General views of the exhibition *Analivia Cordeiro – From Body to Code* at the ZKM | Center for Art and Media Karlsruhe, 2023. Photographer: Felix Grünschloß. © ZKM | Karlsruhe.

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Analivia Cordeiro: From Choreography to Code

Analivia Cordeiro's unique and outstanding pioneering achievement, as the title of the accompanying exhibition indicates, is the transition from body-centered to code-centered choreography. This transition originates from the problem of choreography as a generative schema and notation, as a medium of storage and instruction. For language, there is writing and for music, there is notation for passing on information. For dance, this *ars memoria*—art of memory—hardly exists. Letters are the written symbols of the thoughts. Letters or written symbols of movement barely existed at all. Only today, with the advent of computer-aided motion capture technology, is there a "script of movement," which since 1700 has been designated "choreography."

The word choreography is a combination of the Greek words *choreía* (dance) and *gráphein* (writing): dance-writing. The function of notations is to document and create something that can be passed on. Thus choreography, from Raoul-Auger Feuillet to Rudolf von Laban, was originally about the possibility of reproducing the dance, about prescribing and rewriting the actual movements. Today it is about the analysis and design of movements of the body in space and time.

Dance posed a special problem because of its complexity as a language of body movement in space and time. It requires a notation that is multidimensional. From Rudolf von Laban's notations of expressive dance (*Ausdruckstanz*) (fig. 1) to the Eshkol-Wachman *Movement System* (1968) (figs. 2, 3) to William Forsythe's *Improvisation Technologies* (1999/2003)[1], there has been a series of astonishing attempts to document graphically, to notate the movements of head, arms, legs, pelvis, and torso in the four-dimensional coordination system of space and time on a two-dimensional surface in such a way that they can be replayed, retrieved, and enacted.

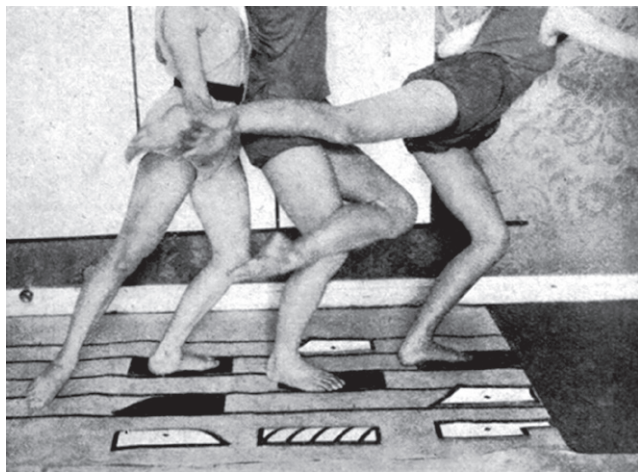
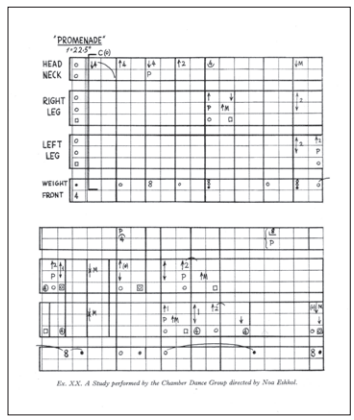


Fig. 1
Dance according to the Laban notation, before 1929.



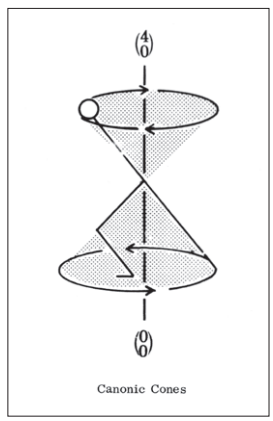


Fig. 2
Noa Eshkol, Eshkol-Wachman Movement Notation (EWMN) for *Promenade*, 1958. © The Noa Eshkol Archive.

Fig. 3
Noa Eshkol, Diagram for "conical movement" of the upper body. Published in Noa Eshkol et al., *Moving, Writing, Reading* (The Movement Notation Society & Tel Aviv University, 1973). © The Noa Eshkol Archive.

1 William Forsythe, *Improvisation Technologies: A Tool for the Analytic Dance Eye*, ZKM | Karlsruhe, Deutsches Tanzarchiv Köln (Ostfildern: Hatje Cantz, 1999/2012), CD-ROM with booklet.

Various ideas about the forms of presentation of dance and performance have inevitably led to the issue of how the movements of the body can be encoded in a notation. Dance is thus not only a question of choreography, but also of code. How can the movements of the body be encoded in space and time? This central question, however, not only results unilaterally from the history of dance and performance, but also from the recent history of art itself. For the visual arts of the 20th century tended toward leaving the sphere of the panel painting and seeking to "exit from the image" [2] (Laszlo Glotzer) in new forms of art such as Happening, Fluxus, actions, and performance. The classic two and three-dimensional space-based arts, such as painting and sculpture, have been pushing forward into four-dimensionality since the 1960s, and the classic four-dimensional time-based arts such as dance, on the other hand, into three-dimensionality. The expansion of the arts has been multidirectional. To this day painting leans toward spatial and object arts, and sculpture toward action arts. Action arts tend diametrically toward the object world, toward visible real or invisible virtual objects, from William Forsythe to Sasha Waltz, and in the world of media, toward film and video and computers. Yvonne Rainer pushed the expansion of dance into film very early and radically by directly producing films (*Lives of Performers*, 1972; *Trio A*., 1978).

Music as the primary medium of time-based art has played a central role in transforming visual art from an art of space (painting, sculpture) into an art of time (action, event, dance). The impetus was an authentic musical issue; namely, the role of the performer. The New Music of the late 1950s (Pierre Boulez, John Cage, et cetera) sought to emancipate the performer, to grant her or him new freedom within the framework of an "open work of art" (Umberto Eco, *Opera operta*, 1962; in English: *The Open Work*, 1989). Against the horizon of an incipient culture of the recipient, the freedom of the interpreter became central. The composer usually writes a score, for example, for piano, but it is only the musician who knows how to interpret and play that score who actually brings the work into being. Composers write music, the score: it is an instruction manual. Performers implement these instructions for use and create the music.[3] The score is a set of instructions for creating a specific event, a performance. The concept of the score has been expanded, from instructions for how to use musical instruments to instructions for how to use objects and people. George Brecht, who attended John Cage's courses at the New School for Social Research in New York in the late 1950s, expanded the idea of a score into the term *event scores*, instructions for everyday and simple actions (*No Smoking Event*, 1961). Yoko Ono, who was also part of the circle around John Cage, also created instructions for the audience, her *Instructions*. Allan Kaprow's concept-establishing *18 Happenings in 6 Parts* (1959) also lists "Instructions" for "a cast of participants."

The performative turn in the space-based visual arts brought about a convergence with the performance forms of theater, music, and dance. The result was acts, actions, and performances. Conversely, the performative turn in the time-based arts, from film to music and dance, led to convergence with performative forms of sculpture, installation, and painting. An immobile piano could be the setting for an infinite concert (La Monte Young, *Composition 1960 #7*, 1959/1960). Performances and exhibitions came together.

Thus the performative turn of art around 1960 began principally with extending the notion of the score in music, and with new experiments in dance that expanded into the worlds of objects and media—it also posed afresh the question of notation. In the 1960s, however, actions, performance, dance, and media art were marginalized by the art establishment. Those artists who, against all odds, took the risk of developing these new art forms represent the "heroic" phase of performance art—it was only the following generation of artists who achieved recognition for their art in the world's art museums at the beginning of the 21st century.

Until a few decades ago, classical ballet was the dominant form of dance. Classical ballet was primarily body-centered. But costume and set design also played an important role—think of the collaboration of Serge Diaghilev's Ballets Russes with Pablo Picasso in 1917 for the play *Parade* by Jean Cocteau with music by Eric Satie.

2 Lazlo Glotzer, *Westkunst: Zeitgenössische Kunst seit 1939* (Cologne: DuMont, 1981), 234.

3 In 1960, composer La Monte Young wrote *Composition 1960 #10*: "Draw a straight line and follow it." In 1962, Nam June Paik wrote *Read-Music-Do it yourself-Answers to La Monte Young*: "See your right eye with your left eye." The graphic aspects of the score took on a life of their own around 1950: Morton Feldman, *Projection 3 for Two Pianos*, 1951; *Earle Brown*, *December*, 1952; Iannis Xenakis, *Metastasis*, 1954, and *4 Systems*, 1954. The score of *Metastasis* in fact became the original sketch for the stunning architecture of Xenakis's Philips Pavilion for Expo'58 in Brussels.

Fig. 4
Jannis Kounellis, *Da inventare sul posto* (To invent on the spot), 1972. Performance.

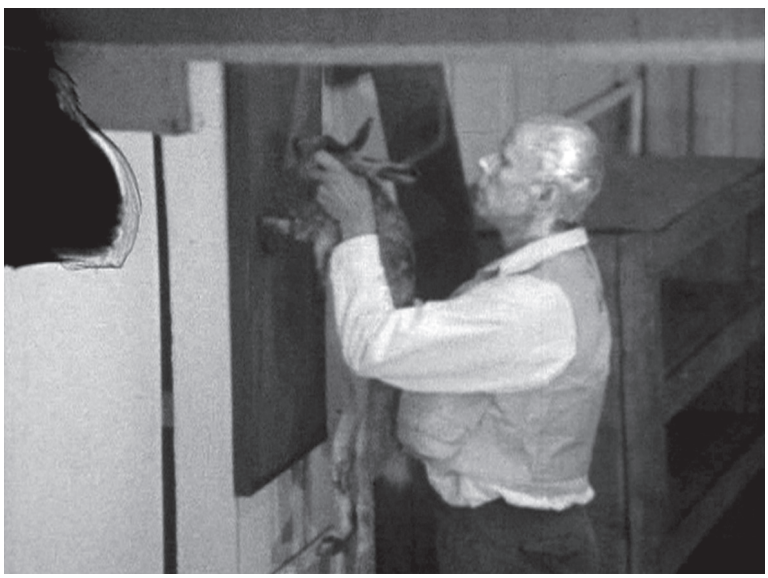


Fig. 5
Joseph Beuys, *Wie man dem toten Hasen die Bilder erklärt* (How to Explain Pictures to a Dead Hare), Nov. 26, 1965. Video still.

More important, however, than the visual elements of sets and costumes was the music. From Pyotr Ilyich Tchaikovsky's *The Nutcracker Suite* (1892) and *Swan Lake* (1895) to Eric Satie's music for *Parade* (1917), it is clear that the musicians and the choreographer were equal partners.

In modern times, these components took on a life of their own and resembled more a sandwich. The music was relatively autonomous, as was the visual presentation. There were also ballets without music, precisely in order to emphasize the autonomy of the two components. An absolute master of such independent elements of performative productions is Robert Wilson, who stages the lighting, the stage design, and the movements of the singers independently of the music. We can state that the ballet was a triad of music, visual art, and dance, in which the primary factor was the choreography of the body in space and time.

After the expansion of the arts, this triad changed. Recognizable in exemplary form in the trio of John Cage, Merce Cunningham, and Robert Rauschenberg: musician, dancer, choreographer and visual artist working as equals. Music and dance exist independently, just sharing the same space and time. The dancers' movements are not tied to the music. The exit from the image made the exit from sculpture possible; the transformation of two and three-dimensional art genres into forms of action, that is, into four-dimensional actions of the body in space and time: from Jannis Kounellis (fig. 4) to Joseph Beuys (fig. 5). The collaboration between Robert Morris and his then partner Simone Forti exemplified these

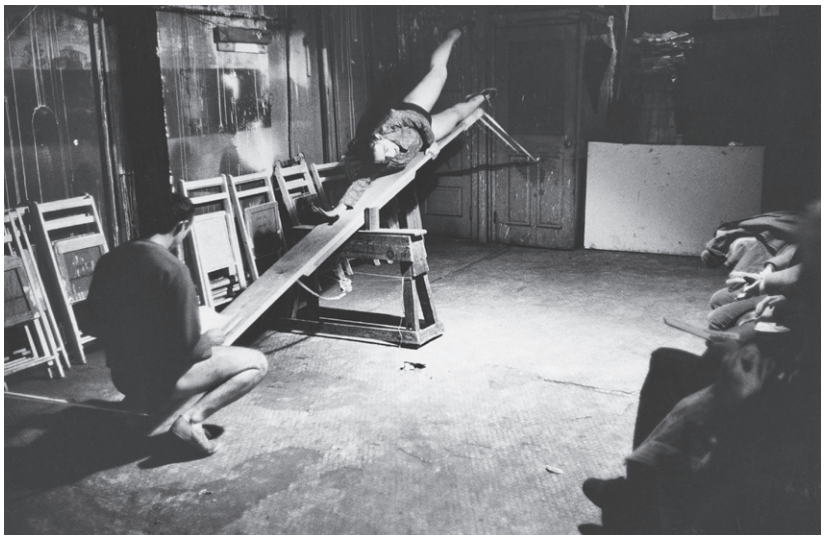


Fig. 6
Simone Fort, *See Saw*, 1960. Performance. Left: Robert Morris, right: Yvonne Rainer © J. Paul Getty Trust, photo © Getty Research Institute, Los Angeles (2014.M.7). Photo: Robert R. McElroy.

Fig. 7
Robert Morris, *BodySpaceMotionThings*, 1971. An installation in Tate, April 1971. Photo © Tate Images / © VG Bild-Kunst, Bonn 2023.

two contrary directions of expansion. Namely, sculpture tending to expand into time, into action, and action tending to expand into space, into sculpture. One example is Simone Forti's "Dance Constructions," which she started creating in 1960. For example, in one of these, *See Saw* (1960) (fig. 6), she combined ordinary movements such as walking, sliding, and climbing with everyday objects such as ropes and sheets of plywood. In the original version of the performance, Yvonne Rainer and Robert Morris moved up and down a long board, balancing their bodies in relation to each other. Taking a cue from this, Morris set up a kind of choreography for visitors (fig. 7) at the Tate Gallery in London in 1971.Choreographers such as Yvonne Rainer and Trisha Brown (*Accumulation*, 1971) explored this field of action that is extended by objects. All the above mentioned artists, however, remained within the realm of analog objects. In the 1960s, Michael Noll of Bell Labs in New York was one of the first advocates of the combination of computers and dance. In his book *Changes: Notes on Choreography* (1968) Merce Cunningham speculated with foresight on the possibility of creating dancing stick figures on a computer screen. Using electronic notation, the figures would move in space, so that you could observe the details of the dance: stop it or slow it down, play with the timing, see where in space each virtual dancer would be, and also observe the shape of the movement.

In the 1970s and into the 1980s there were developments in computer dance and notation besides those of Analivia Cordeiro, including Rhonda Ryman's development of an editor for Benesh Notation. From the late 1980s and 1990s, Merce Cunningham worked with Tom Calvert

and his team from Simon Fraser University in Burnaby, Canada, developing a new computer dance software program called *Life Forms* in 1989. Together with interface designer Thecla Schiphorst, he continued to develop the software, which later was renamed *DanceForms*. One of Cunningham's landmark dances, *BIPED* (1999), which he developed with visual artists Paul Kaiser and Shelley Eshkar, encompasses not only human movement conceived using *DanceForms* but also abstract images and dance figures created from motion captured dance sequences reimaged and resequenced on the computer. [4]

Today, it is noticeable that more and more dance performances use VR and AR applications, or operate with video projections and sensor-supported digital image worlds. In other words, after classic visual art, media art has now conquered dance as well. The body is no longer the dominant focus; this decentered dance form has expanded to include further expressive possibilities; for example, from the body to the code. With this expansion, dance has freed itself from its historical shackles of being purely body art and has pushed forward into new dimensions of anthropology.

A great and innovative pioneer of this extension of dance into media art and anthropology is Analivia Cordeiro. For the artist, the role of notation is significant. Her work on choreographic notation is comparable to G. W. F. Hegel's work on the Concept. It forces the choreographer to make rational decisions that go far beyond pure expressiveness. A master of this technique is William Forsythe (fig. 8). He composes a digital technology of notation using sculptural objects, but the objects, which were visible in the previous generation of artists, are now invisible. He thus works in the abstract space of code.

Analivia Cordeiro's abstract notations are an exact demonstration of the path from expressive body choreography to the coded movement of the body in space and time. In this, she has even in a way anticipated the motion capture system. Her notation not only attempts to capture the movement, to store the choreography for subsequent choreographers, but her notation is generative. It designs, almost algorithmically,

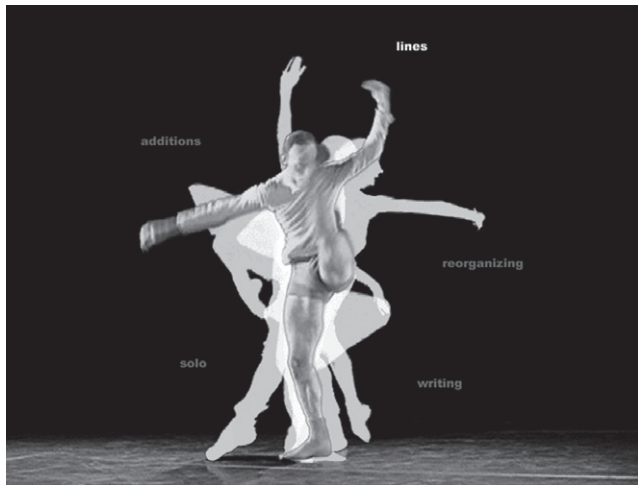


Fig. 8
William Forsythe: Improvisation Technologies. A Tool for the Analytical Dance Eye, 1999.
CD-ROM and booklet. Screenshots. © ZKM | Karlsruhe.

the sequence of movements in space and time, much as *analysis situs* transformed geometry into mathematics. For in *analysis situs*, each body in space is assigned points in the XYZ coordinate system and the points are marked by three digits. In this way, Cordeiro has also mathematized the space for choreography to some extent with her notations. Her concern is *analysis situs*, the analysis of space, and not the expansion of the body. If her performances nevertheless possess immensely expressive value, then it is because she teaches us a secret code, which consists of the fact that the more complex the geometry (i.e., the movements, positions of the body in space), the greater and more intense the expressiveness.

Out of this Cordeiro created the "expressive visualization system," Nota-Anna (1983/94). This achievement in abstraction opened up two optional paths for Cordeiro. On the one hand, to transform abstract sketches of movement into sculptures; and on the other, to mathematize movement. Thus, it remains only to quote her fellow South American Comte de Lautréamont, who was born in Montevideo, Uruguay:
"O austere mathematics! I have not forgotten you since your learned teachings, sweeter than honey, distilled themselves through my heart like refreshing waves...." [5] The new "Language of Dance"[6] (1963) was written by a "programmer as

4 See Janet Randell, "Dance and the Computer-Merce Cunningham," Cedar Dance Animations Limited, 2019. https://cedardance.com/dance-the-computer-merce-cunningham/.

5 Comte de Lautréamont, *Les Chants de Maldoror* [1868], second chant, tenth verse (New York: New Directions, 1965), 86.

6 See Mary Wigman, *The Language of Dance*, trans. Walter Sorell (Middletown, CT: Wesleyan University Press, 1966). First published in German as *Die Sprache des Tanzes* (Stuttgart: Ernst Battenberg, 1963).

choreographer"[7] (1977)—by Analivia Cordeiro. Her computer-based video dance of 1973 is thus an incunabulum of the history of media art as well as the art of the dance. It was presented at the important Computer Art Society festival *INTERACT. Machine: Man: Society* in 1973 in Edinburgh, Scotland, in the context of other important pioneers such as Vladimir Bonačić, Vera Molnár, John Whitney, and John Lifton. Cordeiro's cybernetic models of dance, based on the media of film and video, structured and programmed with the aid of computers, have opened the door to the 21st century: Today's most advanced choreographers all work with sensors as interfaces and computer-based media and codes.

The importance of a code instead of a choreography can perhaps be explained by a reference to Derrida's event. For Derrida, "[t]he trace is the erasure of selfhood, of one's own presence, and is constituted by the threat or anguish of its irremediable disappearance, of the disappearance of its disappearance. An unerasable trace is not a trace, it is a full presence [...]."[8] The trace is a component directly related to what is perceived through it; that is, what is made visible. The dance is visible for a while, replete with presence, but it is precisely through its movement that it erases all trace of movement. Each new phase of movement of a dance becomes presence at the cost of erasing the previous phase of movement of the dance. Dance, in this sense, is the art of the trace, a trace that only becomes visible by constantly erasing itself. The drawing is the trace of a movement of the hand. The hand leaves a material trace on the paper which remains. In this respect, we cannot agree with Paul Valéry, who in 1936 using the example of Degas, stated that there is an analogy between drawing and dance,[9] because while the dance will pass, it is the drawing that remains and persists. The score is therefore less the act, and more the event in the sense of Alain Badiou.[10]

The code, however, is not the dance, any more than the score is the music. Strictly speaking, the great composers, from Bach to Mozart, did not leave us music; they left *mousikē* graphs. They left us visual scores; that is, writings for producing music. Thus music as a trace is comparable to the dance. Movements erase themselves like the sounds do. Music and dance are special cases of presence. Without a trace, presence, which lasts only a moment, is not verifiable. If presence is understood as presence and present, it needs witnesses. The event, the music or the dance, literally testifies that presence is a property of witnessing. To transform the trace back into an event with the aid of witnesses, people or documents like texts, photos, and films, is the real problem of dance.

What is great and innovative about Analivia Cordeiro's achievement is that she went beyond this conception. For her, trace does not only mean recording system, storage. No, she uses the technology of the "trace" (film, video, computer) to construct, to create, to choreograph the dance. This makes her one of the first to introduce video and computer into dance, or into the performing arts like theater, music, and performance. Her seminal 1973 work *M3×3* is considered the first video artwork to come out of South America, and internationally as one of the first dance choreographies created specifically for video, using computer image processing to notate the dance movements. This invention, to use media and code for choreography, also distinguishes her work from other dance and performance productions in the 1970s, which remain in the realm of the body like the work of Ulay and Marina Abramović.

Within the frame of the program of the expanding arts during the 1960s, dance also expanded in three directions: in the utilization of objects (visible and nonvisible); in the utilization of media; and expansion into space. Analivia Cordeiro was the earliest and most radical artist to transfer dance into space. She did not make use of media to document dance performances; instead, she choreographed for the media of video and film, similar to how the best art photographers staged and constructed their subjects. "Dance for video like performance for photography" was her motto.

Likewise she recognized that space is a medium of the dance, similar to modern sculpture. Until 1960, sculptures—depictions of human or animal-like bodies—stood around in space but did not thematize the space itself. It was only after 1900 that modern sculptors

7 Analivia Cordeiro, "The Programming Choreographer," *Computer Graphics and Art 2*, No. 1 (1977): 27–31.

8 Jacques Derrida, *Writing and Difference* [1967], trans. Alan Bass [1978] (London: Routledge, 2001), 289.

9 See Paul Valéry, *Degas, Dance, Drawing* (New York: Lear Publishers, 1948).

10 See Alain Badiou, *L'être et l'événement* [1988]; *Being and Event*, trans. O. Feltham (London: Bloomsbury Publishing, 2013).

focused on space and polemicized against volume, mass, and gravity. One notices from Analivia Cordeiro's mathematical exercises of the body that she perceives gravity as a prison. For Cordeiro, dance is an arithmetic exercise in the space of the mind that is unconscious of its activity. The extremities of her body extend the three coordinates of the space, depict them, play with them. Just like Oskar Schlemmer's dances with poles in his "Bauhaustänze" (Bauhaus dances) (1926–1929) were nothing other than games with spatial coordinates. The arms and legs and torso were extended with rods because the body was defined as part of space and its coordinate system (fig. 9). The body represented the space and the space represented the body. Usually, the body supposedly reflects internal states which the movements of the body externalize, express. This is why it's called *Ausdruckstanz*—expressive dance. Schlemmer and his followers, especially Analivia Cordeiro, who acknowledges him as her role model, articulate the space inhabited by the body. For every movement takes place in space and time, including the movements of the body. Yes, movement creates space and time. In this respect, the home of the body is not the body itself, but space.

This paradigm shift from expression (expressive dance) to space (spatial dance) was already a decisive step that Analivia Cordeiro took. But there was also a second step: the turn to the media. Namely, she had experienced that video and film, as media of notation, enabled the body to be choreographed in space. She has converted every position of a movement, every analysis of a spatial position, every *analysis situs* into the three digits of the spatial coordinates and through this she has mathematized dance and transformed it into a special case of analytical geometry. On this basis of the calculability of movement, she then used computers to control, generate, and program the choreography: "Programmer as Choreographer"[11] (1977). An incredible achievement! The computer community recognized this earlier than most and has therefore invited Analivia Cordeiro to important computer festivals since 1973. Her computer-based choreography of the 1970s is certainly in the great tradition of Brazilian Constructivism and Concrete Art, to which her father, Waldemar Cordeiro, belonged and to which the information aesthetician Max Bense paid tribute.[12] Yet Analivia Cordeiro's achievement of encoded choreography is unique.

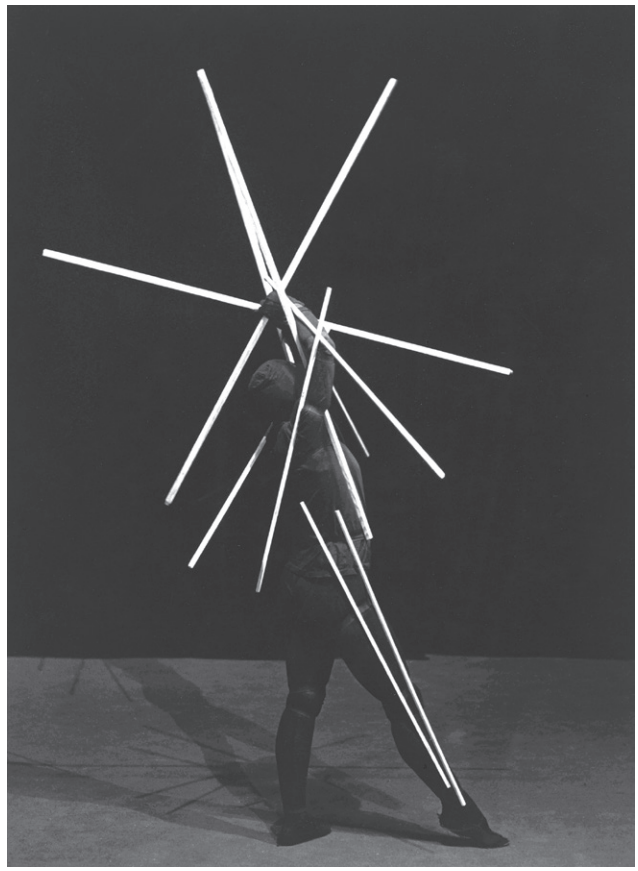


Fig. 9
Stäbetanz (Staves Dance), 1928/1929. Costume by Oskar Schlemmer, performed by Manda von Kreibig at Bauhausbühne Dessau. Photo © bpk / Kunstbibliothek, SMB / Charlotte Rudolph / © VG Bild-Kunst, Bonn 2022 for Charlotte Rudolph.

Only today, when the extension of dance into the media has reached the mainstream, do we understand the artistic achievement of Analivia Cordeiro—with what tremendous imagination and mathematical rigor she has conquered and shaped terra incognita.

Translated from the German by Gloria Custance.

11 See Cordeiro, "The Programming Choreographer."

12 See Max Bense, *Brasilianische Intelligenz: Eine cartesianische Reflexion* (Wiesbaden: Limes Verlag, 1965). The first English edition of this book will be published by Spector Books, Leipzig, in Spring 2023.