup> Jennifer Parker-Starbuck, *Cyborg Theatre: Corporeal/Technological Intersections in Multimedia Performance* (Basingstoke, UK: Palgrave Macmillan, 2011), 14–51; Felicia M. McCarren, *Dancing Machines: Choreographies of the Age of Mechanical Reproduction* (Stanford, CA: Stanford University Press, 2003), 129–58.

<sup>33</sup> Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society*, 2nd ed. (New York: Doubleday Anchor, 1956), 32.

<sup>34</sup> Danielle Judith Zola Carr, "'Ghastly Marionettes' and the Political Metaphysics of Cognitive Liberalism: Anti-Behaviourism, Language, and the Origins of Totalitarianism," *History of the Human Sciences* 33, no. 1 (2020): 147–74.

<sup>35</sup> Beaman, "Computer Choreography," 63.

<sup>36</sup> "Workbook for Computer Generated Choreography," 4, in Beaman Papers.



to break the bind, one is thus predisposed to welcome chance relationships which probably do not really alter personal style but which do provoke one's thinking into fresh channels.<sup>37</sup>

Here, it is not the automated choreographer that should be seen as computational, but the *human dancer*. The dancer is "programmed," the dancer has "a memory bank," and it is a programmed machine with a memory bank that can most effectively dislodge her from the automatic habits of her own thought. Habit, training, and tradition—the bad automaticity that articulates the subject as *social*—must be routed out to transform the body into its "natural" self. Only the mechanization of *chance* can dislodge this force from the dancer, restoring spontaneity to its proper home within the productive human body, by insisting that each body *produce* its own spontaneity. The process, we learn, will "allow the dancer-choreographer to make a personal statement. . . . The personality of the individual performer is fully involved."<sup>38</sup> The cybernetic insistence on the computability of chance and human action and the liberal insistence on personal choice are preserved.

As Beaman's scores were mute on many aspects of the dance, her dancers had to make countless decisions connecting their formal instructions. The automation of choreography produces a "neutral" rule-bound procedure that automates the mechanicity of all beings, "allowing" the dancer to be free of her discipline to become a "dancer-choreographer," possessed of newfound responsibility over her own corporeal action in order to return to a purely individual personality. Just so did Michel Foucault describe neoliberalism as "a set of rules which determine the way in which each must play a game whose outcome is not known by anyone," a *law without planning or aim*, within which the governed can emerge as entrepreneurs of the self.<sup>39</sup> Planning would transform social democracy into a world, warned Ludwig von Mises, of "rigid observance of routine."<sup>40</sup> Corporeal habit and authorial intention, warned Beaman, would condemn dance to mechanistic coordination and repetition. The choreographer and the neoliberal thus find a shared enemy. Yet computer choreography would not just hold a skepticism toward planning and technique, but it would affirmatively construct a system for perpetual nonplanned production.

This latter point helps specify how computer choreography distinguished itself from the period's wider affections for the aleatory and formless. Cage and many Judson figures employed analogies between artistic deliberation and "totalitarianism."<sup>41</sup> Indeed, several critics have thus associated Cage's professed anarchism with proto-neoliberalism: Timothy Morton notes that in Cage, "there is no chance of progress, just an endless application of laws," while Robin James argues that "[d]eregulation is like a random number generator."<sup>42</sup> But these broad critiques of aleatory aesthetics set aside the Cagean emphasis on distributed environmental attention and the tool

<sup>37</sup> Ibid.

<sup>38</sup> Ibid., 5.

<sup>39</sup> Michel Foucault, *The Birth of Biopolitics: Lectures at the Collège de France, 1978–79* (Basingstoke, UK: Palgrave Macmillan, 2008), 173.

<sup>40</sup> Jamie Peck, *Constructions of Neoliberal Reason* (Oxford: Oxford University Press, 2010), 63.

<sup>41</sup> Moira Roth's famed essay on Cage, Cunningham, and Rauschenberg historicizes this tendency as a product of McCarthyite anti-communism; see her "The Aesthetic of Indifference," *Artforum*, November 1977, 46–53.

<sup>42</sup> Timothy Morton, *Ecology without Nature: Rethinking Environmental Aesthetics* (Cambridge, MA: Harvard University Press, 2007), 102; Robin James, "Neoliberal Noise: Attali, Foucault, & the Biopolitics of Uncool," *Culture, Theory and Critique* 55, no. 2 (2014): 138–58, quote on 143.

of the radically indeterminate score—perhaps not the tools of socialist revolution, but not obviously those of neoliberalism. Neoliberal theory rather insisted that markets must be constructed and then encased; competition would then allow the emergence of privately defined individuals. Foucault described this market as “a sort of fine and very reliable mechanism on condition that it functions well and nothing disturbs it.”<sup>43</sup> This discourse fits the computer choreographic program far better than Cagean dice rolls: chance functioning not as a disruptor, but as a part of an eternally repeatable system intended to supplant (not merely enhance) the roles of artistic will and craft. Smooth, efficient, autonomous systems of choreography production would allocate tasks and signs as if by nature, in a way that could never be held to account. These systems were *designed*, but their operations and outcomes would not be *planned*—a distinction, borrowed from cybernetics, that was central to neoliberal theory.<sup>44</sup> Unplanned design was given apparent purpose by live dancing bodies, governed by a system that has no end outside of itself. Simultaneously impressive and incapable, Beaman’s system heralded the constructed, “free” anti-teleological market that neoliberals would employ against democratic capacity.<sup>45</sup>

As Beaman’s dancers cluster in her plastic dome, laboring to guide themselves through a nonsensical series of segmented dance-bits, they internalize mechanically produced chance and manifest it as personalized spontaneity. Performers’ ability to efface the scored control of their own actions resolves the contradiction between cybernetic self-regulation and the liberal individual into a neoliberal aesthetic of accident, grace, and nonsense, in which the management of tasks is statistically allocated to individuals as urgent programs for the discovery of the self. Each of these tasks is not supposed to have any communicative or affective value on its own. Chance combinations, like the movements of the unfettered market, instead generate beauty without attempting it; bodies meanwhile make private motions that mark their “personalities.” All cohered in the image of performing bodies (of *white* performing bodies), bodies whose “choice” articulates the individual for spectatorial pleasure, all while utterly unable to choose to be a *group*. This atomization would only be further radicalized as Lansdown transformed the isolated individual into a deskilled worker.

### John Lansdown: Automated Rubbish

The flyer for “Computer & Art Week” began with a series of questions:

DURING THE WEEK, SEE, HEAR, ASK:  
 IN WHAT IS A COMPUTER?  
 WHAT IS A COMPUTER?  
 IS A COMPUTER AN ARTIST?  
 A COMPUTER FOR PRESIDENT?

ENTERTAINMENT & DISCO & BAR EXTENSION:  
 AN EVENING TO REMEMBER:  
 ‘AN EVENING OF AUTOMATED RUBBISH’ followed by DISCO<sup>46</sup>

<sup>43</sup> Foucault, *The Birth of Biopolitics*, 140.

<sup>44</sup> Quinn Slobodian, *Globalists: The End of Empire and the Birth of Neoliberalism* (Cambridge, MA: Harvard University Press, 2018), 239.

<sup>45</sup> See Peck, *Constructions of Neoliberal Reason*, 42.

<sup>46</sup> “Computer & Art Week” flyer, uncataloged (1971), in John Lansdown Archive, Middlesex University, London (hereafter Lansdown Archive). My deep thanks to librarian Marion Syrratt-Barnes, who made possible my finds from this vast and disorganized collection.

Held in February 1971 in Brighton, “Computer & Art Week” presented much of the ambitions of its producer, John Lansdown.<sup>47</sup> The series hosted several talks on computer-generated aesthetics, showing films, music, and slides of such products, and demonstrations of “techniques used for producing art rather than numbers from computers.” Alongside these, there was a keynote panel on “The Social Effects of Computers” hosted by representatives from the National Council for Civil Liberties and the British Society for Social Responsibility in Science. It was then capped off on Saturday night with “An Evening of Automated Rubbish” (and disco). This conjunction of debates over the social and economic role of computation with “automated rubbish,” including a film of Lansdown’s computer-choreographed ballet, is instructive. His dances, several of which have surviving video documentation, are both rubbish and of serious social importance.

Lansdown, a prominent London architect, first encountered computers as professional tools around 1960. He quickly picked up programming and began developing software to aid architectural drawing and modeling. In 1968, he attended the landmark exhibition “Cybernetic Serendipity,” where he would have encountered a film reel of Beaman’s early experiments, one of the only computer-generated works in the exhibition and the only computer-written performance.<sup>48</sup> Within months, he, composer Alan Sutcliffe, cybernetician George Mallen, and artist Gustav Metzger joined to found the Computer Arts Society, whose journal, events, and networks would become the global center of 1970s computer art.<sup>49</sup> Over the same year, he dove into textbooks on ballet notation, trying to create programs that could not just write natural-language instructions, but generate the foundational poses of ballet in their institutionalized form of inscription and join them into a coherent sequence. Beaman once described her scores as “very much like so many beads without any string to hold them in line”; Lansdown wanted his software to create beads and string them together.<sup>50</sup>

Intent on subjecting “theatrical performance” to computer composition, Lansdown developed computer scores for a range of events: skits, sound poetry, fight choreography, even faux Harold Pinter plays.<sup>51</sup> By 1971 he turned to postmodern dance, although he had difficulty finding dancers to work with. Dance as an institution, to state the obvious, did not have a path along which a middle-aged architect could suddenly begin doing choreography, let alone having a computer do his choreography for him with discomfiting results. Lansdown eventually struck a deal with two recent arrivals in London: a Cunningham-trained American, Sue Little, and a Malaysian-Australian, Kai

<sup>47</sup> For an overview of Lansdown’s remarkable career, see Stephen Boyd Davis and Simone Gristwood, “Computing, Design, Art: Reflections on an Innovative Moment in History,” in *History and Philosophy of Computing: Third International Conference, HaPoC 2015, Pisa, Italy, October 8–11, 2015, Revised Selected Papers*, ed. Fabio Gadducci and Mirko Tamosanis (Cham, Switzerland: Springer Nature, 2016), 101–15. I would like to thank both Davis and Gristwood for their help with this research.

<sup>48</sup> Jasia Reichardt, *Cybernetic Serendipity: The Computer and the Arts* (New York: Praeger, 1969).

<sup>49</sup> Charlie Gere, “Minicomputer Experimentalism in the United Kingdom from the 1950s to 1980,” in *Mainframe Experimentalism*, 112–27. Malcolm Le Grice and Stan VanDerBeek were also early members.

<sup>50</sup> Beaman, “Computer Choreography,” 62.

<sup>51</sup> “Computer Art for Theatrical Performance,” in Lansdown Archive, c.1970. The “Pinter” plays, which I believe are the first computer-generated plays with dramatic dialogue, are quite convincing: “1: Do you still keep the family mongoose? 2: Sad story 1: I think I read about it somewhere 2: Front page news in the scandal sheets 1: Instructive. As I said recently to Lord Harlech 2: Only has one eye you know 1: Exactly 2: Always was one of the boys 1: Absolutely 2: Generous to a fault,” “Conversations,” in Lansdown Archive, 1970.

Tai Chan. He would handle their fringe company's logistics, finances, graphic design, and printing if they would attempt his dances.<sup>52</sup>

From 1974 through 1977 he developed about a dozen works with the company, Another Dance Group.<sup>53</sup> His software was significantly more complex than that of Beaman and Isner. He employed pseudorandom generation within parameters that would ensure that no impossible moves were choreographed, and scripted "recursive, language-like" algorithms that would compose sets of movements along some sort of pattern.<sup>54</sup> The dances were usually not abstract and sometimes worked from sourced movement references: *Victoriana* (1975), for example, scrambled texts from an 1863 melodrama and poses from an 1892 acting manual. He experimented with nonrepresentational scores (*Touching 2*, n.d.), and with the serial interlocking counting associated with Cunningham (*Phase Two*, 1975). By 1978 the company disbanded, as did Lansdown's "access to dancers who want to develop this sort of work with me."<sup>55</sup> He finally reunited with Chan for *A/C/S/H/O* (Sydney, 1990), in which a Macintosh II printed choreography for its dancers onstage during the dance.

The dances themselves, for all those experimental procedures, are mundane. Several short video clips survive, documenting unremarkable twirls, reaches, and floorwork, punctuated with emotional lunges and "romantic" paired gazes. They look like what they are: average postmodern dance. While Beaman thought of abstract verbal instructions and tied every move to a new random cast, Lansdown watched Little and Chan improvise at length and then modeled what they had done in his software. His software represented a wireframe human form, computing mass distribution and balance, checking skeletal boundaries, and weighting possible moves by muscular difficulty, ultimately printing out a series of drawn cells rather than a verbal score<sup>56</sup> (fig. 1). He drew up statistical flowcharts of postmodern vocabulary, assigning probabilities that any given position would lead to another, and wrote those varied probabilities as Markov chains in his programs.<sup>57</sup> Some programs then erased segments of their own generated dances, producing scores with significant gaps to be filled in by each dancer's personal invention.

At first glance, then, the dances hardly seem "technological." Somewhat amateurish postmodern dance was abstracted and iterated to produce somewhat more amateurish postmodern dance, in which the vocabulary does not cohere into any narrative shape and in which dancers are structurally encouraged to follow their private impulses—sentimental and kitschy, judging by the documentation. The taped dances' aesthetic limits help us understand to their purpose and also to interpret their meaning. They look like social activity for hobbyists. Where social dance gathers collectives and reproduces cultural knowledge, however, Lansdown's dances distinguish and produce individuals, while evacuating their cultural practice of all content.

This process pursued Beaman's ideas to their logical end. The theory that a computational process could reveal individual personality has now become a mandate to

<sup>52</sup> Another Dance Group correspondence, in Lansdown Archive, 1974.

<sup>53</sup> Another Dance Group programs and reviews, in Lansdown Archive, 1974–77.

<sup>54</sup> "Creative Computer?" 18, in Lansdown Archive, c.1995.

<sup>55</sup> *Ibid.*, 19.

<sup>56</sup> In the process, Lansdown greatly advanced digital animation. He then founded a graphical effects company that, among other credits, created the wireframe videos for Ridley Scott's *Alien* (1979).

<sup>57</sup> For more on Markov chains and performance, see Ioana B. Jucan, "sys.begin to sys.exit: Software Performs a Piece of Work," *TDR: The Drama Review* 59, no. 4 (2015): 149–68, esp. 158.

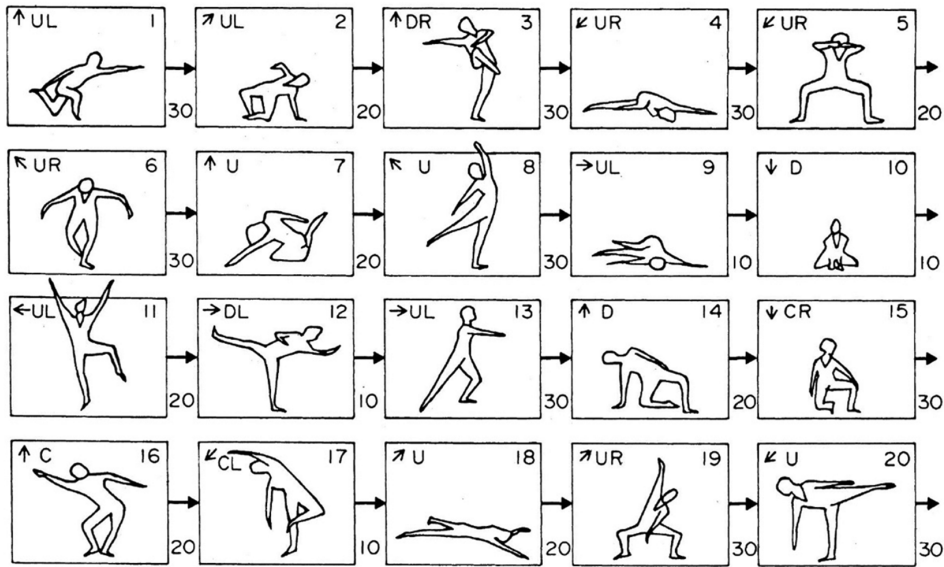


Figure 1. Score from an unknown Lansdown dance, composed and drawn by computer (1978).  
(Source: John Lansdown, "The Computer in Choreography," *Computer* 11, no. 8 [1978]: 19–30,  
reprinted by permission of the IEEE.)

express the self. Lansdown's writings underline his preference for "process over object," quoting composer Herbert Brun: "In the [traditional] case one prefers those events to happen that one wishes to hear; in the second case one prefers to hear those events one wishes would happen. These are not only two different approaches to the composition of music but also two different political attitudes."<sup>58</sup> Different political attitudes indeed. Lansdown, his notes make clear, would accept a negative aesthetic judgment of his process's dances. His artistic project was the procedure of automating choreography, not the performed dance. This lack of interest in the value of what this procedure would produce provides another connection to neoliberal thought. A framework from which production will spontaneously emerge, assuming tasks of social reproduction, abnegating intention, fascinating our attention—choreographic software again resembles the neoliberal market. Hayek's positive vision of the market as sublime self-generating order was similarly accompanied by a critique of human action. In a 1974 address, he attacked the "pretense of knowledge" about any "complex systems"; in *The Road to Serfdom*, he insists that "blindness" defines justice.<sup>59</sup> Contingency overwhelms all human aims, one can only construct games and succumb to their results: process over object(ive).<sup>60</sup> Indeed, the notion that such prediction can assume the production that it models is the promise of financialization. When Fredric Jameson discusses finance culture as "impersonal on the mode of the stereotype . . . [in a] cultural renarrativization of the broken pieces of the image world," could we find a more exact example than Lansdown's scrambled and averaged banalities?<sup>61</sup>

<sup>58</sup> "Creative Computer?" 21, in Lansdown Archive, c.1995.

<sup>59</sup> Slobodian, *Globalists*, 224; F. A. Hayek, *The Road to Serfdom: Text and Documents, The Definitive Edition*, ed. Bruce Caldwell (Chicago: University of Chicago Press, 2007), 135.

<sup>60</sup> Slobodian, *Globalists*, 225.

<sup>61</sup> Fredric Jameson, "Culture and Finance Capital," *Critical Inquiry* 24, no. 1 (1997): 246–65, quote on 263–64.



This abnegation of intention then shifts risk onto the dancers, who must solve the scores' inscrutable equations—crucially, as in Beaman, not through live improvisation, but through delegated choreography. Danielle Goldman has argued that the discourse of white postmodern dance in the 1960s and '70s emphasized personal "liberation" from the "constraint" of "technique," while Black traditions of improvisation have emphasized technique as essential to an always-ongoing "practice of freedom," exemplified by the corporeal discipline employed by the US civil rights movement.<sup>62</sup> In great contrast to these traditions, computer choreography's non-improvisatory practices shared in the tropes supporting Judson improvisation. In Beaman's and Lansdown's procedures, trained technique was eliminated and unstructured "improvisation" was prompted in rehearsal, all to fixate an individual as personal style.<sup>63</sup> While Sally Banes and other foundational critics associated postmodern dance's devaluation of the habitual with "democracy," as if democracy were a natural state, decades of neoliberal governance have since demonstrated that such devaluation weakens the body's ability to *construct* democracy. The assault on technique did not liberate dancers, it deskilled them.

Computational automation rarely succeeds on its own terms. Values of neutrality, efficiency, and individual expression typically serve to entrench a certain tranche of capital rather than achieve a neutral, efficient, and diverse economy. The British economy of the 1970s provides an apt illustration. Labour governments had encouraged widespread computerization as a way to eliminate low levels of clerical labor—jobs held primarily by women. Computers were given to clerical workers with the intention of eventually replacing them, restoring power to male managers (and the social order of the prewar firm). However, as Mar Hicks has documented, British computation generated more work than it eliminated, leading to a gendered crisis: computers needed managers, and the workforce that had been trained to use them was female.<sup>64</sup> Yet firms could not accept a future of female management. Britain thus turned to universities, its media channels, and cultural institutions to promote the figure of the male computer worker, performing intellectual, high-status tasks rather than the "clerical work" previously associated with the machines. Programming had to be promoted as a sort of management, not as a mechanical operation.

In a country with widespread arts funding, it is difficult to define the political incentives behind the grants supporting Lansdown's work and impossible to assess its impact on audiences. But one cannot avoid the general conclusion: Lansdown, whose image of an intellectual manager directing the leisurely nonwork of female dancers was broadcast in newspapers and on a BBC special, took part in a transformation of the social imagination of computing that deskilled women and ensured that men would command the coming digital economy. His dances' portrayal of expressive selves emerging from a non-laborious, un-directed system obscured a process in which he did

<sup>62</sup> Danielle Goldman, *I Want to Be Ready: Improvised Dance as a Practice of Freedom* (Ann Arbor: University of Michigan Press, 2010), 3–5, 8–9, 27.

<sup>63</sup> For Rebecca Chaleff, this substitution of the "ordinary" for the technical furthered the whiteness of postmodern dance. Unlike Beaman, Lansdown worked with prominent nonwhite collaborators, such as the committed and enthusiastic Chan. In 1990, Chan staged *A/C/S/H/O* on his company, which included several aboriginal Australian performers. Might the performance of computer choreography by Asian and aboriginal bodies have troubled the dances' gestures at universalism, marking a conceptual instability or sly auto-critique within the scores' performances? See Chaleff, "Activating Whiteness: Racializing the Ordinary in US American Postmodern Dance," *Dance Research Journal* 50, no. 3 (2018): 71–84; and Chan correspondence, in Lansdown Archive, 1990.

<sup>64</sup> Mar Hicks, *Programmed Inequality: How Britain Discarded Women Technologists and Lost Its Edge in Computing* (Cambridge, MA: MIT Press, 2017).



in fact do choreography, and an economy in which rhetoric of decentralization centralized masculine authority over laboring, proletarianized women. All the same, when a young artist asked if he could support her computer choreography, he responded with enthusiasm, unaware of how sharp her works' critique of his own would become.

### Analívia Cordeiro: Automated Control

In 1973, a 19-year-old freshman asked for access to the computer center at São Paulo's University of Campinas. She was allowed in between the hours of 10:00 PM and 6:00 AM. She was the only woman working there.<sup>65</sup> With no knowledge of Beaman's or Lansdown's activities, Cordeiro taught herself FORTRAN and outlined a proposal for choreographing screen-dances by computer. She submitted the proposal to the International Festival of Edinburgh—luckily, Lansdown was a curator. Thrilled to find a colleague in his work—his attempts to correspond with Beaman had not been successful—he accepted her.<sup>66</sup> With his reply in hand, she persuaded the São Paulo government to provide her a television studio for an afternoon to tape the dance. The work, *M3x3*—a five-minute, 35mm film transfer of an in-studio video feed—proceeded to travel to shows and conferences in Antwerp, Buffalo, London, Jerusalem, Buenos Aires, Paris, New York, and Los Angeles, primarily as part of an exhibition of Latin American digital art. Cordeiro followed *M3x3* with three further dance works, all choreographed by computer, all performed exclusively for video: *0°–45°* (1974), *Gestos* (*Gestures*, 1975), and *Cambiantes* (*Changing*, 1976).<sup>67</sup> She coded each piece of software personally and danced in each of the dances. In 1976, Cordeiro received a letter from Beaman, who had just screened Cordeiro's dances for the American Dance Guild. Expressing regret that funds did not allow them to meet in person, Beaman reported back: “[i]n general musicians in attendance understood what you and I are doing but many dancers felt, ‘Why bother with a computer.’”<sup>68</sup>

This improbable itinerary has two origin points. Cordeiro was the daughter of Waldemar Cordeiro, a prominent art theorist turned early computer artist, who died just as Analívia was completing *M3x3*. She was also the dance student of Maria Duschenes, a wartime migrant from Hungary who was a disciple of Rudolf von Laban.<sup>69</sup> Duschenes showed an 11-year-old Cordeiro a film of Oskar Schlemmer's *Triadisches Ballett*; Cordeiro, obsessed, watched it on loop for years. Rationalist Bauhaus modernism certainly influenced Waldemar Cordeiro. His 1971 manifesto diagnosed an “informational crisis of contemporary art” deriving from the “obsolescence” of non-electronic media; artists must adopt “algorithms largely employed in communications via industrial production,” using computers for “automatic pattern recognition, creative programming, and programming of critical studies of artistic messages,” just as interwar constructivists used the industrial tools of their own day for revolutionary imagination.<sup>70</sup> Further, as

<sup>65</sup> Analívia Cordeiro, personal interview with the author, May 8, 2018.

<sup>66</sup> Edinburgh Festival correspondence, in Lansdown Archive, 1971.

<sup>67</sup> After 1976, Cordeiro moved to New York City to train with Cunningham and Alwin Nikolais. She produced videodances through the early 1990s—not with computer scoring—and after returning to São Paulo earned a doctorate for work on digital dance notation and computer vision.

<sup>68</sup> Analívia Cordeiro, personal archive.

<sup>69</sup> Although Laban is remembered for his system of recording dance through written notation, his intention was to *produce* dance from writing. See Goldman, *I Want to Be Ready*, 59.

<sup>70</sup> See Waldemar Cordeiro, ed., *Arteônica* (São Paulo: Editora das Americas, 1972), 3–4; see also Eduardo Kac, “Waldemar Cordeiro's Oeuvre and Its Context: A Biographical Note,” *Leonardo* 30, no. 1 (1997): 23–25.

Rachel Price has underlined, he “saw the new computer age as a deeply embodied one,” writing about human phenomenology far more than was typical of the broader cybernetic moment in the visual arts.<sup>71</sup> Taking up this project in dance, Analívia adopted her father’s preferred tool and his politics, but she inverted their relationship: computational authority became no revolutionary method, but an expression of state power.

Cordeiro’s 0°–45° is harsh, ugly, and alienating. The video is noisy and degraded, with contrast maximized to produce a fully black-and-white and depthless image. A single dancer can be discerned, with some effort, from a backdrop of angular shapes. Far from an individual, she is anonymized and abstracted. She does not string her geometrical poses together with personal inventions: they are held, shifting suddenly on unpredictable counts to atonal and unrhythmic music. The computational score is not concealed but manifest, visually collapsed into its own performance and playback. More than just her poses are computational, however. Cordeiro’s programs scored her cameras’ positions, cuts, effects, and focal points. The television studio facilitated an all-encompassing digitization unachievable in traditional live theatre. The dance standardizes, fragments, and dictates the body; neither Schlemmer’s pastel whimsy nor Waldemar’s revolutionary hopes can be found here.

Nor could they be found across Brazil in the 1970s, in which the modernist movements that accompanied postwar industrialization were crushed by the country’s military dictatorship (1964–85). Power was maintained through widespread surveillance and suppression of the public sphere: “totalitarianism” was no art-theoretical strawman. The regime was not itself neoliberal: although capitalist, aligned with the United States, and loyal to the entrepreneurial bourgeoisie, its economic policy was marked by the nationalization of industry and investment in centralized infrastructure.<sup>72</sup> At the same time, it is important to recall that Latin America was the historical vanguard for neoliberal government. As Patricia Ybarra has written, “the transition to neoliberal formations in Latin America is *simultaneous with* rather than *subsequent to* the ’60s in the United States.”<sup>73</sup> Just months after Cordeiro premiered her first dance, Chile would undergo its own military coup, transforming the country into a laboratory for neoliberal policy. Although neoliberalism is often synonymous with anti-statism in Anglophone politics, its history in Latin America was violently authoritarian; neoliberal theory is plainly anti-democratic. In this respect, the Brazilian regime’s authoritarian structure became a model for neoliberal governance in Chile and Argentina, as did its transformation into a low-income, debt-loaded, export-driven economy. Yet Brazil’s ruling generals, partial to the centralized nationalization of industry, were no neoliberals.<sup>74</sup> Acknowledging the complexity of Latin America’s shifting politics at just this period, I offer that through her engagement with authoritarian conditions, Cordeiro generated tactics

<sup>71</sup> Rachel Price, “Early Brazilian Digital Culture; or, the Woman Who Was Not B.B.” *Grey Room* 47 (2012): 66.

<sup>72</sup> For a thorough review of scholarship on the dictatorship, particularly on the military’s relationship to bourgeois capital, see Marcelo Ridenti, “The Debate over Military (or Civilian-Military?) Dictatorship in Brazil in Historiographical Context,” *Bulletin of Latin American Research* 37, no. 1 (2018): 33–42.

<sup>73</sup> Ybarra, *Latinx Theater in the Times of Neoliberalism*, 7 (emphasis in original).

<sup>74</sup> That said, student activism in São Paulo in the 1970s focused on the regime’s efforts to raise fees for higher education and commodify its degrees, a program now considered paradigmatically neoliberal. See Colin M. Snider, “‘Deficient Education,’ ‘Academic Questions,’ and Student Movements: Universities and the Politics of the Everyday in Brazil’s Military Dictatorship, 1969–1979,” *The Americas* 75, no. 4 (2018): 699–732.

that can sharply engage the neoliberal project. Although Beaman's and Lansdown's unquestioning techno-futurity led them to a neoliberal aesthetic, Cordeiro's critical approach led her to techniques resonant with practice and thought today.

In Cordeiro's dances, bodies are set within a regime of corporeal governance whose absence of sense—the scores' aleatory lack of design—reveals a strict mandate on the body; this corporeal regulation then contrasts with the scores' apparent lack of communication with the dancer's subjectivity. The dances outline nondemocratic life, the structure of a police state in which one's affect counts for little past its potential for consumption. As Cordeiro recalled to me:

We had no freedom here in Brazil, we had no freedom of [speech], no freedom to think. People would be killed and tortured, we had this around us the whole time. When you talk about rules. We had rules, not only computer rules, but political rules, and we were not *that* aware because we were growing up. We were kids, which means we had this as something we had to accept. So in a way . . . you can feel, in these videos, something that's hard, that's dry, that's not fluid, not soft at all. . . . This was something that was inside our nervous system. Control.<sup>75</sup>

What Deleuze wrote of the "control society" bears upon her work. "Enclosures are *molds*, distinct castings," he writes of the past "disciplinary" society, but "controls are a *modulation*, like a self-deforming cast that will continuously change from one moment to the other."<sup>76</sup> Computation applies the methods of modernization to representation itself, and in so doing can permeate corporeal experience in space and time. Cordeiro used dance to materialize that affective condition. Rather than revealing a natural self, the ceaselessly unpredictable demands of computer choreography serve to situate its authority within the depersonalized subject. The subject is remade, as with Beaman and Lansdown, but the ends of capital adorned by those artists' projects of self-revelation are here laid bare.

Her first work, *M3x3*, staged this depersonalization through a troublingly familiar use of blackface. Nine dancers wear identical costumes comprised of leotards, body-covering tights, hair caps, and heavy blackface paint. All nine are young light-skinned Brazilian women. They rock from pose to pose, all at the splayed angles of a diagrammed body, collectively avoiding all unison or eye contact with one another while shifting in a clockwork-like, interlocking temporal pattern. The human form is reified as fragmented, reproducible, and Black. Cordeiro's intention was not to racialize her dancers; she sought the clarity of a high-contrast video image and the absence of the face (effects that in her subsequent *0°–45°* were achieved through postproduction processing). The produced video does read differently from the photographed performance, and the face paint does not resemble traditional Brazilian blackface<sup>77</sup> (fig. 2). While the dance's lack of intentional reference to Blackness may be difficult to credit, especially to an

<sup>75</sup> Cordeiro, personal interview. The effects of the dictatorship extended to her work. She began working for video because she did not believe she could safely perform her work in Brazil; she did not allow any of her videos to be shown in Brazil until 1978, and even then, only at the protected ground of the Goethe-Institut.

<sup>76</sup> Gilles Deleuze, "Postscript on the Societies of Control," *October* 59 (1992): 3–7, quote on 4 (emphasis in original).

<sup>77</sup> Ronald C. Conner, "Brazilian Blackface: Maracatu Cearense and the Politics of Participation" (MA thesis, University of California Riverside, 2009). Brazil does not have a significant documented tradition of minstrelsy, but there were many blackface Carnival traditions.

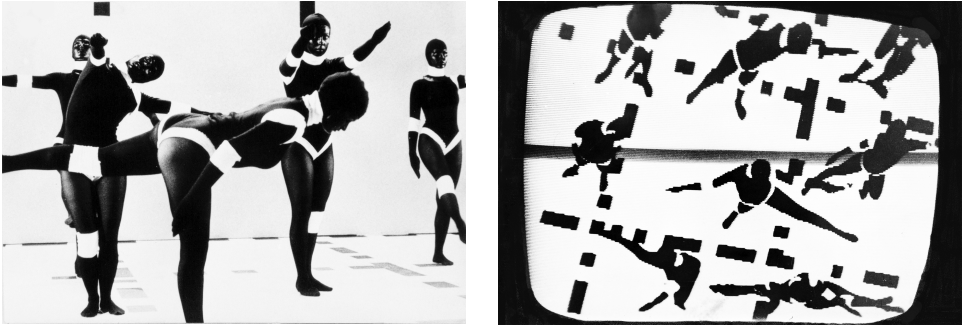


Figure 2. Left: Photo from Analívia Cordeiro's *M3x3* shoot (1973). Right: Still from final *M3x3* video. (Photo: Courtesy of Analívia Cordeiro.)

American audience, Brazilian racial identification has historically emerged within a national ideology of "racial democracy" devoted to cross-ancestral mixing in which Black and white identifications were situational and relatively depoliticized.<sup>78</sup>

Yet to approach this work today is to engage with race. Whatever its context, *M3x3* fits squarely within global traditions of anti-Blackness and the lineage of avant-garde blackface appropriation, associating the Black image with reification, mechanization, and the passively animated body. These codes date to modernist tales of enlivened things, in which "Negro, dolls, and automata, blackface and machine . . . operated with an unquestioned logic, each as a mask of the other."<sup>79</sup> This logic then resurfaced across the "minstrel avant-garde"—cases by Robert Wilson, San Francisco Mime Troupe, and Wooster Group are all rough contemporaries to *M3x3*—the performer evacuated of subjectivity, inhabited by text and command, made both machine and Black through external epidermalization.<sup>80</sup> The made Black body, in a performance emphasizing its own deep and arbitrary control of the performer, literalizes Simone Browne's concept of "racializing surveillance": if Black subjects are the ultimate targets of computational power, then it is little surprise that the 'Black' image found use as a specter of technological dystopia coming for the presumed-white spectator.<sup>81</sup> The oppressions and abstractions of computational control, *M3x3* warns, are akin to making a group of white women "Black." If we understand the target of Cordeiro's critique as neoliberal control, we can see how easily racializing logics present themselves for her use. Across many neo-avant-garde examples, a white-centered humanism—the liberal humanism thrown into crisis by cybernetic science—thus finds a new life as a reaction against computational-neoliberal governance.

Cordeiro's other dances, however, present a distinct critical model worth attention and emulation. I will conclude with her final work of computer choreography, *Cambi-*

<sup>78</sup> See Livio Sansone, *Blackness without Ethnicity: Constructing Race in Brazil* (New York: Palgrave Macmillan, 2003).

<sup>79</sup> Louis Chude-Sokei, "The Uncanny History of Minstrels and Machines, 1835–1923," in *Burnt Cork: Traditions and Legacies of Blackface Minstrelsy*, ed. Stephen Johnson (Amherst: University of Massachusetts Press, 2012), 104–32, quote on 120.

<sup>80</sup> Sumanth Gopinath, "Reich in Blackface: *Oh Dem Watermelons* and Radical Minstrelsy in the 1960s," *Journal of the Society for American Music* 5, no. 2 (2011): 139–93, esp. 180.

<sup>81</sup> Simone Browne, *Dark Matters: On the Surveillance of Blackness* (Durham, NC: Duke University Press, 2015), 16–17.

*antes*.<sup>82</sup> The harsh atmosphere of the previous dances has been replaced by a burst of energy. Shot on color Kodak video, even the piece's black-and-white set and costumes seem warm. Rather than square angles, we find curved cut-outs and spritely diagonal vectors splayed across the floor, walls, and the three dancers' bodies, now adorned with white half-masks and splashes of red facial paint. The visual vocabulary is reminiscent of Brazilian Neo-Concretism—the playful abstraction of Lygia Pape and Hélio Oiticica that articulated itself against the austere rationalism of Waldemar Cordeiro's generation (fig. 3). Poses begin extended and angular as before but proceed toward curves and spins as the dancers' bodies start to pull into themselves—a trend toward involution only glimpsed at in fits and starts, this dance being as aleatory as the rest. But the three bodies do begin to exert their gravity, as torsos come to the floor and limbs cease their extensions and approach some rest. Most remarkably, the dancers' faces are visibly expressive and amused, threading together their sequences with a sly, ironic humor: calm and centered, they do not indicate the physical effort underway in the dance. Sometimes their movements hit on syncopations and twists that feel grounded in samba rather than modern dance; at other points, modern weightedness and floor work dominates. Throughout, there is a clear impression of *following*, of geometric forms that must be marked and worked into the dancers' hip-grounded, leaping, curling arcs. The alienated distance between performer and score is always visible, never overcome. In contrast to the cheery playground of Beaman's *Cluster at the Center*, *Cambiantes* depicts neither the computational score's revelation nor oppression of a natural self; rather, the subject is indicated and foreclosed from spectatorial view. No narrative of resistance, *Cambiantes* performs patient *endurance* as an aesthetic practice.

Where Beaman criticized the dancer for her convention-bound automaticity, *Cambiantes* demands that the dancer dance from her habitual impulses. Computational rules are followed to a disturbing degree, their un-constructive illogic plain. Yet the habits of the trained body moving in both social-dance and dance-training traditions—precisely the kind of automaticity that Beaman and Lansdown hoped the computer would banish—provides a distinct contrast to the score's digital abstractions. As Goldman writes, dance's political promise lies in “negotiation with constraint,” rather than emancipation from it.<sup>83</sup> *Cambiantes* thus offers two lessons for performances of computationally created scores: those on stages and those in our everyday lives. First, the structure of chance does not obviate the articulation of *constraint*: indeed, it extends constraint, its illogic addressing the subject at its neurological base. A worker evacuated of prior habit is easier to manage. Second, although the extensive reach of arbitrary control does not reveal the self, it does not negate the subject. Performances of the mandates provided by such systems can indicate the subject as held in reserve, preferring to subsist in alienation rather than naturalize computational control through the tropes of spontaneous emergence and self-expression. In such conditions, an ironic remove may be the only way to wring beauty out of the nonsensical material provided by machinery built for the maintenance of power: an underlined contradiction that sparks spectatorial critique.

<sup>82</sup> Despite, or perhaps because of, the racial charge of the work, *M3x3* has anchored a revival of art-world interest in Cordeiro, with recent acquisitions and exhibitions by the Centre Pompidou, V&A, and MoMA. (It is typically advertised as the first work of Brazilian video art; its presentations to date have not mentioned race.) Moreover, these institutions have shown a longer version of the video that includes images of the dancers preparing in the studio without makeup, echoing minstrel dramaturgy.

<sup>83</sup> Goldman, *I Want to Be Ready*, 27.





Figure 3. *Cambiantes* by Analívia Cordeiro (1976). (Photo: Courtesy of Analívia Cordeiro.)

### Conclusion

In the work of all three artists, computer choreography becomes a metaphor for governance by aleatory management. Coding, undergoing a sociopolitical transformation to a masculine and elite craft, symbolized and annexed dance technique to deskill and atomize the feminized dancer. Cybernetic models of control found in human performance a venue for shedding their inorganicist garb; the human performer could internalize the absurdities of the constructed market and present them as a newfound (but also natural) liberated self. The earnest performance of computational scores thus staged a utopia of neoliberal productivity, where graceful beauty and individual choice emerge from ludic indifference. Readers can judge the results of pursuing this utopia at the national, indeed planetary scale for themselves.

This history need not reflect poorly on the past decade's return to computational performance scoring and control. On the contrary, the late wave of such work often activates social analogy and employs its own tools with *V-effekt* distance; even where artists deploy AI to more stylistic purposes, such as found in algo-raves, few among them would describe their software as neutral or impersonal. Distinct from its echoes in many ways, not least technologically, early computer choreography might rather deter us scholars from lauding these works as decentering the human through the technical assemblage's apparent effacement of intention. To praise an aesthetic of surrender to statistical whim, of the dissolution of group agency and production of deskilled selves, threatens—particularly with abnegation, formlessness, and dividuality held out as salvation—to align criticism with the project of late capital's most influential ideologues.<sup>84</sup> Research on the deployment of AI, and computation generally, in performance would be better served through attention to the computer's symbolic importance for the capitalist phase it materially made possible.

<sup>84</sup> For a similar polemic, see Anna Kornbluh, "Extinct Critique," *South Atlantic Quarterly* 119, no. 4 (2020): 767–77.