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CHOREOGRAPHIES IN THE WORLD OF AI

THE MEMORY, THE EVENT, AND THE TECHNOGENESIS

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Abstract

The rise of artificial intelligence (AI) is opening up new opportunities for the arts, including dance. Initially facilitating the practice of writing down dances, AI is now able to perform innovative choreographic tasks. Phenomenologists and technophilosophers have explored the potential benefits and drawbacks of the proliferation of this unpredictably fast-growing technology and have called for new ontological approaches, basing their AI philosophy on their knowledge and experience of real-world, corporeal dance, they have predicted the arrival of a new technogenetic era. This paper delves into these theories, providing a more detailed discussion of the innovative concept of technogenesis proposed by contemporary dance philosopher Erin Manning.

Keywords: AI, dance philosophy, artificial choreography, memory, technogenesis

1. INTRODUCTION

According to the Greek poet Hesiod, one of the main sources of art, an essential expression of human creativity, is memory. The Muses, the goddesses who inspire and help artists – including Terpsichore, the muse of dance – are the children of Zeus and Mnemosyne. Mnemosyne is the goddess of memory and lends her name to the river in Hades, a counterpart to the river Lethe. While dead souls drink from the waters of the Lethe so that when they are reborn, they will have no memory of their former life, the initiated have the privilege of drinking from the waters of Mnemosyne after death – the water of memory, revered as one of the purest sources of knowledge by all cultures. The worshipper must drink from these two wells: the water of the Lethe to forget human life and the water of Mnemosyne to remember what he has seen in the other world. After experiencing this initiation into death, the godly man is likened to the inspired scientist, the poet, and the prophet.

Are memories and remembrance still as valuable today as they once were, or has technological progress rendered them superfluous or even dangerous? To what extent are everyday and artistic experiences affected by dystopian visions, in which memory and memories can be exchanged and transformed, and in which humanity becomes subordinate to artificial intelligence? Should memory be protected? Is this possible,

and if so, how? In this paper, I explore the relationship between art and memory in the context of dance and technogenesis in order to answer these questions. Art is an inspired dynamic of *remembering and forgetting,* and in the history of art, looking back has often played a more significant role than looking forward, with greater emphasis placed on remembering than on dreaming (Barcsi, Hrubi &Weiss, 2021). In contemporary art, reflection on the phenomenon of remembering has been a prevalent theme for decades, and since the advent of Artificial Intelligence (AI) in the art world, the dimensions of this discourse have expanded even further. This is due, in part, to the incomprehensible size of AI's data storage capacity and its similarity to human memory (Suh, 2023), and, on the other hand, to the technogenetic possibilities that have emerged in the technological fields of artistic creation over the last decade, making individual movements, sounds or images transformable. Memory also serves as a kind of restoration, fueled by the hope of creating a new whole from the fragments of traumas and pains experienced. Art, alongside memory politics and trauma research, plays an important role in these creative processes.

Just as art plays an important role in exploring the various forms of memory and forgetting, as well as in examining the interconnections between identities and historical periods, it is also involved in rethinking the role of archives *as a medium* in shaping history. Exhibitions, lectures, performances, and reinterpretations by artists of archived materials (e.g., images, texts, dance performances, or recorded performances) dedicated to the themes of the archive reveal that their meaning is profoundly influenced by the way in which *they* are structured and re-created.

The role of memory in artistic reenactment is also essential. In the philosophical concepts of art that I will touch upon, memory is central to identity formation. The significant historical and art aesthetic aspects related to (critical) theories of memory will be partially discussed later (Boros, 2023). In the context of performance art, theories of *re-performance*, participation, and collaboration are emphasized in interpreting the function of memory (Boros, 2023). These theories critically examine the problematic aspects of individual and/or collective memory through the lens of performativity. Building on these investigations, it can be stated that there is never a complete memory but rather a re-creation or a re-interpretation (Süli-Zakar, 2023).

As we will see, this is the insight that dance philosopher Erin Manning draws on in developing her new concept of memory in relation to dance based on technogenesis. Indeed, with the advent of AI, new possibilities for memory, dance art, and choreography have arisen, and the problems of time, duration, memory, freedom, collaboration, creation, and the individual are increasingly being addressed in relation to AI.

The choreography, the composition of the work, and the temporal structure are meaningful not only in the relation between parts and the whole but also in the interplay between before and after, where the latter rewrites the former. The work is a living structure whose temporality is an important dynamic factor. This temporality is similar to the temporality of the I-consciousness, evolving in tandem as the self-image emerges in contrast to previous states, what one can call oneself. The relation to the given work takes shape within these before-after temporal references (Almási, 2003). AI can reduce this complex reference system, but, as Manning points out, it can also open it up to creative processes that enhance human potential (Manning, 2009).

One of the most important features of AI is its seemingly infinite memory capacity. These artificial neural systems, equipped with both learning and recall algorithms that allow the use of learned information, significantly expand the amount of information stored at any given moment. An artificial neural network serves as a specialized form of memory that functions both as associative and addressable memory, and its main feature is its capacity for adaptation and learning.

With its potential in machine learning and natural language processing, AI is fundamentally changing not only the research, predictive, and practical aspects of science but also the everyday tools that people use, culture as a whole, and perhaps even the traditional view of human beings.

However, what is left of traditional aesthetics? Or is there now only anti-aesthetics (Almási, 2003)? The question of whether technical progress can eclipse beauty and truth was already posed in the 18th century by Friedrich W. J. Schelling. Similarly, Martin Heidegger based a large part of his philosophy on the interrelationship between time, existence, and technology.

The fear that machines and technologies will turn against humanity and deprive us of our will, independence, freedom, and memories is millennia-old. Biblical golems, Greek automatons, horror stories about the possibilities of creating artificial life, and the Frankenstein narrative all testify to this fear. This is evident in Fritz Lang's 1927 film *Metropolis,* which inspired a long line of later horror and fantasy works with the figure of the *Maschinenmensch*, the robot in human form who wreaks murderous havoc. The advent of the technological singularity that these stories foreshadow (i.e., technological advancement that is accelerated by superhuman intelligence to the point that man can no longer understand it, can no longer store it in his memory, and will no longer need it), is a depressing vision of the future (Joy, 2000).

In this paradoxical situation where AI serves as both a useful tool and a threat, in a world of AI-dominated choreography, is it possible to preserve the dancer's body, creativity, and memories? How can the dancer collaborate with technology rather than be subjugated by it or try to use it as a tool?

Manning addresses these philosophical issues related to technology by incorporating contemporary theories of technogenesis and process philosophy concepts of time and memory into a practice-oriented system meticulously and carefully constructed to protect the dancer's potential from total exposure to technology. In order to understand her theory, it is crucial to first understand specific philosophical issues of technology, the concepts of technogenesis and hybrid choreographies, and the conceptions of time in process philosophies. The paper initially aims to present these concepts and then introduce Manning's theory to present a thought experiment that affirms the persistence of human qualities (e.g., being, memory, movement, time, and art).

2. INTERTWINED: HUMAN AND MACHINE MEMORY

The innovative world of choreography contributes to new technological-ontological knowledge through practice-oriented research in which participants critically reflect on conventional creative processes as well as the emotional and phenomenological frameworks within which choreography is created. Since around the 1960s, integrating choreography with computer technology has evolved into an aesthetic and

philosophical issue. While contemporary dance ranges across a broad spectrum, from minimalism to total absence of instrumentality, from slow-motion to total technical embeddedness and design, AI can find its place in any of these forms of dance (Rainier, 1964/2008; Manning, 2009).

The constantly renewing, changing, and evolving technological landscape presents challenges that seem to demand the qualities and virtues advocated by classical philosophy from artists and audiences alike. A curiosity to understand the world, freedom from prejudice, a passion for learning and experimentation, the ability to see the potential for error and fallibility, and the need to develop clear, community-based ethical standards – thinking in the community – are becoming increasingly essential yet again. Contemporary choreography not only experiments with these aims but also confronts the problems that arise in a changing creative and receptive medium in an increasingly technical age.

The notion of technology as a constraint on the dancer was not raised during the early development of AI. Although the intersection between computers and dance had already taken place in previous decades, such as Jeanne Beaman and Paul Le Vasseur using computers to create choreography as early as 1964, they were still seen as a liberating new invention, not a tool to limit artistic ability.

In 1965, A. Michael Noll, a pioneer of digital art, created the first *computer* ballet, or computer-generated ballet animation, which was presented to the public in Dance Magazine (Noll, 1967). He then created *Incredible Machine*, a film reflecting the state of computer graphics, film, and music at the time, which continues to inspire art projects to this day (Cohen, 1968).

Merce Cunningham was a trailblazer in integrating computer-generated movement patterns and choreographic experiments, exploring the unknown realms of hybrid (i.e., humanoid and AI) dance art. Cunningham and his followers focused on abstract, non-translatable choreographic work based on randomness using a radical approach to space, time, technology, and human movement. Following Cunningham's example, some contemporary choreographies are not created in virtual spaces, in collaboration with AI applications, amidst an ever-changing environment of technological development. In AI choreographies and rehearsal/performance processes, dancers often find themselves partnered not with a human dancer but with digital avatars, which can represent the dancers themselves or take the form of an arbitrarily designed interactive AI dancer.

Today, the multimedia elements of dance stages (e.g., projectors, lighting, interactive light and sound effects, lighting effects, LEDs, or drones) often place the spectator in a space that seems both real and virtual. Many choreographies are partly or entirely based on algorithms using digital motion capture techniques. AI can be applied to choreography in many ways (e.g., through avatars, modeling, digitization, the memorization of movement, analysis of exercises, comparison, and synchronization of choreographies), and it also facilitates cooperation between different artistic disciplines.

The relationship between AI and the artistic practice of dance is rooted in research based on machine learning using *big data*[1] and the generation of physical models. These capabilities enable AI to understand human movement. Although recent aestheticians, following Masahiro Mori's (1970/2012) famous *uncanny valley* theory[2] , assume that humanoid robots cannot be interacted with in an authentic way that is equivalent to human communication, the combination of motion capture technology and virtual reality allows for continuous communication (or its simulation) with AI devices. Motion capture technology can precisely capture body movements and identify someone based on their unique movement patterns. Body composition characteristics, musculature, strength, mental attitude, and the dancer's vitality can be digitally and aesthetically incorporated into a virtual avatar, allowing for the dancer's imaginative, intuitive inner world to be placed in an external space that can provide opportunities for new connections, interactions, and empathic communication (Jones, 2019).

On stage, the dancer's movements evoke words and images on a screen, verbally and visually expressing / translating thoughts and feelings. The machine responds to the human performer, and the creative choreography evolves as the technology responds to the motion capture data. It is also a kind of rehearsal, an interactive relationship with the virtual model, and at the same time, the AI learns from this interaction. The next step in this collaborative learning process is the dancer's interaction with another computer-generated humanoid AI dancer in real time.

This form of communication is a novelty in practice. Instead of the conventional use of mirrors or video, this technology allows for the highlighting of certain movements, the temporal extension of details, and the expression and repetition of forms, colors, non-corporeal forces, and energies. This interdisciplinary practice of dancing with virtual models also raises new technoethical questions and offers new perspectives on intensely lived experiences. This approach has challenging theoretical and philosophical implications, which will be discussed later in this paper.

Therefore, AI is a very useful tool in the rehearsal processes, offering a range of functions, including analyzing movement, refining dancers' technique, comparing choreographies, and calculating numerous optimization factors. At the same time, as already mentioned, AI can be considered to possess infinite memory due to its

[1] *Big data* refers to datasets that are an order of magnitude larger than those that have traditionally been analyzed in the past. This volume of data cannot be processed with traditional tools and is of such a scale that it represents a qualitative leap from the data management and processing capabilities of previous eras. Above a certain amount of data, it is possible to understand a process, a digital service or even patterns of human behavior, such as that of dancers. Big data is not a fixed database, but a constantly evolving set of data from which conclusions can be drawn through continuous observation. It can be used for both predictive analysis and behavioral analysis. Machine learning systems based on *big data* are highly effective in terms of error detection and analysis.

[2] Mori's hypothesis postulates that human empathy for robots, which are becoming increasingly human-like, increases for a while and then sharply declines. As robots become less distinguishable from humans, the emotional response becomes positive again, approaching human-human levels of empathy. The term 'uncanny valley' refers to the cognitive reactions of disgust and revulsion that humans develop when encountering androids, robots, and other animated human characters exhibiting visual or other anomalies. The 'valley', representing the extent to which robots are almost, but not fully human produces reactions that range from disgust to rejection, as well as a range of uncomfortable and compulsive feelings and perceptions. These can also develop in humans in contact with robots, with aversion being stronger the more human a flawed, abnormal, or malfunctional the entity appears.

extensive data storage capacity. This memory, like the memory capacity of the human brain, does not merely mechanically record specific parameters but is also capable of reconstructing memories.

A recent study investigating the ability of generative AI (the best known of which is the large language model ChatGPT) to replicate the memory functions of the human brain has yielded surprising results. The experiment aimed to assess AI's ability to recall past memories, aid learning, and enable creative thinking. Using 10,000 images, the researchers trained an AI model that simulated the memory processing and replay functions of the hippocampus and neocortex in the human brain, which are crucial for learning and generating new ideas (Spens & Burgess, 2024). The hippocampus, primarily concerned with memory and spatial orientation, plays an essential role in learning, the process of long-term consolidation of memories, and the processing of spatial information. Although the neocortex is the outermost part of the brain and is responsible for complex thought processes such as decision-making, language skills, and consciousness, as well as higher cognitive functions and self-awareness, both brain areas are essential for higher mental processes such as memory, learning, and complex thinking (Felkai, 2024). In the experiment, the network mimicking the hippocampus rapidly absorbed and replayed each training signal/image, training the network to mimic the neocortex. The neocortex then learned to reconstruct these scenes, identifying essential elements such as the location of objects in space (Felkai, 2024).

This process allows the brain to remember past scenes, events, and feelings and to generate new ones effectively. The brain replays memories while it rests, which helps it recognize patterns from past experiences that are essential for predictions about the future, survival strategies, and artistic creation. However, this process is also subject to various distortions, one of the essential features that Manning emphasizes in her work.

The research demonstrated that the AI model was able to extract information from experience, as well as recall specific events and imagine possible future experiences. According to the researchers, memory itself, whether human or machine, is akin to *imagining the past*, whereby stored details are integrated with possible outcomes (Spens & Burgess, 2024). This model also shows that human memory is not simply a representation of past facts but a mixture of both memory images and our expectations surrounding the memory. This is particularly important in Manning's model of the creative interweaving of human and machine memory.

The emergence of this hybrid memory leads Manning to another important question: What can humans do without the technology inherent to the human body? Has humanity ever existed without technology, and has memory ever functioned without technological assistance? These questions are highly topical in the wake of the digital turn, as is the question of whether AI can become more human, thinking and feeling without a human-like body. For the time being, AI lacks the capability to respond to the movements of a dancer as a human would, partly due to the fact that it does not have a human body (Prescott & Wilson, 2023). However, AI can convert dancers' movements into music or visual cues and can produce an infinite range of combinations using visual, acoustic, and kinematic data. Here, again, the role of memory comes into play.

3. TECHNOLOGY AS A PHILOSOPHICAL PROBLEM

The experience of virtual time-space has been largely pioneered by computer games and films, which have been the subject of philosophical debate for decades. Contemporary debates on the ethics of action and virtual identity cannot but include a discussion of ontology and metaphysics (Belyaev, 2019). Representatives of the philosophy of technology foresee a new evolutionary phase for machines that will have a profound impact on human development. This is poised to transform not only working conditions and cultural production but also the perception, thinking, and centrality of man in relation to other beings. The latter position is also accepted by post-Anthropocene[3] and post-humanist[4] thinkers, who also consider the threatening presence of a non-human reality as a possibility. Following in the footsteps of technophilosophers, Manning develops an evolutionary theory that reframes the indispensability of technology as an opportunity that has been present from the beginning of human history rather than an impending apocalypse.

Although technology as an entity in its own right has not been addressed by philosophy in the past, due to the fact that AI-driven technology has been networked across all areas of social organization, production, research, art, and culture and fundamentally changes previous technologies, contemporary philosophy treats it as one of its most critical issues. The philosophies of technology tend to emphasize its application in specific fields (e.g., medicine, space research, or the optimal organization of social processes), while some philosophies of mind and language, for example, proclaim its imminent demise. Some phenomenological approaches seek to refute this criticism. Cognitive science, for instance, examines the mind with a focus on its cognitive capacity. At the same time, some branches of psychology regard it as a mere machine, a tool for creating explicit models of the human being.

Looking back in time, we can see that the philosophical and technological starting point in regard to the relationship between AI and machines is René Descartes' concept of body-mind, in which he distinguishes between the thinking and the extended substance. This distinction remains a subject of debate in the contemporary philosophy of technology, as machines are defined as consisting solely of extended substance. Descartes' philosophy implies that machines cannot think, remember, or feel, and an entity that cannot think, remember, and feel like a human being could pose a real threat to human society. This threat has been echoed across various levels of culture (e.g., pop culture, science fiction, literature, post-Anthropocene philosophies, or negative utopianism) for some time. The latter, a critical attitude towards technology, emerged in the 19th century and remained significant in the 20th century. In the works of Edmund Husserl and Martin Heidegger, we can trace the unfolding of the idea that an ever-thickening technical barrier is closing us off from the world, gradually

[3] Post-anthropocentrism criticizes the hierarchy of races and advocates for 'biocentric' equality. In this theory, the human perspective is one among many, and is of equal weight to the perspectives of any other beings on earth.

[4] Posthumanism critically examines the humanist ideal of "man" as a universal representative of human existence. Man is one of the existents among things, but not a central being. The philosophy that has emerged in the wake of the ecological crisis and the shattering of the humanist worldview, further influenced by technological advancements, marks a new era that strongly challenges the humanist myths equating human identity with reason, free will and self-consciousness.

diminishing our direct access to nature and only allowing us to experience it through the lens of technology. Heidegger adds that all this is merely a symptom of a much deeper problem: man's misunderstanding of existence (Heidegger, 2004).

Technology became increasingly central to philosophical thinking in the decades leading up to the digital turn. Heidegger explored the event and technology, while Jacques Derrida delved into the event and the machine (Derrida, 2001). Paul de Man focused on the rhetorical machine and the textual event (De Man, 1989), and Bernard Stiegler, one of the prominent authors of the turn, analyzed the relationship between technology, time, and the event (Stiegler, 1994/1998). These contributions paved the way for a philosophical trend that intertwines technical objects with the ontogenesis of humanity.

The digital turn has significantly complicated our perception of technology, with AI now raising questions about the nature of the human subject and its place in the world, as it increasingly participates in creative processes, even in areas previously considered the exclusive domain of humans (Chatterjee, 2022). This is also the case for dance, as the range of AI applications in areas such as human movement, emotions, learning, and therapy continues to grow (Hu & Wang, 2021).

4. HYBRID CHOREOGRAPHIES, NEW BODY BOUNDARIES

As an art form inherently based on experience, connection, and interaction, dance – and with it, the world of choreography – has undergone significant changes, as Manning (2009) points out. It is conceivable that reliance on human memory alone was never feasible since records, images, and sculptures have been preserving memories since the earliest civilizations. Today, however, we are entering a new paradigm wherein machine memory, thinking, action, and creation interact with humans, leading to real-time, simultaneous changes. The *new techno-aesthetic* paradigm, characterized by digitally enhanced dynamic forms of knowledge, requires less verbalization than previous paradigms, is less abstract, and gravitates more toward the medium of direct experience. Rather than being conceived as static entities, mental states can be interpreted as dynamic events unfolding over time.

Some dance performances are now based on hybrid (AI-human) collaborations and improvisations, where dancers often work together on remote stages simultaneously. Choreography, although interpreted by the body and from the perspective of dance, also interprets itself from the perspectives of technology and AI.

Dancers, viewing their digital partners not as avatars but as distinct entities, can observe their own movements and dynamics in real time, from a new perspective. In this respect, Anna Pakes points out that choreography holds specific potential for acquiring new knowledge, which can serve not only for the arts but also for a better understanding of all processes related to lived bodily experience and human nature (Pakes, 2006). Thus, dance and choreography are understood by dance philosophers not only as artistic forms but also as mediums of movement connected to human knowledge and its environment. They represent spaces for contemplation and movement and fields of research that renew the relationship between dancer and spectator.

But can a machine really dance? Recent advances in robotics, such as those demonstrated by companies like Boston Dynamics, prove that machines can take part in improvisational exercises. And what is meant by dancing? On the surface, dance appears to be primarily a bodily, fleshly exercise and experience, a kinetic expression of amorphous, subjective, emotional, and affective states. The action can be seen as a primary form of non-verbal communication and one of the most expressive of the arts. However, the digital turn in culture (Runnel & Pruulmann, 2013) and the corporeal turn in the human sciences (Vermes, 2023) have resulted in an aesthetic and philosophical paradigm shift that radically questions the nature, changes, and modifications of bodily self-experience, neuro-experience, and bodily experience and identity, now reframed in a digital context (Orbán, 2013).

According to some theorists, hybrid choreographies challenge the boundaries of bodily identity through dance, prompting a reexamination of the very nature of corporeality in and through movement. The breaking down or shifting of bodily boundaries is precisely one of the key goals of these performances: open-ended choreographic explorations that defy conventional movement norms, embrace the unpredictability of movement, and encourage spectator participation in the construction of meaning. Manning belongs to this theoretical strand, as co-creation with AI in itself implies altered bodily boundaries. Many of the theorists exploring new digital choreography, including Manning, are inspired by the work of Suzanne Langer. Beyond the purely practical, rational aspects, Langer emphasizes interactivity and the poetic, embodied, and sensitive dynamics of dance, focusing on "the how" of dance. The aim of choreography as an art form is to express *virtual gestures* and *virtual forces* (Langer & Knauth, 1953). The essence of dance is to exploit these vital forms, which necessitates innovative practices that challenge the limits of the body. Manning relates this virtuality, as we shall see, to the process philosophies' conception of time and the basic technological philosophical assumption of the inseparable nature of human and machine knowledge. This perspective requires a reinterpretation of choreographies.

A choreography involves three basic levels of abstraction: 1) style, the dancer's mode and movements of expression; 2) syntax, the language of the choreographer and the work; and 3) semantics, the overarching meaning or theme that organizes the work into a coherent whole (Blacking & Kealiinohomoku, 1979). All three levels present theoretical and practical challenges for computer-generated choreography. Syntax is perhaps the easiest to formalize and is the starting point for generative choreography (Calvert & Wilke, 2005). With the advent of *deep learning*[5] enabled by the graphics processing unit (GPU), new generative models can be created that can capture both style and syntax. Deep neural networks show promise in modeling the semantic level, as well. The GPU, also known as the graphics processor, is the central unit of the video card and is responsible for performing complex graphics

[5] Deep learning is a subset of machine learning techniques that use artificial neural networks. Artificial neural networks attempt to mimic the way the biological nervous system (e.g., the human brain) processes information. These networks excel at extracting, predicting and classifying information from data. Deep learning, together with big data, has become the driving force behind artificial intelligence. Deep learning techniques have the advantage of being able to work with relatively raw data, and in certain application areas (e.g., speech and image processing) they can achieve much better results than previous machine learning solutions.

operations. The GPU is also responsible for taking over high-level tasks directly related to creating and displaying graphics from the CPU so that its computing power can be applied to other operations.

5. TECHNO-PHILOSOPHIES

Philosophy has traditionally distinguished between technological developments (i.e., artificial objects produced for human use and with specific purposes) and know-how. In order to understand Manning's complex techno-dance theory, it is essential to understand the concept of *technogenesis* and the fundamental theses of the technogenetic philosophical movement.

Technology, as we have already mentioned, has only recently begun to be addressed in philosophy, most notably in the fields of analytic philosophy, the philosophy of science, theories of action, and decision-making. Contemporary dance philosophies not only draw on these theories but also seek to develop their own, sometimes spiritual, approaches. These seek to capture not only the structure or social patterns of dance but also the spiritual and intellectual aspects of dance akin to what is explored in the spiritual sciences.

The term technogenesis refers to the co-evolution of humans and technology. This concept, integral to the history of civilization, encompasses the co-generation of increasingly sophisticated methods and tools(Anker & Lindee, 2008). The 20th century has seen an intensification of this process, raising real co-evolutionary questions about the relationship between subjectivity and objectivity, the invasive nature of technology in human life, and the nature of the new technological world order. At the same time, these theories see the role of technology in design, creation, and performance as fundamental. Two key features of technology are instrumentality and productivity. Instrumentality, that is, the presence of expedient means in a well-equipped society, is the primary focus in the philosophy of technology within the humanities. Productivity, on the other hand, pertains to the production of an optimal quantity of useful tools, objects, events, and the aspects of their creation and is examined by various branches of analytic philosophy, often in the context of engineering technology. The intersection of these two philosophical fields raises fascinating questions, as the objects and artifacts produced by technology can be examined from an *ontological* point of view.

Philosophy traditionally regards the classification of things as an ontological operation. In contemporary philosophies of technology, the ontological status of particular objects, technologies, and events is a prominent area of interest. According to philosophies of technology, different technological processes are specific modes of existence that can be described in terms of *ontogenesis*; that is, they are best described by the term *coming into being*.

Technologies, as tools for producing different versions of *space-time* and as forces shaping the ontological status of human beings, are central to the work of the technology philosophers Gilbert Simondon (2009), Bernard Stiegler (1994/98), Bruno Latour (1999), Brian Massumi (2022) and Erin Manning (2007). These scholars integrate contemporary findings from information theory, communication science, and the natural sciences, seeking explanations for a new ontology and the ontogenesis of technology. Technological ontogenesis describes the co-evolution of machine and

human actors, which some authors trace back to the earliest use of tools. Manning finds the theories of process philosophers inspiring and applicable to his discussion of space and time as a foundation for a philosophy of dance based on development, vitality, and freedom.

6. TIME, SPACE, AND SUBJECT IN PROCESS PHILOSOPHIES

Philosophers of dance seek answers to emerging anthropological, ethical, and ontological questions of artificial dance (Franko, 2012; Manning, 2009), often drawing on cultural studies, historical sources, philosophical arguments, applied philosophy, and phenomenology. They combine their ideas about the body and the subject with an essential task of choreography: the research of the subject reinterpreted in terms of the body. The focus on the sensual, physical, tactile, dynamic, and intuitive aspects of dance (i.e., kinesthetic and somatic components), as well as the classical mind-body problem, are also important lines of research in contemporary dance philosophy. Researchers in this field are concerned with the interrelationships between mind, body, and environment. Thinking holistically, they focus on perceptual experiences and the body as the primary and active medium. In this view, the body is not a fixed object but a phenomenon that is actively produced in the here and now of a situation, with perception and thought being inseparable.

Phenomenology holds that people are fundamentally bound together by their physical similarity and ontological identity. Our primary, experiential connection to the world keeps us intersubjectively connected to each other. Contemporary dance theory interrogates this field of experience, scrutinizing the real and symbolic movement of the subject in society. Their point of departure is that dance is inherently a contested space, always historically, politically, and temporally determined, and thus requires a critical approach. Maintaining the phenomenological principle that the mind and body are intimately intertwined and can only function together, most theorists (taking the foregoing into account) argue that the subject alone is insufficient as a foundation of knowledge and that the traditionally subject-oriented method of phenomenology needs to be renewed (Rothfield, 2004).

In the hyperreality of postmodernity, Jean-Paul Baudrillard claims that there is no longer any actual reality, only *simulacra* that substitute for reality. Thus, the ontology of this era lacks a center, and the distinction between the real and the not-real is blurred (Baudrillard, 2009). In this context, what does it mean to redefine the subject?

Contemporary dance philosophies partly draw on the concepts from process philosophies to clarify the dislocated ontological position of man. Process philosophies view beings as connected by dynamic, network-like relationships. In their *emergentist* philosophical systems, which focus on the originality and emergence of new qualities in being as well as relationships between things, the phenomenon of life dominates the hierarchy of existence. The concept of life here includes a reflexive aspect and can be described in the broadest sense of reflexivity (Marosán, 2017).

Alfred North Whitehead is one of the most prominent exponents of process philosophy. His ideas question the object-subject dichotomy, emphasizing the interrelation of consciousness and the environment as well as the common questions

regarding individuality and community, which are the foundations of contemporary dance philosophies, including Manning.

Whitehead's influential philosophy portrays the world as a single organism, the result of God's ordering action. The things of the world are events that are made comprehensible through grasping (i.e., prehension), a process through which the object's past determinations and future possibilities meet. Real things represent events within which we are presented with a number of possibilities. A state of fulfillment is reached when one of these possibilities becomes concrete. Processes in subjective perception have a mental pole in addition to the physical pole. Depending on the new content a thing acquires through this process, it evolves and changes its relation to other entities. This content is determined by the relations between events, which can be understood as associations varying in degrees of complexity and interaction (Whitehead, 1967).

In Whitehead's metaphysics, there is no sharp dividing line between the immediacy of memory and the present, nor between *present* and *future anticipation*. Pure physical anticipation is the embodiment of the past in the present. Causation, or memory, represents the emotional adaptation to a given situation, establishing emotional continuity between the past and the present. In regard to memory, the past does not skip the temporal succession of nature as it is present in the mind as a direct fact. Thus, through memory, the mind is detached from the mere passing of time, implying that what is past for nature is not past for the mind. Existence is synonymous with activity and creative experience, embodying the interactions of beings with each other. The past, therefore, has a causal effect on the present, which is considered the primary mode of perception. Whitehead proposes an ecological model of the world, according to which each being is a self-sustaining entity with an inherent right to exist. Each being exists in and for itself, impacting itself and indirectly or directly impacting all other beings.

The concept of time, which is essential to the definition of the contemporary subject, has been discussed by many thinkers, including Manning, using Henri Bergson's (2009) qualitative concept of time and Gilles Deleuze's (1987) actuality-virtuality distinction. According to Bergson, qualitative time (i.e., duration) challenges abstraction-based theories and determinisms in physics and psychology. The essence of duration and motion is the emergence of being and processuality, which can be used to develop a new conception of freedom and the self. He envisions the universe as a set of images where the perception of the past and present exists in the form of images and memories in the virtual, inert, and unconscious movement of the container. Bergson disagreed with the psychological perspectives of his time, which reduced conscious phenomena to mere quantities. In his view, consciousness could only be described through a qualitative approach. Consciousness is a multiplicity of flowing experiences, with the unfolding of qualitative changes representing experiential time. This experiential time is different from its physical counterpart: it is not measurable nor quantitative and, therefore, not parallel to space, as many philosophers before Bergson claimed (Bergson, 1990).

The essence of Deleuze's theory lies in the juxtaposition of virtuality and actuality and the acknowledgment of the possibility of their transitions into one another. In this framework, the present is actual, the past is virtual, and both are

real. The virtual, while real, is not actualized but has the potential to be actualized, and vice versa. This implies the coexistence of both the virtual-real and actual-real. The relationship between virtuality and actuality is not the same as the relationship between possibility and reality since possibility does not exist in Deleuze's view, while virtuality does. Virtuality is real and, therefore, does not come into being but can be actualized. In its actualization, its reality remains constant as it has always been real. Virtuality and actuality are not different in their degree of reality but differ in terms of their manner or quality. The virtual and the actual do not represent each other, so their transition into each other is not a transformation of the same entity. There is a close relationship between possibility and actuality: they are expressions of the same thing, real in one sense but not in the other. The virtual is a form of reality that can actualize itself, whose realness may be of a different nature but not of a different degree. Thus, for example, the present and the past are real to the same extent but are qualitatively different. Ropolyi points out that virtuality's realness is defined in terms of its presence and the degree to which it exists in the world (Ropolyi, 2021).

In the next chapter, I will present this in Manning's interpretation, including Whitehead's notion of prehension and his views on actuality and futurity.

7. ERIN MANNING'S AI-DANCE PHILOSOPHY

Erin Manning is a Canadian philosopher and dancer known for her research on the body, movement, and perception, as well as for her understanding of dance not only as a form of artistic expression but as a source of knowledge offering a deeper understanding of the body, perception, and the world. She considers the technological and process philosophies mentioned earlier as fundamental to the development of her theory.

Her approach holds that dance as a science can be practiced. In this context, dance is understood not only as a performance or choreography but as a process in which bodies and environment engage in co-creation. As such, dance involves both the outcome and the process, with new knowledge and meaning generated through participation in this process. Manning explores the links between perception and movement, pointing out that dance not only pertains to the body but also the ongoing interaction between the body and the environment. Movement and perception are intertwined, and dance reveals the diversity and richness of perceptual experience. Dance is often interpreted in the context of 'dancing perception,' where body and movement are not merely expressions of a particular perceptual content but of perception itself. According to Manning, dance can help to form new perceptual relationships and extend the depth of perception; as such, she understands dance not only as an artistic act but also, in scientific and philosophical terms, as a field in which new notions of body and perception can develop.

Manning has developed a theory that combines concepts from Bergson, Whitehead, Deleuze, and the philosophy of technology to create a new AI dance philosophy. She examines the changing concepts of subjectivity, the body, gesture, virtuality, time, and space, synthesizing her novel insights into a complex and inspiring theory into which we can see the previously mentioned philosophical questioning integrated.

In the following, I will present her theory on the digital possibilities of dance and the main philosophical theories on which she bases her concept. Manning's point of departure is that in researching the relationship between new technologies and dance, defining the nature of a gesture is paramount.

The collaborative work between humans and AI agents required to create AI software necessitates a precise understanding of gestures and how gesture systems are created. The computer programs that create choreographies must incorporate the dynamics of movement into their systems. It is not enough for the computer to merely record the dancer's movements; the program also needs to have a deeper understanding of the qualities and gestalt of the movement[6] (Lahunta, 2006).

The collaboration between technology and the human dancer hinges on an understanding of the syntax of the moving body. The productive integration of dance and AI technology relies on the technology's ability to recognize where a movement begins and ends, marking its coordinates in a sentient system. This is by no means self-evident knowledge and requires the development of a grammar of movement rather than the established method of breaking movements into discrete bits of data (Manning, 2009). Such development must draw on a gestural vocabulary that transcends fragmented, independent segments of individual body parts and their movements. Traditional 'dictionaries' of movement do not recognize the moment of the gesture's birth, thereby limiting the advancement of sensemaking technologies. The virtual coming into being described by Deleuze is only possible through the perception of the continuum of movements. Instead of the pre-loaded form language of movement detection technology, attention must be paid to the pure plastic rhythm and the technological creation of the sensing, moving body (i.e., technogenesis). This necessitates micro-perceptual observations as opposed to simply relying on the visual and sound effects assigned to movements by AI-generated software on the sensors, which may reflect the qualities of the technology rather than the dancer. In this context, the quality and virtualization of the interactions between dance and its spectators emerge as a fundamental issue in dance philosophies.

Marc Boucher refers to this experience as kinesthetic synesthesia (Boucher, 2004). When observing a dance performance, we experience kinesthesia even without movement on our part, participating in the dance while being in a completely static spectator position. Kinesthesia, according to Boucher, is also a form of corporeal communication, and kinesthetic synesthesia is the combination of visual and proprioceptive experience, allowing a visually observed movement to be experienced kinesthetically. This sensory experience is continuously flowing and complex and can occur even when the event playing out in front of us is not performed by anthropomorphized actors (Boucher, 2004).

According to Susan Langer, frequently cited by Manning, dancing is inherently virtual: it is experienced in the display of virtual forces during the dance performance and in the tension between dancers and between dancing figures and the ground

[6] According to Gestalt psychology, the visual whole is always more than and distinct from the sum of its parts, representing a form of self-organization. Gestalt is the experience of the "whole", as we also tend to perceive wholes, not just individual parts. The visual experience is not only the sum of its visual elements, but also their structure and hierarchy. According to Gestalt psychology, formative factors include proximity, continuity, grouping, closure, similarity, dissimilarity, continuity, proportion, and rhythm.

(Langer, 1976). The forces at work during these interactions are virtual, emerging from the dancer's memory and imagination, resulting in a virtual entity. In addition to the physical attributes present in a dance performance (e.g., body, space, time, gravity, objects, and lights) that exist tangibly but cannot be perceived separately from the dance, the virtual forces constitute the true essence of the dance. We observe virtual realities, symbolic expressions of life, the forces of dance movement, centers of power, emanations, conflicts, resolutions, rises and falls, and the living rhythm of the performance.

By accepting that dance as an art form is a process of virtualization, the question arises as to how digital technologies can capture and reflect these virtual forces to serve the aesthetic and communicative functions of the art of choreography (Manning, 2009). If the virtual energies of dance could be captured, this would provide a natural, spontaneous means of tuning into the affective dimension during choreographic practices.

Manning's critique of the collaboration between AI and dance is that the current state of technology limits the potential of dance. Existing technology limits the dancer's possibilities, with bodily movements being simplified into bits of machine memory. Gestures become data instead of an experiential fullness that can be lived, and attention is diverted from the pure, plastic rhythm that is the essence of dance. For the time being, hybrid collaborations are more technological experiments, merely utilizing the body to move the system and record, visualize, or transform its movements into sound effects.

Manning poses a critical question: Do technologies that "enhance" the body with sounds and images, acting as prostheses, really increase the technogenetic potential of the body? Do they really create a new, hitherto unimagined moving body or bodily experience? Or is the body a pre-formed entity to be augmented by prostheses? Manning argues against this latter view, referencing Deleuze's concept of the machine (Deleuze & Guattari, 1987), Antonin Artaud's concept of the body without organs and its interpretations (Deleuze & Guattari, 2007), posthuman philosophers' ideas about human nature (Hayle, 2000), and Derrida's notion of technicity (Derrida, 2001). Manning uses these theories to challenge the claim that the body can be reduced to a fragmentary entity that can be enhanced organically through prosthetic means (Massumi, 1999). Such an approach represents a closed concept of the body, preventing it from reaching a higher level and generating *new ecologies* of experience. Trapped by stereotypes of the dancer and the spectator as prisoners of technology, the spectator is thus unable to escape the familiar, conventional process of creation and perception. However, in order for experimental transformation to occur and for virtualities to emerge, one has to engage directly with the event, and the dance itself must become an event, an occasion.

Manning emphasizes that the evolution of machine systems is necessary for affective transformation to occur and that technological systems and bodies themselves must undergo change. The potential excess of the *technogenetic body* cannot be fully realized within the limits of prostheses; a kind of *transduction* is needed to facilitate a change in dynamics[7]. The body, as an event, becomes the

[7] Transduction is the translation process by which physical (i.e., mechanical, light, chemical) energies perceived by the senses are translated into electrical signals that the brain can understand.

subject of the composition. As interesting as technology is in itself, without the vocabulary of the moving body, it remains a tool rather than a technique for exploration (Manning, 2009). Here, we can recognize Whitehead's notion of virtuality and a concept of space rooted in its creation.

According to Manning, the dancing body is *created* alongside technology rather than appending technology to a passive body that serves as a base. The digital process itself is predetermined and predictable, even if the state of the system may change, and this limits the technogenetic potential of the body. The effect of the unknowable is virtually present in every movement, and it is essential that technogenesis encapsulates this aspect. The virtual cannot be accessed in any other way; it can only be triggered by a nascent movement (Manning, 2009).

The fundamental question, which we have already touched upon, is what the body is capable of without prostheses. More specifically, if we adhere to this concept, can the prosthesis be "internal"? Is it possible to overcome the organic-prosthesis dichotomy? This is a difficult question, particularly since we observe that choreography is currently constrained by software limitations. Technology does not exploit its wider potential but rather reduces the capacities of the body; the relationship between the dancer and space remains diminished, and the dancer is relegated to cross and run through space instead of creating it.

Contrary to these limitations, Manning advocates for a paradigm in which technogenesis surprises the dancer. In her view, collaboration should not be a relationship with an external source but rather a co-composition. Engaging in co-movement with software is also a process of learning to move and shape the software itself. The evolution of technical systems in Manning's conception is *ontogenesis* advancing toward *technogenetic evolution.* In this view, the technogenesis and ontogenesis of biotechnology is not merely the addition of the technical to the biological as a prosthesis. Instead, it is understood as an original concept that is inherently technological.

The definition of the body thus undergoes a transformation: it is no longer a stable entity but rather a creative vector of experimental time and space. The body is grounded in movement, characterized by pure, malleable rhythm. If the body is viewed as pure plastic rhythm, it cannot be separated from the micro-movements of which it is composed.

To conceive of the body as moving is not to interpret the body in the limited terms of a pre-formed world but to envisage moving worlds that are, in fact, these bodies in relation to each other. Bodies are nodes of potentiality that qualitatively alter the rhizomatic web of time and space[8] in which they temporarily reside. These webs are not different from the bodies they encompass: they are themselves perceptual bodies in motion. Perceptual bodies in motion are open systems that

[8] A common element in the theories of Deleuze and other contemporary philosophers is the juxtaposition of opposing poles, also called rhizomatic thinking. A rhizome (i.e., a root system) is a network in which all elements are connected to all elements. In a rhizome, there is an absence of hierarchy and no distinguished points. The rhizome is a set of images, things, words, meanings, signifiers, and both political and biological representations. In this interconnected network, opposition between two elements is non-existent because there is a connection between any two points. In addition, there is no difference between the external and the internal; turning the rhizome inside out makes no difference, as its structure and function remain unchanged.

reach out to other perceptual bodies and are formed in these matrices. Through these relational individuations, they transcend their ontological status, becoming ontogenetic. Technogenesis is the dynamic emergence of the perceiver within the realm of body movement (Manning, 2009).

As previously noted, Manning draws heavily on Whitehead and Bergson's concepts. Both are process philosophers focused on the themes of creation, freedom, development, and vitality. For Whitehead, the environment built with technology and its interpretation is always a function of the norms of the time. According to his philosophy, from which Manning adopts theories on perception and emergence, as well as the concepts of the subject and prehension, the universe is a process of creative progress (Czétány, 2019). In this process, beings are constructed from self-referential syntheses encompassing the entire multiplicity of the universe. God and the World both contain these manifolds, which, interpenetrating with each other, evolve into newer and newer elements within the manifold of the World. According to his ontology, the actual occasion is that which exists and can have an effect, and actual events are actual entities. Being according to existence, in this view, is the principle of process. The subject is a private sensation that constructs itself from the elements of the universe (Czétány, 2019). An actual event is an act of experience composed of data, which are fused into a unified whole. The unity of the actual event is a conjunctive synthesis of the whole multiplicity of the universe, expressed in a subjective feeling – the feeling, even if in an abstract way, captures the universe in its unity. The subject is the concept that constitutes the actual event, and the object is what appears to the subject as data in this process (Czétány, 2019).

The countless data of the actual world constitute the initial data of an actual being's existence. The subject feels the unique particularity of events and synthesizes them into a unique perspective. The system of connections is infinite in space and time, representing a continuous coming into being and concretization. Each element of the universe relates to the subject and alters the synthesis as a whole. Concrete, actual existence encompasses the whole universe, is in a fully determined relation to all its elements, and relates them to itself. This process is what is referred to as prehension, the appropriation of the elements of the universe to bring the actual being into existence (Czétány, 2019). If a given element is included in the subject's synthesis, we speak of positive prehension; if it is excluded, negative prehension takes place. The subject's feelings are formed from the data derived from positive prehension. According to Whitehead, the world consists of concrete actual existents and abstract eternal objects. For Manning, it is important that, in Whitehead's view, actual existents are pre-existent and objectified events. Abstract eternal objects are conceptual existents, universals that can have objective forms, such as mathematical objects, and subjective forms, such as emotions or sensory qualities. The eternal objects, abstracted from the world, form a timeless, distinct multiplicity – a "Platonic world of ideas". Here they are inactive, but become actualized when they serve as data of the actual existent, conceptually defining it (Czétány, 2019). Movement is a creation with the senses; the body perceives these movements, or changes in circumstances, as sensory experiences. According to Whitehead and Manning, perception is sensory *and* non-sensory, encompassing the perception of the past in the present. Perception is not a simple accumulation of sensory data; the subject

experiences the world, but the world is also experienced and transformed. In fact, the subject does not precede his experience, for without experience, there is a subject. Thus, the world is composed of subjects in the making, representing temporary individualizations of an evolving world. Objects or things are not experienced as such but *as events* that recreate us in time and space, reindividualizing us; we, in turn, recreate these events. The self, then, as Manning suggests, is an event created by an active-creative experience. That is to say, the world is not pre-formed but is created through experience. The past exists if its virtuality can be activated in the present, which aligns with the Bergsonian concept of active memory. The present is a recomposition of the past, which is an invention rather than an imitation; in other words, the present is not predetermined but always new, largely formed by experiences that activate and recompose the past.

Perception is an *event*, that is, particular prehension(s) that take a subjective form. Objects are constituted by events, which implies that reality is simultaneously an activity and an appearance, an activation of virtual relations. Manning emphasizes that to think of the body in terms of appearance and activity is to acknowledge the body's unactualized potential: aspects of its being that have not yet been actualized but can be brought into being. The process of the body becoming something is the materialization of reality, a juncture at which various technologies are involved.

By moving in harmony with technology, the body can transcend its current state (Manning, 2009). The dancing body is a sensory body in motion, creating new microspace-time situations with each movement. Space, or the ground, is an integral part of this creation and is interwoven with the body's knowledge. During prehension, the ground also moves with the dancer, becoming part of the dance. It represents an active compositional element, a determinant of the process; it dances itself and thus forms the conditions for the emergence of the ontogenetic body. This dynamic interaction is how techniques are realized by the dancing body and vice versa, creating a pure, plastic rhythm. A key aspect of technique is the ground: the dancers learn to kick away from it against gravity, but such movements are never simple but instead represent qualitative alterations of the duration of the experience. Dancers can move as if space-time were being compressed or bent as if it were being created. This process constitutes a technogenetic experience through the recreation of the body.

Novelty and creativity are always generated in the present: within the intervals between novelty, reality, and appearance during the actualization of the virtual. Prehension catalyzes reality, prompting it to move towards appearance. Reality contributes to experience by bringing the experiential past into the present. Thus, appearance and reality coexist in a process, rather than in opposition as objectivity and subjectivity. Perception occurs initially through appearance, with appearance grounded in the activation of reality. To experience is to witness the inversion of reality and appearance as an event, to experience the present as an emergence of the past, which can only be understood as the present of both the future and the past. The eventuality of actual appearance arises as a consequence of perception. Perceptual bodies in motion, emerging ontogenetically, are the product of these temporal entanglements (Manning, 2019). For Whitehead, the contemporaneous world is immediately present to the experiencing subject, while real existents of the past

are felt by the subject as existents through causal agency. This aspect of perception precludes the danger of the subject having private feelings only about himself and knowing other real beings only through inference (Csikós, 2001; Whitehead, 1967, p. 237).

Manning also draws on Simondon's concept of ontogenesis, according to which technology is *the technology of emergence* through which new, complex systems emerge, which can be described as landscapes of possibility (Simondon, 2009). These are ecologies that emerge through the technogenesis that shaped them in the form of complex matrices of body and machine, offering the body the possibility to transcend its organic limitations. Technogenetic transformation is a process unfolding over time, transforming the entire world rather than just the individual properties of a pre-existing system. This leads to pivotal questions: Are these technologies capable of detecting the virtual effects that transform the virtual into the actual and the real into the appearance? Are they capable of recognizing the pure rhythm of the sensing body, tracking the beginnings of movement, and rendering past traces perceptible?

How can software be trained based on something that can only be known from its *effects* and *memories*? How can a movement that is not yet visible be known, remembered, or felt? As we have already mentioned, Manning argues that technology must evolve to become ontogenetic, operating at the level of invention and complemented by *virtual potential*.

This evolved technology would be able to recognize movements and their relational matrices, leading to the creation of new sensing bodies in motion. If unconstrained by the limitations of the software, such technology would not only realize certain movement parameters but would also represent the constructive technological process itself, including its inherent errors and misalignments (Manning, 2009).

The conclusion is one that has long been implied not only by the philosophy of technology but also through choreographic work in practical AI environments: a new technogenetic body is emerging. This new body is not an addition to or a replacement of the old body that precedes it in time and ontology but an entity that is self-replicating. Here, Manning draws attention to the concept of prosthesis deconstructed by Derrida, replacing it with the notion of prosthesis assigned to the previously criticized notion of a stable body. According to Derrida, prosthesis not only refers to a physical instrument or body part but also includes the more general notions of addition and replacement. Prosthesis is a concept through which traditional hierarchies and dualisms, such as – original and secondary, natural and artificial, internal and external – are called into question. Prosthetics, therefore, is not merely an extension of the human body but a phenomenon that fundamentally shapes and transforms concepts and interpretations. Prosthetics extends human capacities but is also embedded in everyday life and culture, actively shaping them. In deconstructing the notion of the prosthesis, Derrida draws attention to the fact that the prosthesis is not simply a third thing added to the original but creates a dynamic that constantly transforms the relationship between the original and the prosthesis. This allows for traditionally accepted oppositions and hierarchies between the original and the secondary to be inverted (Derrida, 2005).

The body, memory, and movement are never perfectly in sync with the present; they are always virtual, reflecting what they might become as the organic and the technogenetic realms intertwine. In this interplay, the organic aspect is as much a technology of the senses as the senses are a technology of the organic. It is a perception that activates the body's relationship with the world and unlocks its technogenetic potential. The dynamics of experiential space and time are transformed through and with the dancer's body, which is activated both sensually and non-sensually in the movements of the sentient body. Perception, as such, emerges from a process of connections. The sensing body also perceives time in movement by activating past movements in the present. Whitehead categorizes the direct perception of the past as a non-sensory perception. Non-sensory perception connects us to the past, enabling us to sense the past and feel the world ecologically before we come to know it in a precise manner. Ecological sensation implies a direct experience of the relationships that compose space and time (Manning, 2009).

This perspective implies that we are not limited to attributing meaning to forms; we are also shaped by and within our environment. *Ecological time spans* are characterized by their non-linearity and richly layered nature, with relationships that are rich in reality, formation, and birth.

According to technogenetic thinking, we do not perceive an object in itself but through our experience of it. Therefore, objects are always novel since they are not static entities but are brought into new relations and realized through new experiences.

As such, technology must engage with both the sensory and non-sensory, the virtual and the actual, and in the nascent stages of experience. But how can this integration be achieved? Manning addresses this question by referring to Deleuze's concept of time-images from process philosophy.

The Deleuzean concept of time is also non-linear. In this framework, an image not only represents an action or event but becomes a container encapsulating both virtual and real-time. Deleuze exemplifies this through his description of moments in film as "crystals of time" where time is compressed and stretched, thereby dissolving the progression of linear time dominated by the moving image. In these time images, the cause-and-effect relationships that dominate classical narratives are destabilized and are replaced by a focus on contemplation, reflection, and the simultaneous presence of different temporal planes within the image. Deleuze further distinguishes between the touch-image and the perception-image. The touch image captures subjective, emotional aspects, while the perception image focuses on objective, sensory aspects. Together, these contribute to the complex nature of the time-image (Deleuze, 2008).

After this reflection, it is worth recalling Manning's example, mentioned above, of AI technology's ability to transform a dancer's movement (i.e., its spatiotemporal data) into sounds. The resulting sounds are not generated at the moment of movement but rather during the "reaction time" of the system. The sound is *technogenetically* generated and sensorially experienced, yet it appears with a few seconds delay compared to the perception of the original movement. This results in a shift in space and time on the stage, with its intensity being distinctly felt. It is not the sound but the subtle change in affective tone that is decisive. The spectator also feels a connection with the space, which requires a new kind of attention: recognizing the nuanced differences in tone.

This approach ushers in a new compositional practice linked to the *ontogenetic* change in the bodies of spectators and participants. Technogenesis is, as previously mentioned, the recomposition of bodies at different points in time on the perceptual spectrum. However, technogenesis extends beyond the realm of dance and performance. It represents a new possibility to create embodied interactions in virtual spaces (Manning, 2009).

This mode of technogenesis conceptualized by Manning is grounded in Deleuze's and Felix Guattari's theory of collective individuation, which explores new ways of organization and individual existence, with a particular focus on relationships and group formation. One of the fundamental concepts of this theory is the *rhizome* (i.e., the collective tribe), which is presented as an alternative to traditional, linear, and hierarchically rooted structures. While traditional systems take the form of a tree or a root system, the rhizome is a horizontal, networked, branched, and multidirectional structure, emphasizing the diversity of relationships and their non-linear nature. Related to this is the fact that, according to Deleuze, individuals and groups are constantly engaged in processes of territorialization and deterritorialization. Territorial processes imply that something that was previously organic (the territory) takes on a definite form (the territorial), while deterritorialization implies a withdrawal or breaking away from previous structures or organizational forms. *Collective individuation* implies that individuals exist not only as individual personalities but also as collective entities and that the relationships between individual and collective dimensions are dynamic and constantly changing. Individuation is not limited to the individual level but also takes place at the collective level, with both levels interacting with each other (Deleuze & Guattari, 2019).

According to Manning, collective individuation also emphasizes the unified developmental process of individuals and groups within both individual and collective dimensions. In this theoretical framework, the dynamics between relationships, networks, and individuals are of paramount importance, and individual and collective realities are constantly interwoven and intertwined.

Manning proposes that this notion can be integrated into the conceptualization of abstract machines as described by Deleuze and Guattari (Manning, 2009), wherein machines are not only physical devices but also entities that play a role in the fields of information, interconnection, and creativity. The notion of the abstract machine is far removed from the traditional idea of the mechanical machine. It transcends physical structures, encompassing abstract aspects of interconnections, functions, and information flows. Abstract machines are networks of information and connections, dynamic entities participating in creative processes and contributing to the flow of ideas and information in various ways. The abstract machine is related to the concept of the rhizome introduced by Deleuze and Guattari. Just as the rhizome is an alternative to traditional hierarchical structures, the abstract machine also epitomizes non-linear and multi-directional organization.

Manning's philosophy of AI bases the possibility of realizing technogenesis on theories of emergence drawn from process philosophies and ontological theories from technology philosophies. The concept is complex and requires a reframing of many of our conventional concepts, as pointed out by Maxine Sheets-Johnstone (Sheet-Johnstone, 2014). By bringing the argument systems of process and technology

philosophies together and seeking out interconnected and interdependent concepts within them, she constructs a living, moving philosophical system.

Manning's work inspires philosophical thought in multiple domains by presenting action and thought, philosophy and art, research and creation as inseparable and engaged in a continuous process of emergence. This approach has resonated in areas such as art pedagogy (Flint & Guyotte, 2019), art research (Truman & Springgay, 2015), educational research and development (Colmenares & Morvay, 2019), and many other fields (Flint, Cannon & Toledo, 2022). The question of how to bring the technogenetic body to life in collaboration with technology is also addressed by Manning in the context of therapeutic sessions and teaching. In her project *SenseLab*, she conducts research in the field of practice-oriented philosophy.

8. CONCLUSION

My paper aimed to present the emergence of the concept of technogenesis, born out of the philosophies of technology that conceptualized the rise of AI, with a special focus on the world of dance choreography. Starting with technology as a philosophical question, this paper examined the philosophical notions of event, subject, actuality, virtuality, rhizome, and prosthesis, as well as the choreographic applications of AI which have been experimented with so far. By incorporating process philosophies into contemporary dance philosophies, we have witnessed the emergence of a creative and innovative field, one which we were able to explore in detail through Erin Manning's philosophy of AI.

To summarize Manning's insights discussed above, she suggests that technogenesis can occur if technology is able to recompose the body in the realm of sensory experience by utilizing the relative qualities of experience. Such a technogenetic event is more than representation. It becomes crucial for both the dancer and the audience to discern the microperceptions through which the movements are activated, many of which extend beyond sensory perceptions. It is then possible to perceive the relationship from which the movement is born, which is an affective experience and thus inseparable from the space-time created by the technogenetic event.

Technogenesis inevitably creates something in relation to an event that does not end with the performance. The residual affective tones have an impact on the participants. Technogenesis is always more than the given date, sensory presentation, and moment, making the process and duration perceptible as the body, considered mechanical, is individualized. Such a process cannot be planned in advance. This raises a critical question: How can such spontaneity be implemented by a program or a technological system?

In order to understand this, we need to accept the ontogenetic link between digital technology and the inherent technicity of the individualized body. Rather than treating the technologies used in dance and choreography as prostheses, we need to clearly recognize the coexistence of individuation and technological processes from the outset (Manning, 2009). Making this movement visible does not mean confining it to the parameters of technology or reducing it to gestures. The created body produces various timelines and memory traces: an ontology of

the body moving in time. This perspective marks the birth of a new ontology and a new metaphysics in the making.

Technology should not function as a system that gradually replaces and dominates the moving body but as a complex interface through which the technogenetic body can emerge. Technology cannot be inserted into or superimposed on the body; it must come into being with it. Movements are relative, and relations are never just abstract bits of movement. A body's capability is determined by its capacity to overwrite the vocabulary it already has in the here and now. According to Manning, the ontogenetic body has infinite potential for technogenetic development. However, predicting which direction these potentials will move within the realm of dance choreography remains a challenging endeavor.

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