STAGING A CONTEMPORARY HIEROPHANY: STRATEGIES OF RHYTHM AND ALGORITHMIC VIOLENCE IN *ΔNFANG* BY THE FRONTE VACUO COLLECTIVE

Luca Befera
Università di Torino
luca.befera@unito.it

ABSTRACT

The present paper studies the most recent performances of the Fronte Vacuo collective, which merge ubiquitous digital elements with the performers' body dimension. Specifically, I will consider the case of *Δnfang*, the first and prototypical piece of the *Humane Methods* cycle, delving into the algorithm processing and staging. The software determines repetitive sound and light patterns based on the AI underlying learning process. Its real-time evolution continuously redefines the piece's multimedia content, also influencing human beings' behaviour. Naked and speechless performers enact obsessive actions aimed to express the software constraints and hegemony. The dramaturgy and overall structure are hence fixed, whereas internal parameters continuously change. Within this framework, I hypothesise that both the algorithm and performers might be conceived as instruments: the former, as built by the authors to autonomously play; the latter, as controlled and irrevocably influenced by the machine. Repetition stands as the fundamental parameter that permeates gestures, bodies, digital artefacts, and symbolic meaning towards a ritual attitude, enacted as an unavoidable as much as sterile practice.

1. INTRODUCTION

Contemporary musical performance has progressively entailed different media over the last decades, which extended staging and sensory perspectives [2,10]. The involvement of tactile, visual, and gestural dimensions has been strictly connected to the employment of various analogue media – such as sensors, lights, and visuals – and digital technologies – such as software used to compose automated or interactive processes [12,33,46]. These tools not only assumed a scenic function but became a pluralistic instrumental apparatus usually accessed through graphic interfaces [4,37]. The implications of the second and third waves of human-computer interaction [6,35] have then determined a new relationship with technology implying the predominance of digital environments and their merging with broad socio-ocultural contexts. The usage of artificial intelligence [30,44] and virtual or augmented realities [24,29] within performances and their growing real-time interactivity related to this perspective, manifesting the ubiquitous and pervasive nature of information technologies [40]. Such approaches were also parallel to the technical evolution that took place in the theatrical field [32], showing ongoing similarities to such scenic representations also in the centrality of bodies [39,48]. However, authors such as Marko Ciciliani, Jenifer Walshe, Alexander Schubert, Brigitta Muntendorf, Samson Young and Stefan Prins have still maintained a prominent use of the musical dimension. Parallelly, they are pursuing an experimental approach questioning the role of digital media, in which theatre "rediscovers itself as a part of society, that is, a laboratory of the social, in a very different sense than before: not as a workshop for innovation and not as a place for individual experience, but as an epistemological device in which the question of collectivity can be posed as a problem of government" [36]. In other words, they aim to unravel pervasive social dynamics rooted in information technologies, revealing or exploiting them within a theatrical environment.

Works by the Fronte Vacuo collective, founded in 2019 by Marco Donnarumma, Margherita Pevere, and Andrea Familari, are posited within this environment, merging the expertise of each author towards a particular aesthetic approach. Even if all dealing with intermedia composition, its members singularly studied muscular sensors and mechanical prosthetics [13], biological and biotechnological matter [41], and audiovisual performance tools [20]. The three works of the collective realised so far, all belonging to the *Humane Methods* cycle, brought on stage these different facets. Also, they focus on violence in algorithmic societies [22], namely discrimination carried by wide-spreading algorithms that impose partial accounts and pre-existing biases. Indeed, the AI automated systems work "in and through the relations of selves to selves, and selves to others, as these relations are manifest in the clusters and attributes of data"; consequently, it necessarily discriminates by

affording "greater degrees of recognition and value to some features of a scene than they do to others" [3].[1]

In a posthuman [27], feminist [9], and cooperative [26] perspective, Fronte Vacuo considers the performance as a body composed of *various* organic bonds which encompass humans and non-humans, living and non-living beings [16,42]. Rhythm stands as crucial since, in a conceptual view, since both sounds and matter are composed of repetitive patterns that define a distinctive milieu [11,16]. The different layers exploited in *Humane Methods* regard naked and speechless performers with repetitive and jerky movements, interacting within the sonic and light settings extemporaneously defined by the algorithm. Some of these aspects are not new in theatre and dance art production, as stated by the authors themselves [15,14]. The reflection on body and technology refers to the prosthetic tools in pieces such as *Exoskeleton* (1999) by Stelarc and *Epizoo* (1994) by Marcel·lí Antúnez Roca; the intermedial performance to works by the Santasangre collective such as *Sigradi* (2008); nudity and choreography to dance performances by Maria Donata D'Urso such as *Collection Particulière* (2006); costumes to the living sculptures by Olivier de Sagazan such as *Transfiguration* (1998); symbolism and rituality to theatrical pieces by the Societas Raffaello Sanzio such as *Tragedia Endogonidia* (2003).

On the other hand, other recent performances also dealt with algorithmic surveillance and computational dominance. In *Algorithms* (2015) by the Turbo Pascal collective, for example, spectators are arranged according to instructions given by the software and delivered by speakers and performers [36]. In *Sight Machine* (2017) by Trevor Paglen, the Quartett and audience members are constantly monitored by a camera while the show goes by, and their shapes are projected on a background canvas [50]. Both still differ from *Humane Methods*, especially because the former does not involve real-time processing, and AI is only assumed; the latter does not imply a ritual dramaturgy but a canonical concert venue, eventually augmented by digital media. Finally, sound and light pulsation patterns, further analysed, also recall the approach of minimalist composers such as Steve Reich – in homorhythmic loops and phase shifting [19] – and Fluxus authors such as Earle Brown – in their aleatoric assemblage according to pre-defined sections [25]. Nevertheless, the extemporaneous management of audiovisual material is not assigned to the performer but to the automated computation of the algorithm. The distinctive perspective of the play is indeed rooted in the AI dramaturgical implications, as always entwined with living beings on stage. The machine interplay is perceivable through the audiovisual outputs rendered by analogue media and paired with performers' actions through recursive gestures occurring within clearly defined narrative cycles. Also, molecular processes of onstage biological matter – as fungi and plants – conceptually recall the sequential renovation of the software, whereas in-motion mechanical devices – as self-standing prothesis – the performers' movement.

In dealing with artificial intelligence, the aesthetics of *Δnfang*, and generally of the *Humane Methods* cycle, considers the different issues already discussed in the academic literature about algorithm problematics [23,32,47,45], generally encompassing: 1) automation, as machines replace human agency through pre-set processes based on datasets; 2) architecture, as automated digital models influence the structure of commercial and public organisations; 3) predictive models, concerning the employment of quantitative knowledge for anticipating people behaviour. In this article, I will explore these issues in relation to *Δnfang*, hypothesising that the dramaturgical intent revolves around AI as a ubiquitous – or even sacred – entity which slowly and imperceptibly consumes human identity and body. Rhythm and repetition outline a ritual attitude that human beings cannot avoid, resulting as aligned with as contaminated by the recursive methods of the computational artefact.[2] Or, as described on the piece webpage, "it counts, they worship, they touch, they sense, it counts, they isolate, they hate, they attack" [21].

2. *ΔNFANG*: BODIES, INSTRUMENTS, AND PROCESSING

Δnfang (2019) is the first production of Fronte Vacuo and stands as a prototype for the following works, which developed from the same human-machine interaction but with different procedures.[3] It enacts the relationship between two main characters (interpreted by Marco Donnarumma and Margherita Pevere) evolving through recursive loops, where each scene restarts with the initial setting but also provides a slight change of the plot during its development. In the first cycle, the performers appear on stage dressed in a full-length robe and a cloth to cover the face with holes at the height of the eyes. They search for a stool and, once found, they grab it and sit down. Then, they perform the same mechanical gesture over and over, which recalls the cross sign ending with a shot in the forehead (Fig. 1). Meanwhile, sonic and light patterns play according to numeric outputs automatically generated by the AI learning

[1] *Δnfang* was premiered on 4 October 2019 at Romaeuropa Festival, Rome; *ʊr*, 22 September 2020 at Touch Me Festival, Zagreb; *Σxhale*, 5 February 2022 at CTM Festival, Berlin. The main differences between the pieces regard the number of characters – from one in *ʊr* to six in *Σxhale* – and the algorithm function – dealing with only lights in *ʊr* or lights and sounds in the others but working with autonomous inputs in *Δnfang* and with performers' motion data in *Σxhale*.

[2] Besides the collective website [22], this aspect was also expressed in the meeting I had with the authors in Vienna after the *Σxhale* performance on the 13 of March 2022.

[3] Except for the article drafted by the authors themselves [8], there are no scientific writings about the performance. Therefore, I will report data especially gathered from the collective website [22], the online interview with Marco Donnarumma and Andrea Familari occurred on May 9, 2022, and the analysis of the entire video of the premiere. I am kindly grateful to them and Margherita Pevere for the shared data and the attention devoted to me.

process. Over the cycles, the male figure on the right gets ever closer to the female one on the left in a devious way, but his actions are always interrupted: excluding the eighth and last sequence slowly fading out before the coda, the previous seven ones end abruptly with other performers, previously acting and watching in the background, stopping him while music and lights switch to a sinusoidal drone and a stable and warm neon (Fig. 2). The plot development also provides the secondary characters gradually undressing the main ones and, around the end, limiting the male freedom by tying his left leg. The climax occurs on the eighth repetition when the constricted male character enacts a silent scream. It follows a march of seven naked performers accompanied by a pre-set musical track where they simultaneously and slowly move in front of the stage with a jerky walk, until falling to the ground one by one.[4] Hence, this episode is a coda that breaks the loop repetition and brings to the performance end.

As here inferred, the hierarchical dynamic between AI and performers is enacted through the plot evolution, implying an obsessive and constrictive framework which ends with human identity deprivation. Both parties show the inability to reach their goal, as always partially controlled by someone or something else. Therefore, I posit here that different and never fulfilled agencies – as the "satisfying power to take meaningful action and see the results of our decisions and choices" [34] – are employed: performers, who are supposed to be consciously acting, emerge as mechanical and subjugated entities; the algorithm, which manifests the ability to evolve, is constituted as an inanimate computational artefact. To highlight this conflictual and infertile relationship, I propose to treat both parties not only as agents but as instruments which are built or enacted to be used – by the software or by the authors, always by rhythm centrality. The performance emerges as a dark ritual that is still enacted within the theatrical milieu to show compulsive behaviour and mortification of the body happening within a digital hegemonic context.

Figure 1. *Δnfang*, Romaeuropa Festival, snapshot showing the first episode.

[4] For the sake of argumentation, I will not address the symbolic meaning of the beginning and the end scenes employing the figure of the deer. Even if significant, this aspect is considered subsidiary for the present purposes.

Figure 2. *Δnfang*, Romaeuropa Festival, snapshot showing the first intermezzo.

2.1 Algorithm-Instrument and Digital Agency

The algorithm is the core digital aspect of the performance not only for the overall concept but also because it defines in real-time a substantial part of the scenic setting. It implies reinforcement learning whereby rewards are given to assist the achievement of certain results [46].[5] In this case, it is a Deep Q-learning implemented in Python and programmed through the Keras library. The task is to get as close as possible to an array of ten decimal numbers from 0 to 1 arbitrary assigned. Positive rewards are automatically given when getting closer and negative vice versa. The algorithm moves in parametric space and prints its values on a UDP server. Then, it gets the rewards and changes its status by adding or subtracting a constant in relation to the neural network processing. This process restarts from scratch for each episode. Indeed, the software is not programmed to fulfilling the task but to constantly try and start over [8].[6] Its behaviour is made intelligible by means of analogue devices on stage: the numerical data generated by the machine are converted to OSC protocol and then processed through Pure Data – used by Donnarumma for sounds production – and TouchDesigner – managed by Familari for light control. The two automated dynamics are therefore distinct but generated from a common matrix referring to the AI outputs. The main values employed to manage sounds and lights, as visible in Figure 3, are not only the numbers computed by the algorithm (on top) but also the distances (on bottom) – namely, the difference between the given values and the values outputted by the algorithm, approximated as integers from 0 to 2 – and the two rewards (in the centre).[7]

[5] The source code – developed by Baptiste Caramiaux like all the pieces of the *Humane Methods* cycle – is freely accessible on the programmer's GitHub account [7]. I also gathered more data from the email exchange with the programmer occurred on 29 August and 13 September 2022.

[6] Besides the lack of a long-term memory, Donnarumma also stated in the email exchanges occurred on 13 June 2022 that the goal is set to be almost impossible to reach.

[7] As Donnarumma and Familari stated in the email exchanges respectively occurred on 13 and 14 June 2022, even if the range is reported between 1 and 3 in the article about *Humane Methods* [8], both Pure Data and TouchDesigner process values from 0 to 2 for technical reasons. Basically, they are the same 3 values but with an offset of 1

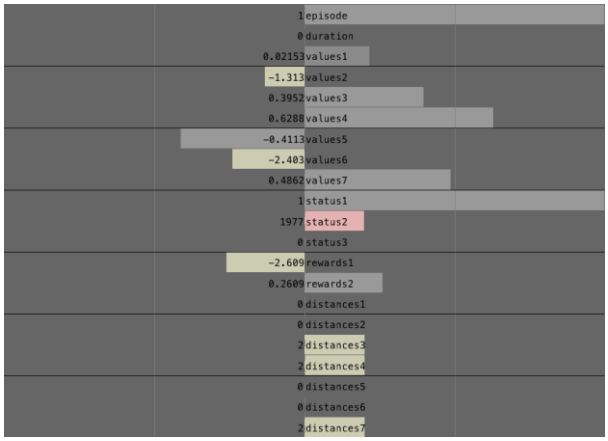

Figure 3. *Anfang*, excerpt from the TouchDesigner patch showing the algorithm outputs.

Sounds are managed according to two pattern sets called "phrase 1" and "phrase 2" in the Pure Data patch visible in Figure 4, each consisting of seven elements. As shown in the note on the right, each of these phrases is triggered by the distance values: e.g., if the algorithm prints a number whose distance to the first given value is approximated as equal to zero, the first pattern of the first phrase will be activated; if equal to one, the second: if equal to 2, none of them. Patterns are played at 300 bpm and are replaced each 64 beats according to the algorithm re-inputted values. Figure 5 shows the transcription of the 14 patterns. The first index number refers to the pairs of patterns shown in Figure 4; the second one to the phrase. Hence, the first two staves correspond to the block on the top-left corner of the patch. Each block employs the same piano sample obtained from Renoise, thus implying seven different piano timbres.[8] Each quaver is equal to one beat, so that the two bars reported in Figure 5 are played eight times before changing (8 quavers × 8 repetitions = 64, which is the number of overall beats before other values are inputted). It is possible to overview the heterogeneity of the different patterns in regard to pitches and accents, which allow a certain variety within an overall homorhythmic tendency. Additionally, pitches do not all belong to the same harmonic series, often causing a certain acoustic nuisance which sides the obsessive patterns. Moreover, another slight variation is related to the sound triggering, as the AI values are gathered in Pure Data in a span of 500 milliseconds instead of 50 – which would be enough to guarantee correct interoperability. The higher value makes certain glitches occur, thus breaking the rhythm regularity with unknown, but not too disruptive, events (e.g., adding an initial phase shifting between patterns).

position. Note that only seven out of the ten values are employed for these calculations, and status and direction have never been used.

[8] The distinction between bass and percussion reported in the figure, vaguely recalled also by the pitch of the patterns, might suggest the influence of electronic popular music belonging to Donnarumma's background [17].

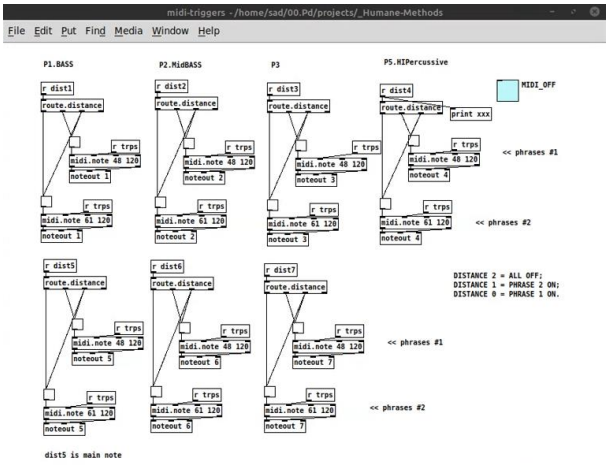

Figure 4. *Anfang*, excerpt from the Pure Data patch showing the 14 sound patterns.

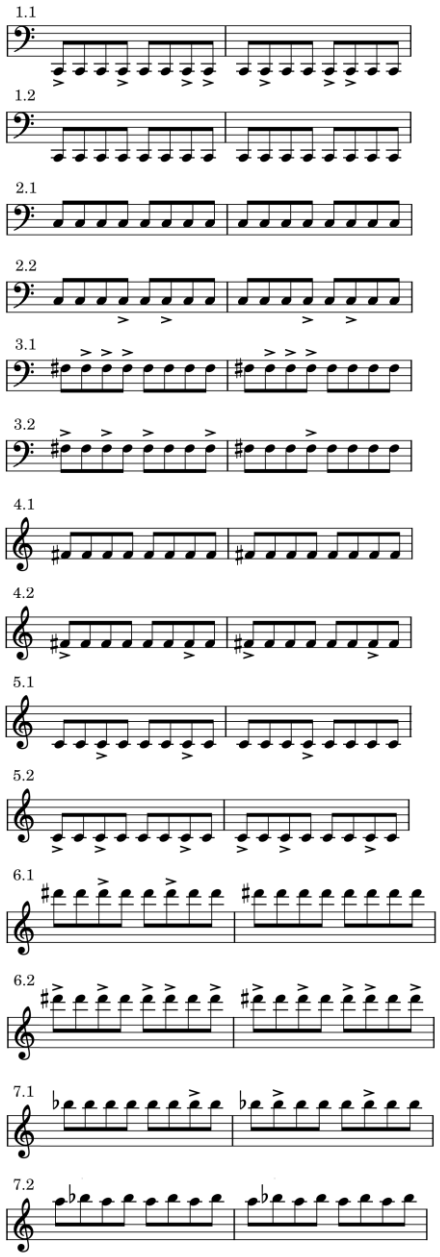

Figure 5. Transcription of the 14 sound patterns.

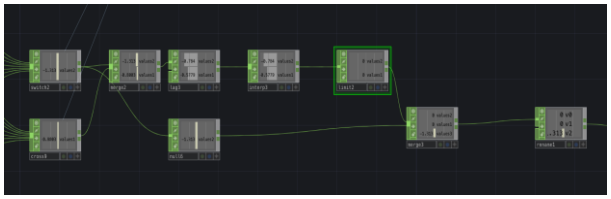

Figure 6. *Anfang*, excerpt from the TouchDesigner patch showing the lights starting management.

Lights, on the other hand, are triggered every second, resulting in the perception of a continuous flow still based on rhythmic patterns of pulsating intensity. This medium mainly employs the values outputted by the algorithm, not the distances. The excerpt of the TouchDesigner patch in Figure 6 highlights the prior transformation applied to these values to reproduce three different rhythms. The seven numbers are initially filtered by a switch module (on top-left) – which determines the simple alternation between one value and another – and a cross module (on bottom-left) – which also provides the transition throughout all the intermediate values between the seven numbers given by the algorithm. These functions are then reported in the sequence of modules at the centre: on the top, both are firstly merged, then slowed and interpolated to be smoothed – where the limit excludes negative or too high values for better management during the live performance; on the bottom, the switch remains as it is, also including the negative values. It follows the three oscillation patterns on the right: the interpolated and positive switch ("v0"); the interpolated and positive cross ("v1"); the cross as it is originally provided ("v2"). Further calculations are applied to associate each pattern to lights, which are pre-set and change depending on the scenic episode. Therefore, lights appear from ever-changing sources and in multifaceted oscillations – still not belonging to extended patterns as for music. Another cross further relates the intensity to learning, as lights become more stable as the distance to the given values decreases or, conversely, more dynamic**.**

The outlined techniques emulate AI learning through sound patterns and light oscillations which make the process perceivable on stage.[9] The algorithm, hence, is conceived "not for its capacity to achieve a certain goal, but rather for the particular computational behaviour driving its learning mechanism […], interpretable only by observing its choices and subsequent actions. In this sense, it became observable as an actor" [8]. Still, lacking an aesthetic intent, the software refers to pre-set statistical rules, so that its prerequisites are not detached from the authors' will [43]. It thus manifests a digital agency, namely the "capability of machines to act autonomously, but on behalf of humans" [1], even if implying a certain ability to evolve, act, and make choices. In summary, the algorithm stands halfway between an actor – as it is enacted to be – and an automated entity – as it only processes data over the whole piece, and its behaviour is expressed by balancing a certain mechanical homogeneity – e.g., concerning tonality of lights and regularity of patterns – with slight organic changes, towards a stochastic and obsessive atmosphere shaped in its likeness.

2.2 Performer-Instrument and Ritual Enactment

If the algorithm works through commands given by humans, performers are themselves influenced by the computational environment that, as staged, governs their behaviour. Indeed, they act as mechanical beings not able to realise their goals and enclosed in sterile relationships. Their subjugation is enacted within a ritual framework constituted by two main aspects: performers' connotation and gestures; the algorithm ubiquity suggested by the sound and light design.

Regarding the first aspect, ritualisation is "embedded within the dynamics of the body defined within a symbolically structured environment" [5], firstly recalled by the actors' rough clothing or nudity already mentioned. Then, performers repeat "a hybrid form of gestural prayer" each time with a variation, thus mirroring "the episodic learning of the algorithm" [8]. Figure 7 shows an example from the scene in the middle of the performance, where a red liquid – strongly recalling blood – is poured on the female character's belly after the male and the other actors gather around her. In the following episode, the male is forcibly undressed and tied. The disruptive deprivation hence brings to the manifestation of the character's naked body, presumably revealing his inner nature as a limited being. The event snapshotted in the figure is liminal: from then on, he and all the other characters will progressively collapse, showing the negative facet of the ritual event.

Concerning the algorithm, it lacks a clear physical embodiment but is depicted as ubiquitous through an ever-perceivable audiovisual environment.[10] Thus, it stands as "Unseen", namely as "an entity of imagination [which] ontological status is not known" and which, as such, gains normative values or even transcendent meanings [38]. At the same time, the mechanical repetition implies "the 'power, reliability and immortality of the machine'", as already explored by minimalist composers [28]. Automation and normative/transcendent values converge in a mechanical entity lying in another reality that, at the same time, is accessible through audiovisual signs. Through this ambivalence, the authors enact the underlying power relationship of the machine, as humans perform actions driven by computational factors as tangible as out of their consciousness.

[9] Another method also implies that music gets quieter and light dimmer as AI approaches the target values over the episodes [8]. Fading into darkness and silence might thus be compared to human collapsing which progressively occurs.

[10] The only physical manifestation regards the two protheses fixed on the iron structures, as stated on the performance website [21]. Still, these elements are not directly relatable to the algorithm because always in the background, working only in the last part of the play and not synchronized with the audiovisual stimuli.

It should also be noticed that it remains unclear if performers are aware or not of the algorithm stimuli during the play since they are not explicitly synchronised to what it does. The audiovisual outputs can be considered either diegetic – where beings on stage move their ritual actions precisely from the perception of lights and sounds in the background – or extradiegetic – where AI is instead manifested only to the audience who can overview its implicit and pervasive existence. As an appendix to this argument, it can be observed that the final march, as a coda in which the meaning of the work is shown, is instead explicitly synchronised with the steps of the performers. In any case, regardless of performers worshipping the AI or another related entity, the algorithm exercises its power as "something of a wholly different order, a reality that does not belong to our world, in objects that are an integral part of our natural 'profane' world"; in other words, it represents a "hierophany" in any case [18].

Hierophanies, as referring to myth and religion, imply the conscious recognition of sacred elements as reference points for better understanding the world and getting oriented within it. In this case, instead, the AI algorithmic violence induces loss and subjugation, also because its deceitful dictates are passively suffered. Therefore, the rhythmical audiovisual environment portrayed by the algorithm constricts humans within a negative ritual dynamic that they are not able to avoid. Their body results as driven by its ubiquity and sacred power as an instrument apparently deprived of free will. Hence, it is exactly this distorted view of sacredness, mediated by computational factors, to reveal the intrinsic nature of enacted social relationships, as enclosed within a theatrical environment that shows an archetypical insight. In other words, the actors' unconsciousness is counterposed to the spectators' knowledge: AI still represents a reference point to whoever watches not only for understanding the performative dynamics but also a broader socio-cultural milieu where dark and mischievous issues occur.

Figure 7. *Anfang*, Romaeuropa Festival, snapshots showing one of the middle episodes.

3. CONCLUSIONS

The analysis of the performance and the underlying computational models have highlighted a prominent ritual dynamic that takes place according to digital dictates. The algorithm is composed to reflect an autonomous entity apparently acting with its own agency and influencing the whole environment and performers' actions. Still, the milieu where the performance takes place is defined by the authors, who also set the algorithm as an instrument that automatically plays. On the other hand, humans recall primitive beings holding their rites and relationships while unconsciously controlled by the digital simulacrum. These sterile loops are rooted in rhythm as a fundamental motion associating bodies, gestures, and digital processes. The performers' unconsciousness of the digital pervasiveness implies that their actions occur after the algorithm audiovisual interplay, as something not willingly made but strongly driven. Consequently, both performers and the algorithm, as acted by someone or something else, might be conceived as instruments with their own affordance.

The ritual dynamic of *Anfang* emerges from rhythm itself and it is also characterised by the various props and gestures. By dealing with algorithmic violence, it recovers the perceptual dichotomy between the corporeal and the digital, merging it with the opposition between human and divine. The performative venue encloses these dichotomies as a distinctive milieu, so far as the event is enacted. The audience, hence, can observe the whole dramaturgy and participate from the outside in the expressiveness of the work. To this extent, the epistemological goal lies not in the ritual event but in its staging, as a metaphor for contemporary social dynamics. Indeed, *Anfang* deals with the three issues generally addressed to algorithmic society mentioned in the introduction, as human agency is strongly influenced by machine behaviour; the automated digital model articulates the overall structure of the piece; the employment of processed data somehow determines the dramatic development. It emerges a theatrical setting showing a ritual of digital power and human loss where, insofar as the obsessive repetitiveness and power of the machine become ubiquitous, humans emerge as impotent and unconscious. Insofar as "it counts, they worship, they touch, they sense, […], they isolate, they hate, they attack" [21], and, ultimately, collapse.

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