

Assemblages of presence: ritual, gesture, and technologies in embodied archives

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Abstract | This paper investigates the integration of immersive technologies in an archive of performance practices, investigating how different modes of knowledge production can intersect to create a new spatial ecology. It examines how these intersections between artistic practices and scientific methods evoke enchantment, bridging traditional divides between organic and technical knowledge. This convergence creates new forms of knowledge, opening pathways for exploration in a hybrid space shaped by performativity and interaction.

KEY WORDS: Immersive technologies, Archival practices, Performance training.

Assemblages da presença: ritual, gesto e tecnologias em arquivos do corpo

Resumo | Este artigo investiga a integração de tecnologias imersivas em um arquivo de práticas performativas, explorando como diferentes modos de produção de conhecimento podem se intersectar para criar uma nova ecologia espacial. Ele examina como essas interseções entre práticas artísticas e métodos científicos evocam encantamento, conectando conhecimentos tradicionais orgânicos e técnicos. Essa convergência cria novas formas de conhecimento, abrindo caminhos para a exploração de um espaço híbrido moldado pela performatividade e interação.

PALAVRAS-CHAVE: Tecnologias imersivas, Práticas de arquivo, Treinamento em performance

Ensamblajes de presencia: ritual, gesto y tecnologías en archivos corporalizados

Resumen | Este artículo investiga la integración de tecnologías inmersivas en un archivo de prácticas escénicas, investigando cómo pueden entrecruzarse distintos modos de producción de conocimiento para crear una nueva ecología espacial. Examina cómo estas intersecciones entre prácticas artísticas y métodos científicos evocan el encanto, salvando las tradicionales divisiones entre conocimiento orgánico y técnico. Esta convergencia crea nuevas formas de conocimiento, abriendo vías de exploración en un espacio híbrido configurado por la performatividad y la interacción.

PALABRAS CLAVE: Tecnologías inmersivas, Prácticas archivísticas, Formación performativa

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Introduction

If you throw a vase up, it shatters on the ground. If you pick up all the shards and throw them back into the air, it's very unlikely that they're going to reform exactly as the intact vase was before it was broken. The artist's job is to take those fragments, the shards of the vessel, those torn up pieces of paper, and reconstruct something new, a new image. The form is of collage, but it's a different way of saying that we construct our understanding from fragments that we pick up all around us and inside us. (KENTRIDGE, 2021)

Performance and technology have a long history of exchange and interdependence on and off stage from the ancient days of theatre to contemporary explorations using new media. At the same time performance practices are expanding as a major paradigm applied in both the arts and sciences, with different disciplines referencing various terms such as presence, situatedness or multisensory affect (SALTER, 2010). This paper seeks to explore how immersive technologies can be applied to embodied research within the traditionally analogue environment of the performer's training room. Building on a research project that focuses on the re-enactment of an archival collection of techniques, we aim to investigate how research roles are renegotiated and reorganized with the introduction of new technologies. Specifically, the project examines the processes of developing, practicing, and performing an archive by activating the embodied legacy of Odin Teatret¹ within a virtual environment. It focuses on the translation of techniques through Extended Reality, as well as the development of dramaturgical approaches to archival practices. For the project to go through the stages from concept to an experience, custom design processes and tactics of working were created, that combined both structure and experimentation. Initially intended as a way to bring order to the chaos of working with unfamiliar tools and professionals from the complementary fields of performance, design and engineering, the project evolved into a new mode of knowledge production—one that would have been impossible if confined to a single discipline.

We begin these writings describing the initial challenges that we faced as our diverse knowledges and backgrounds brought tensions and limitations, as well as the methods that we employed to translate practices carried in the body to the virtual realm. As we navigated the novelty of the collaborations and the mediums involved, we realised that we need to acknowledge and actively engage in the project in a hybrid and

¹ Odin Teatret, founded in 1964 in Oslo, Norway, by Italian theater director Eugenio Barba, has been a renowned theater company known for its innovative approach to performance and actor training. Shortly after its founding, the company moved to Holstebro, Denmark. Odin Teatret is recognized for pioneering a unique, research-based method of theater-making that goes beyond conventional storytelling, integrating elements from anthropology, ritual, and global performance traditions. More information: <https://odinteatret.org/index.php/odin-teatret/>

experimental way, while developing our own unique processes of co-creation. We examine our work through a lens of pre-industrial ways of knowing, both in the hybridity and in the use of rituals as a form of creating room for both structure and repetition. Through this open way of working, we will refer to two new projects that have emerged, which bend the rules of our practices to create new layers of meaning both in archival practices of performance training, and in representations of the body within immersive spaces.

Translating practices

About three and a half years ago, a team consisting of a performer specialized in the field of theatre and dance techniques, and a designer with background in architecture and interaction design came together to embark on a research project between the fields, with the support of the members of the Institute for Psychoacoustics and Electronic Music (IPEM), a laboratory with research in musicology, engineering and digital humanities. The project's goal was to translate the extensive archive of Odin Teatret, a historic theatre laboratory, into an extended reality (XR) experience. As one of the oldest theatre groups in the world, Odin Teatret has over sixty years of research in embodied practices. In this project, we have worked mainly with former Odin actresses Iben Nagel Rasmussen and Roberta Carreri and performers who have been long-term disciples of them, as a way of accounting for the genealogy of their practices across different cultures and new generations².

Our roles within the project would be multifaceted, encompassing creation, production and reflective practice. We embarked on the complex process of motion capturing (MoCap) Odin Teatret's training techniques by inviting the performers to our labs at Ghent University in groups of two for several consecutive days. This close collaboration with the practitioners gave us early insights into what it might mean to translate corporeal energies into virtual forces and physical bodies into their abstracted, digital counterparts. As we moved from capturing physical and vocal techniques to exploring immersive navigation experiences, we started to rethink theatre training in a virtual space, exploring how to convey the essence of embodied practice within a virtual environment.

² An overview of the project, practices recorded, and performers involved can be found at <https://asil.ugent.be/projects/pota/>.



FIGURE 1 - The researchers preparing a MoCap session with practitioners Roberta Carreri and Patrick Campbell. Ghent University. 2021. Credits: Bruno Freire.

After the initial excitement of our collaboration, we began to notice significant differences in our practices, communication challenges, and gaps in understanding. Coming from distinct educational backgrounds, engaging with each other's methods felt like navigating uncharted territory. Terms and concepts familiar in performance often seemed abstract to designers or engineers, and vice versa. For example, the vocal exercise *Resonators*, detailed later in this chapter, required one party to grasp resonance boxes while another learned the fundamentals of particle systems in computer graphics. The novelty of working with XR technologies further compounded this, as it lacked standardized pipelines or clear starting points.

Each team member approached the work differently: the designer started with visual concepts, the performer focused on exercises, and the supervisor proposed scenarios for human-machine interaction. Translating intangible qualities—like bodily energy or the experience of a trainee performer—into digital formats posed additional complexities. Overcoming these challenges required embracing uncertainty and the subjective nature of our work. We moved away from rigid structures and instead developed adaptable, fluid working methods—less like solid building blocks and more like porous, interwoven threads, open to change.

Performance training, as embodied knowledge designed for the body, highlighted the inadequacy of traditional research methods like controlled experiments or quantitative analysis for our goals. Instead, artistic expression became a vital bridge, allowing

ambiguity and improvisation to shape the research process. Another crucial component was maintaining ongoing dialogue with practitioners in the studio. Through interviews and open exchanges, their metaphors and imagery naturally influenced our design imaginary, enriching the development process.

Key to our practice has been the translation of metaphors; tracing the qualities of exercises which are inherent to the work of Odin, and then translating them into interactive scenarios in the virtual world. For reasons of conciseness, we will only refer to two exercises that we translated. Slow motion is an exercise that creates a collective, continuous flow of slow movements, requiring the practitioner's centre of gravity to constantly shift in response to the impulses generated by other bodies and stimuli in the space—such as the breeze from nearby movements, warmth, or the sound of breathing, generating a passivity and surrender in the body that dances, or better *'is being danced by'* the space. Here, taking the metaphor of *seaweed* – also used by the practitioners themselves – we populate the virtual training room with seaweed that moves both independently and interacts with the participant when approached.

Resonators is a vocal and breathing exercise, activating different boxes of resonance in the body – the top of the head, nose, mouth, neck, chest and stomach. The participant is prompted to utilize their voice through singing or talking in varied pitches, thereby exploring the impact of vocalization on their body and its interaction with the virtual environment. To achieve this, a ring of virtual particles was designed to appear at the height of the participant's core and to 'follow' their movements within the room. We extract the participant's voice pitch and volume in real-time and these data control the particle system, leaving traces as they expand and contract, producing organic forms that envelop the participant.

As we expanded our work, we were confident enough to claim a design process that would help us continue further. This processual way of tackling the challenges of the project is not new, but has its roots in pre-industrial and hybrid ways of knowing before abstract representation and categorization. We will use this frame, weaved with our own experiments and findings, to shed some light to our own challenges and new pathways that emerged.

Hybrid ways of knowing

The history of inquiry in the Western world has largely aimed to capture natural forces and phenomena through categorization, measurement, and control (HAYWOOD

ROLLING JR, 2013). This pursuit of objectivity and empirical rigor created rigid boundaries between disciplines—such as the arts and sciences or mind and matter—reinforcing the notion of a world that can be neatly compartmentalized and controlled.

In *We Have Never Been Modern*, Bruno Latour (1993) critiques this binary view of knowledge and nature, arguing that it overlooks the hybrids that exist between the human and the non-human, the material and the immaterial. Latour posits that our attempts to separate nature from culture and science from society are based on artificial distinctions which do no service for either the sciences or the arts. Instead, he suggests that we live in a network of relations in which these entities are intertwined, affecting and transforming one another in ways that defy simplistic categorization.

The growing interest in art-based research and research-based art opens new spaces for rethinking knowledge production, especially in Academia and in times of AI generated articles. What are the new shapes for knowledge production and what are the urgent networks that must emerge so that we can begin to acknowledge research emerging out of other frames of validation? How to approach time and processes within new academic frames or, just as importantly, how to reconnect with Non-Eurocentric and decolonial knowledge production and dissemination practices within thick institutional walls? Further, we are well aware of the fact that Motion Capture could be considered an extractivist practice. Critiques stem from how MoCap systems prioritize the translation of human movement into data, often stripping it of its context, nuance, and embodied meaning (SUTIL, 2015; LEPECKI, 2006). This approach clearly enhances an extractivist logics, where the focus is on harvesting raw material—in this case, the movement of the human body—for technological or commercial purposes, often at the expense of the subjective, cultural, or creative significance of person being captured. Throughout the cases discussed below, we aim to open a discussion on how recorded motion data can remain tethered to the subjective and cultural layers of a performer's expression.

After almost four years in this project, these writings call for diverse and intersectional approaches which highlight the fluidity of knowledge creation, where affective, experiential, and embodied experiences are validated. Such interdisciplinary practices reveal how knowledge emerges, not just through quantitative data but through the intertwining of multiple perspectives, affective insights, and embodied practices. This process values the subjective experiences and multiple perspectives of the researchers and practitioners, producing knowledge that is affective, experiential, and not always quantifiable, but deeply connected to the human experience.

Erin Manning introduces "not knowing" as a method central to research processes

that resist predetermined outcomes and certainty. She describes it as an "opening onto the not-yet-formed" (MANNING, 2016), inviting researchers to engage with processes, materials, and relations without fixed trajectories. Rather than representing a deficiency, "not knowing" becomes a form of receptivity to unanticipated thought events, enabling knowledge production in unexpected ways.

Without knowing, we adopted "not knowing" as a methodology, discarding linear, result-driven paradigms in favor of dynamic, process-oriented approaches. Manning's notion of "suspending the need for predetermination" attunes researchers to "minor gestures"—subtle, affective shifts often overlooked in goal-oriented methods. This openness allows knowledge to emerge relationally and speculatively, embracing an epistemology of becoming rather than fixed certainty.

Our collaboration demanded more than understanding roles—it required adopting the other's perspective and embracing the discomfort of uncertainty at every stage. This openness was essential to our creative process, fostering unexpected discoveries and deeper collaboration. Over time, our roles blended: the designer incorporated movement practices into project initiation, while the performer took on troubleshooting technical challenges. This role fluidity expanded our expertise and encouraged a holistic approach to both creation and the knowledge it generated.

Introducing immersive technologies brought new opportunities and constraints. These media enabled innovative documentation and storytelling but also imposed technical limitations and undefined methodologies. The agency of these constraints shaped the work in unforeseen ways, making the medium an active participant in the creative process. Each medium's unique characteristics demanded adaptation and reframing, revealing and activating new techniques. Interdisciplinary methodologies thus not only generate new knowledge but also uncover and mobilize the techniques intrinsic to each medium, setting them into motion and engaging them across disciplines.

Ritual

Rituals are structured, repetitive behaviors imbued with symbolic meaning, accompanying humans through all the transitional phases of life. Rooted in ancient human practices, rituals are embedded in every culture, including the most secular ones. By utilizing symbolic markers of group identity, evoking continuity, coordinating actions and ideas, and creating meaningful experiences, rituals foster a sense of unity that can transform individuals into communities (XYGALATAS, 2022). They offer individuals both a

sense of belonging and familiarity while marking the passage of time, serving as symbolic techniques that bring people together and provide stability in an ever-changing world (HAN, 2020). Additionally, rituals are inherently embodied performances, where a community's order and values are physically expressed (HAN, 2020).

Arnold Van Gennep (1960) identifies three distinct phases in rituals: separation, transition, and incorporation. The separation phase marks a clear boundary between sacred and profane realms, often involving symbolic behaviors that invert or suspend ordinary social roles, signaling participants' detachment from their previous status. In the transition (or liminal) phase, participants enter a state of ambiguity, suspended between their old and new roles. This phase often lacks the clear attributes of either status and becomes a space for transformation. Finally, the incorporation phase symbolizes participants' reintegration into society, now occupying a new, stable, and clearly defined social role. Of these phases, the liminal stage provides unique opportunities for exploration and creativity. This concept of liminality has been used by Claudia Schnugg (2020) when discussing artscience collaborations, where both artists and scientists are freed from the routines and norms of their respective fields. In this space of uncertainty, they can engage in unorthodox methods, leading to unexpected learning and discovery.

There are notable parallels between ritualistic practices and the process of co-creation in performance training with immersive technologies. The hybrid nature of such work creates a unique tension that calls for a customized approach, one that can accommodate and integrate the research methodologies and workflows of each participant. Our design process mirrors the structure of a ritual, beginning with a somatic exercise—a kind of physical and mental preparation—followed by brainstorming. These initial steps set the stage for translating ideas into prototypes through a collaborative process of research and design. This initiates a feedback loop in which prototypes are tested in virtual environments, assessed through movement and dialogue, and then revised through cycles of fixing, changing, improving, or even discovering new pathways. This iterative process, which can last anywhere from a couple of hours to several months, ultimately leads to a functioning prototype ready for presentation or exhibition. Throughout these loops of working, the process is balancing between problem-solving and intuition that comes from a place of sensibility, collected through personal experiences in working with and on performance, with or without technologies. It is a sympoietic process between the technical, the organic and the performative, as Donna Haraway would suggest: a *making-with* each other: Sympoiesis is a word proper to complex, dynamic, responsive, situated, historical systems. It is a word for worlding-with, in company."

(HARAWAY, 2016).

This sympoietic entanglement of movement and prototyping with both software and hardware creates a space where experimentation beyond disciplinary confines is possible, while still maintaining a commitment to a structured framework. Like ritual, this process involves a deep devotion to the work, evident even before the creation begins. Ritualistic elements emerge in the coordination of the various team members, in the setting up of the workspace, and even in the daily calibration of Motion Capture cameras. This calibration, which determines the position and orientation of the seventeen cameras of the studio, must be repeated every day and forms part of a shared routine that fosters a sense of connection both with the work itself and among the team members. Even though this article focuses on the act of creation, this way of working can then be translated and echoed into the outcome of the work itself.

From Tension to Enchantment

As we gradually overcame our initial tensions, we began to see tangible signs that this way of working could be both meaningful and transformative. By trusting each other's strengths and recognizing the value of our diverse perspectives, we moved beyond misunderstandings, and something almost magical began to unfold. The process of co-creation became an enchanting act, whereby the re-crafting of our techniques and instincts gave rise to unexpected forms of experimentation.

Now, in *The Craftsman*, Richard Sennett (2008) describes craftsmanship as a dedication to quality, care, and the pursuit of mastery through iterative practice. For Sennett, craftsmanship is defined not only by skill or technique but by an ethos of commitment to the work itself—an “intelligent and lively engagement with material” that allows for continuous learning and refinement. Just as Sennett’s craftsmanship engages with materials through a cycle of trial and reflection, we have begun to adopt an iterative, exploratory and questioning approach to the materials we had at hand.

We will give two examples of works that were born during the last year and are still under development, as we allowed space for inquiry and dialogue.

Bodily Intensities with thermal feedback

Heat is transfer of energy without transfer of matter. Because temperature is molecular motion, heat is not something inherent to a body but rather a quantity transferred from one body to another. Speaking in simile, heat is like the motion that the dancing body produces: a surplus of energy,

released into the world. Both heat and dance originate in the body while also exceeding it. As fluctuating ephemera, their traces linger but cannot be held fast (BERGER, 2019).

The first example emerged during an improvised performance, after months of experimenting with a thermal camera and observing how a performer's body temperature changes while on stage. Thermal cameras have been widely used to measure human activity across various scales, with applications such as intruder detection, disaster rescue, and medical analysis (GADE; MOESLUND, 2014). Inspired by the versatility of its use, we became curious about how this technology could be applied to theatre laboratory practitioners. The central question driving our exploration was: What could this technology reveal about the dancer's body, and could it help us visually represent the dancer's energy? A significant and inspiring example is the short-film *ORA*, a 2011 collaboration between choreographer José Navas and filmmaker Philippe Baylaucq.³ Filmed with 3D thermal imaging technology once developed by the U.S security and defense company Lockheed Martin for military purposes, the film presents "a unique assemblage in which a machine of control in fact works to engender intimacy rather than alienation or fear" (BERGEN, 2019). Another notable project is *Thermal Drift* by Rafael Lozano-Hemmer, an interactive installation where thermal cameras capture the heat of participants which are visualized as particle systems on a screen which disperse, blurring the boundary between the human body and environment (LOZANO-HEMMER, 2022).

Our experiments began with a small 8x8 pixel thermal sensor connected to a microcontroller. While this setup produced intriguing results, the images lacked clarity. We then switched to a more advanced thermal camera with a resolution of 256x192 pixels that could connect to an Android phone. This significantly improved the quality of the images, revealing more detailed thermal patterns. We spent several hours in the lab, monitoring the heat of La Selva's body while dancing. We observed noticeable changes in her body's thermal image after just a few minutes of movement. To maximize the accuracy of these observations, it was essential for the performer to wear minimal clothing.

This discovery led to a series of experiments aimed at transforming La Selva's thermal dance footage into expressive, real-time visuals. We created a system of feedback loops designed to activate whenever the yellow areas—indicating the most heated parts of the body on the camera image—surpassed a specific threshold. Each time this threshold was crossed, the system would capture a snapshot of the dancer's warmest pose, which

³ <https://www.youtube.com/watch?v=c-AHtUsO6Wc>

would then be added to the evolving visual output. This process resulted in an evocative, often abstract representation of the dancer's body heat, where the virtual body was reimagined in a way that blurred the legibility of the physical body. The visuals became an ethereal reflection of the dancer's movement, reshaping the body into fluid, heat-driven forms.



FIGURE 2 – Experiments with thermal feedback of La Selva dancing, 2024. Credits: Ioulia Marouda & Adriana La Selva.



FIGURE 3 – Experiments with thermal feedback of La Selva dancing, 2024. Credits: Ioulia Marouda & Adriana La Selva.

With the arrival of LUME Teatro (BR) to our labs for a 10-day collaboration, these experiments became more and more refined. One of the most significant aims of this project has been to trace the influences of a certain lineage of theatre training, with

strong roots in Odin Teatret's practices, across different cultures, particularly Latin American theatre groups that have adapted, recycled and questioned these practices within their own contexts.

LUME Teatro emerged in 1985 as a performance research centre at UNICAMP (SP, Brazil). LUME developed a series of (pedagogical) practices that seek to perform *affective encounters* between actor-observers with other bodies and stimuli found in everyday life-human or non-human. We only decided to collaborate with members of the group after three years of experimentation, because of the nature of their processes, which seemed particularly difficult to combine with new technologies, since their practices do not rely on codified bodily work but on energetic encounters. Through living together, active observation and expanded attention, LUME's researchers *embody* and *transform* the affective materiality of these encounters in their own bodies and voices. From underrepresented worlds, left out by history and the official episteme, LUME researchers learned songs, created oralities, and recreated bodies, rhythms, energies and bodily stories of these worlds, generating immaterial archives of affectivities⁴. One of the main sources for the development of LUME's actor training practices is what they term *energetic training*:

The energetic training work seeks to "break" everything that is known and addicted to the actor, so that he can discover his hidden and stored potential energies. And how to achieve this? Luís Otávio Burnier, creator of LUME, based on Grotowski's research, believed that physical exhaustion could be a gateway to these potential energies, since, in a state of extreme exhaustion, psychic defences become more malleable [...] (FERRACINI 2012, our translation).

We thus wanted to investigate how new technologies could provide a space to allow us to interact with the actor's nakedness and exhaustion, giving us the opportunity to accompany this energetic stripping in order to be inhabited by *the other- a character, a persona, a material, another energy...* Through thermal imaging we started to imagine glitched-like spaces of repetition, transformation, and contamination from which new forms, relations and modes of knowledge could possibly emerge.

⁴ LUME has published a series of books and articles recounting these affective encounters. Please refer to their webpage for a full account of LUME's writings: <https://www.lumeteatro.com.br/publicacoes>



FIGURE 4 – Lume Teatro Performing in the lab with real-time thermal feedback, Ghent University, 2024. Credits : Ioulia Marouda & Adriana La Selva.

This craftsmanship-oriented method aimed at understanding what an embodied archive could become when reflecting LUME's working principles. Luis Otavio Burnier further asserts that "mastery in performance arises not from fixed techniques but from a sensitive responsiveness to the body's energy" (BURNIER, 2000). Similarly, in our work, engaging with the thermal camera as a tool involves a meticulous, almost craftsman-like, attention to how it captures and interprets the performer's energy. The iterative adjustments we make—shifting from low-resolution sensors to more advanced cameras, refining feedback thresholds, and reconfiguring visual outputs—represent a dialogic process of "listening" to the materials at hand and allowing them to influence the development of the research itself.

Further, Sennett's notion of craftsmanship as a "conversation with resistance" (2008) also underscored our methodological orientation toward the unknown. The thermal camera, while a sophisticated tool, imposes certain limitations, requiring us to work within the constraints of its pixel resolution, color scale, and refresh rate. Just as a craftsman hones their technique through repeated engagement, our experiments with feedback loops and thermal imagery operated as a dynamic crafting of embodied intensities. The choice to establish feedback loops that capture peak energetic moments when the body surpasses a heat threshold is, in itself, a crafted response to the subtle (im)materialities

of LUME's energetic training, visually articulating what Burnier describes as the energy that "emanates beyond the visible body" (BURNIER, 2000).

This ongoing experiment has pushed the boundaries of how we understand and represent the physical body in immersive, digitally mediated environments, allowing us to translate invisible processes, such as body heat, into a visual language crafted in the same terms as LUME's actor's training⁵. As much as we are aware that heat is not the same as what Burnier understands as energy, this crafty translation process which involved a long period of engagement with LUME's performers, allowed us to get closer to what Berger terms a material thermopoetics: "situated in between our own unseen visceral corporeality and the specific materiality of the infrared camera" (BERGER, 2019). This small but powerful project has been calling us to ask further how the process of making things reveals to us new epistemologies for interdisciplinary research. By crafting, tweaking and questioning the (material) things we have in hand in our lab, a thinking process is shifting the directions of our research.

The death of the stick figure

The conversation around how to represent the body in virtual space has been a central theme in our work. From the outset, we sought to find ways of interpreting the body in an expressive manner without directly representing any specific identity group. This approach arose from our desire to create an abstract body that could still convey human movement while remaining free from conventional representations of race, gender, or ethnicity. In the early stages of our project, we experimented with abstract shapes that could embody the dynamics of human motion without being tied to any particular body type. Our main working avatar during this time has been a root-like figure—an abstract form onto which we mapped the recorded movements of the various performers we collaborated with.

⁵ For an in-depth approach to translation in relation to this project, please refer to LA SELVA, Adriana. Architectures of access: virtual translations of embodied knowledge in theatre training. *Em*: DE FRANSISCSCI, Enza; MARINETTI, Cristina (org.). **Translation in the Performing Arts**. London: Routledge, forthcoming.



FIGURE 5 – The root-like avatar used in previous works of the researchers, 2023. Credits: Ioulia Marouda & Adriana La Selva.

However, after three years of intensive collaboration and countless hours spent inside a motion capture studio, we began to question the normativity embedded in the formalities of the captured body itself. The rigid framework imposed by motion capture technology, which often attempts to precisely replicate the physical body's movements in a virtual environment, became something we felt compelled to challenge. We realized that even within the abstraction of our root-like avatar, there was an underlying adherence to conventional notions of the body's form and movement.

The motion capture system we use at our university is called Qualisys, typically employed in scientific research for experiments involving movement analysis. It consists of a seventeen-camera setup arranged around our laboratory. The person or object being tracked wears a suit embedded with markers, which the cameras recognize after a daily calibration. The cameras are calibrated at the beginning of each day to recognize the relative position of the markers in space. Using an algorithm and considerable human effort, these markers are then recorded in a computer: every marker gets identified as its respective body joint, and then the human skeleton is calibrated.

After years of working with motion capture technologies and engaging in conversations with researchers focused on movement and computing⁶, we began to

⁶ The origins of our inspirations for this project are challenging to trace, yet we have engaged in feedback discussions with several scholars over the years. A notable example is Laura Karreman, whose generous reflections and bibliographic contributions have influenced our approach. In her PhD thesis (KARREMAN, 2017), she critically examines the reduction of the dancing body's complexity to a mere image. She also questions the embedded habits of seeing and knowing inherent in the process of movement capture. Furthermore, our participation in the Movement and Computing (MOCO) Conference 2024 in Utrecht provided valuable insights. Presentations such as Kim Vincs' (VINCIS; MCCORMICK; MARDAMOOTOO, 2024) discussion on volumetric interaction were particularly impactful, helping us refine our understanding and frame the ongoing dialogue about these themes.

question the dominance of the traditional stick figure as the primary representation of the body in motion capture systems. Multiple artists have profoundly influenced our understanding of the body and its digital representation over the years. From Merce Cunningham's groundbreaking 1993 rethinking the body and its movement possibilities in *LifeForms* (CALVERT et al., 1993), to Gibson and Martelli's innovative engagement with motion capture, the body, and digital embodiment in projects like *Man A VR* (2015) and *Capturing Stillness* (2013), we see a rich lineage of artists reflecting on how the body is perceived and represented in virtual spaces. Another noteworthy work is *Skinning/ True Mesh / 16:9 Full Time Texture* (NEIDERT; BÅGANDER; KARLSSON, 2017), a project that appropriates 3D animation imagery to create physical costumes inspired by digital aesthetics. Our experimentation navigates these intersecting paths—both questioning the limitations of the captured body in contemporary popular visual culture, while also imagining alternative possibilities and meanings.

This led us to return to the motion lab, armed with sketches and spontaneous ideas, in search of alternative ways to configure the dancing body. The process involved cleaning data, calibrating custom skeletons, and rigging geometries that we created, all of which required using different software programs and a lengthy exchange of technical specifications with the developers of the Qualisys system. The results, although still in development, represent early proofs of concept for new forms of digital skeletons. We will dive below into a small thought-crafting journey, a parable, that will hopefully emerge as an interdisciplinary account of a designing methodology for embodied archives.

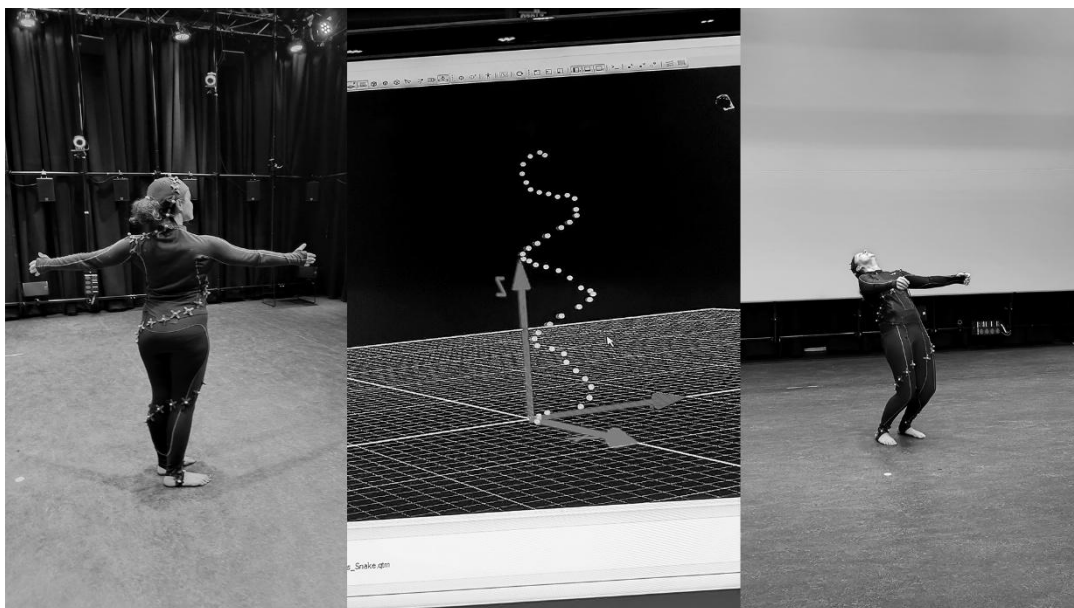


FIGURE 6 – Adriana La Selva performing with a custom setup of MoCap markers in the shape of a spiral, Ghent University, 2024. Credits: Ioulia Marouda.



FIGURE 7 – The translation of La Selva's dance with a skeleton in the shape of a line, Ghent University, 2024. Credits: Ioulia Marouda.

Custom-made skeletons are used in industries when actors perform animals or imaginary beings, but not as abstracted expressions of the body. For us, this rethinking of the captured body is a question on power, on authorship of the data, on the normativity of the captured and represented bodies in digital realms. Finally, it is a celebration of the performing body, a search for other meanings and an openness to various associations, as the dancing body can be an abstract form, a blob, an animalistic figure, a feather floating, or nothing at all.

Our process with Qualisys' algorithms has become a craft in itself; an iterative engagement that brings an enchanted quality to the act of data translation. As we revise, recalibrate, and reshape the digital skeletons of physical bodies, we experience what Sennett might call the *wonder* of craftsmanship—where the friction between aspiration and resistance, between human creativity and technological limitation, produces unexpected insights (SENNETT, 2008). This enchanted engagement with motion capture not only pushes the boundaries of what digital avatars can be, but also opens new pathways for understanding embodied experience in virtual environments.

Our results have, somehow and so far, intuitively developed what we call a *metonymic spatial ecology*⁷ in our VR archive, where fragmented bodies become fluid narrative vessels for training practices. As La Selva has mentioned elsewhere:

⁷ Metonymy is a figure of speech, like metaphors. One of the functions of a metonymy is to use a part of something to refer to its whole. It allows a concept or thing to be represented by an associated attribute or component, often creating a more indirect, yet evocative, way of describing something.

Rather than a fixed story or predefined path, narrative vessels are fluid dramaturgical structures that hold and guide the visitor's interaction with embodied stories, allowing for individual meaning-making through gestures, movements, and sensory experiences (La Selva & Maes, 2024, forthcoming).

In this ecology, each fragment—a limb, a gesture, a shift in heat—becomes part of a network of expressive dynamics of forces between body, technology, and space. This metonymic fragmentation allows the body to exist in a state of constant reassembly, deterritorializing the practices recorded in other environments.



FIGURE 8 – Interpretation of the performer's shoulder, drawing from Plastiques exercise, 2024.
Credits: Ioulia Marouda & Adriana La Selva.

This small insight brought us back to our data. In our .qtm archive of recorded practices⁸, we have selected a series of exercises that already deal with the segmentation of the body: exercises that came originally from Corporeal Mime and Etienne Decroux's legacy⁹.

For Decroux, segmentation embodies a kind of a moral lesson derived from an in-depth study of gesture which "in order to represent one thing invents another, or let's say, rediscovers another" (SOUM, 2016). Such a study derives from the observation of statues and their gestures. In turn, he developed a practice named Mobile Statuary:

Mobile Statuary is always a surprising discovery for those who have concluded that corporeal mime mimes only things, tangible actions. Mobile Statuary puts movement there where there is none [...] and Mobile Statuary will tell through movement this thrust of the mind, this adventure of the thought. What thought? All thought, none in particular! It's this idea that

⁸ .qtm is the file format generated by the Qualysis MoCap recording system.

⁹ This is of course a reference to create a clear lineage within our research. The mastery of controlling specific parts of the body has been, in a way, an essential principle of the performer's work throughout the history of theatre and dance and therefore, segmentation exercises with different names can be seen in many other theatre and dance traditions such as Commedia Dell'Arte, Noh, Kabuki, Peking Opera...

seduced Decroux: Thought can be, ungraspable phenomena that it is, materialized by a path made by body parts. "Visible portrait of the invisible," a mental displacement represented by a corporeal displacement, or, better still, by a movement within the body itself, [...] a sinuous one, which undulates, which expands and retracts, not like a thing, but very much like a thought, going beyond a mere portrait and becoming the essence of a man or of a woman. This movement, called segmented movement, is also for Decroux a morality lesson because it must, in order to exist, continue - continue to incline, to curve, to find its direction. As in life, where to begin things is not as difficult as to continue them. What a beautiful idea, to perform Mobile Statuary in the hope of learning to be persistent! [...] Mobile Statuary can, of course, serve as phrasing for the preceding categories, and the more the acting conspires with it, the more one finds it no matter what the style. But when Mobile Statuary exists autonomously, it manages to give the most complete portrait of the metaphysical with physical means. It's as if one sees the being from inside, from the interior. (SOUM, 2016.)

The insertion of movement there, "where there is none", takes place through a system of articulation of intentions organised by what Decroux termed *dynamorhythm*: "which has to do with the body's speed, muscular intensity in a movement, and the crystallization or immobility of a gesture or attitude (SOUM, 2016). In short, energetic qualities organised in a tangible structure for the trainees¹⁰.

This legacy, which is both a philosophical and a physical one, as we can read above within the frame of our research, took two different roads. One can be traced through training practices that Grotowski later developed and termed *the plastiques*. According to Mika Juusela, the plastiques are exercises directed at finding different sources of movement in one's body and, later, giving these sources full control for moving the body as a whole. (JUUSELA, 2021) This work was further investigated by Eugenio Barba and Odin's performers. Iben Nagel Rasmussen for instance, addresses segmentation exercises as a necessary practice to master the body's equilibrium in asymmetric positions (NAGEL RASMUSSEN, 2021).

¹⁰ Throughout the history of notation systems for performance, there are a few attempts to organise such qualities in a readable manner for the purpose of transmission. Other examples are the Laban efforts and Roberta Carreri's "Six States of Water", largely discussed in relation to this project in the article 'Affective topologies and virtual tactile experiences in theatre training' (La Selva, 2023).

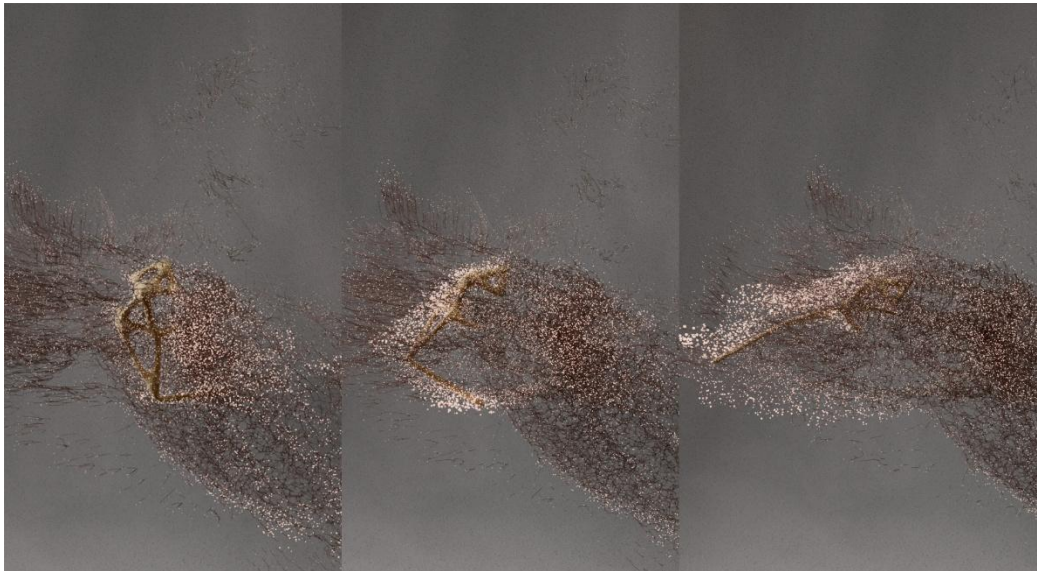


FIGURE 9 – Interpretation of the performer's shoulder as sources of movement, drawing from Plastiques exercise. Credits: Ioulia Marouda & Adriana La Selva.

The other road settled in Brazil through Luis Otavio Burnier, founder of LUME as said before, and long-term disciple and assistant of Decroux in the 1970's. In a way, through the energetic training already described in the previous section, Burnier has dismantled Decroux's techniques in order to find a two-way road: from Decroux's forms towards intentions (dynamorhythms) Burnier's training begins from an explosion of personal energetic qualities in order to find one's intrinsic forms, which he has termed *matrices*.

Matrices, mobile statuary, plastiques. They all are in a way, we argue, what Erin Manning associates with her notion of *minor gestures*. In her book with the same title (2016) Manning examines the potential that certain gestures, which are not immediately recognized within dominant structures of power/knowledge, have to reshape perception and create new modes of becoming-with a certain environment. For Manning, minor gestures are movements that elude fixed definitions and thus retain a capacity to disrupt and reimagine normative modes of experience, engaging with the fluid and often unseen dynamics of thought and feeling (MANNING, 2016).

This approach resonates somehow with the archaeological use of artifacts (objects that have been made, modified, or used by humans) and ecofacts (a natural object found at archaeological sites that holds significance due to its association with human activity or environmental context) as *proxies*—fragmented indicators that gesture toward larger historical and cultural narratives (KNITTER; SCHIER; SCHÜTT, 2021). In both contexts, fragmented representations serve as metonymic stand-ins, offering insight into complex realities by extrapolating meaning from partial or indirect forms.

All these intentional accounts of energetic qualities are concerned with gestures that extend beyond direct representation to suggest nuanced, often ungraspable meanings. Decroux's segmented movement isolates parts of the body to express invisible forces, much like Manning's minor gestures, which reveal a tendency or force within and beyond the individual's intentional control, becoming a porous communicative membrane with one's environment. Much like our own research and creative process, our minor gestures towards the crafting of an archive are trying in a way to make visible the invisible forces behind the practitioners' recorded forms.

Much like the archaeological artifact or ecofact, which bears traces of human activity and suggests past interactions with culture or nature, our abstract, root-like avatars in virtual space trace the performers' bodily movements and intensities. Each fragment, whether a limb or a thermal imprint, functions as a proxy, a piece of the dancer's embodied narrative within a digital ecology that is continuously reshaped by the forces of movement and heat. This metonymic spatial ecology, therefore, aligns with an interpretative framework where the fragmented—whether physical, virtual or archaeological—opens possibilities for understanding complex energetic systems.

Conclusion, ritualistic approaches to co-creation through minor gestures

Engaging in a creative research project within academia is a complex endeavor, one that involves navigating both the process of co-creation and the outcome of collaboration. The journey often begins with uncertainty and discomfort. In response to this, our proposition is the creation of a framework built on trust—trust in oneself, in others, and in the unknown. This can be fostered through slow, ritualized steps that allow space for both the structure of repetitive actions and the freedom of transdisciplinary experimentation. It is about working in the gaps of knowledge, where the unexpected can emerge. The outcome of the research extends beyond a work presented in exhibitions or talks, to the transfer of knowledge itself, the sharing with diverse professionals which becomes part of our own embodied knowledge.

By engaging with Van Gennep's ritual structure -separation, transition, and incorporation-, our research in virtual archives transforms gestures from static records into dynamic, and interactive archival experiences. This approach underscores a methodological commitment to perceiving archives as spaces of becoming, where the corporeal and digital intersect to evoke new modes of knowledge and sensory engagement. Each stage becomes a lens for understanding how practice-based research

might reveal layers of embodied knowledge and invite alternative modes of engagement within virtual spaces.

Going backwards in this article, in *separation*, we have isolated elements—Iben's segmented actions, Mika Juusela performing Grotowski's plastiques, LUME's heat, sensor displacement in Adriana's body—where the body or subject is removed from its usual contexts and norms. In our case, this meant disentangling the performative gesture from its conventional representations in virtual archives. By abstracting the body through technological mediation, such as motion capture and thermal imaging, we introduce a preliminary disruption that invites new, unbound modes of presence. It is a stage that reveals a visible portrait of the invisible, drawing out forces and impulses that lie beneath overt action.

The second stage, *transition* (or *liminality*), serves as the experimental, craftsman-like phase where boundaries blur and our own known methods undergo transformation. Here, Manning's idea of minor gestures is especially relevant; gestures in this stage are mutable, capturing the energy of in-betweenness and challenging dominant modes of representation. In our practice as researchers, this transitional phase occurs through exploratory, gestural manipulations of movement data and bodily visualization, creating new spatial ecologies where *practices become proxies*: fluid, metonymic vessels for training narratives.

Finally, *incorporation* involves integrating these explorations into an ongoing methodological framework, embedding the findings as knowledge artifacts within the virtual archive. At this stage, fragmented and abstracted gestures—refined through processes of segmentation, digital reconfiguration, and minor gesture discovery—become part of a *metonymic spatial ecology* in which archives embody not only preserved knowledge but the evolving relationships and gestures that arise from continual interaction.

Our approach to technology is holistic rather than divisive. In our methodological approach, technology can be viewed not as a collection of tools but as an *assemblage of techniques*, and as such, it acknowledges the interdependence of technical apparatus, skills, and methodologies required to manifest a technology's potential. Beyond the marvel of technological advancements, we see *assemblages of techniques* as tools for renegotiating roles and power structures within creative fields and the broader production of knowledge. Projects such as these offer the opportunity to reshape and question research validation structures through processes of disciplinary translation. In our case, the collaboration between performers, technicians, designers, supervisors helped to break

through hierarchical structures enabling new forms of co-creation centered on each one of our crafts.

At the same time, we view enchantment not as the illusory smoothness often presented by capitalist imagery, but as the space that is created when we subvert and reconfigure, when we connect with each other to break down our barriers as much as possible and create ties, when we connect with technology at hand, accepting its own sense of agency through its limitations and potentialities, and our own differences. Through this lens, technology can reveal insights that might otherwise go unnoticed, offering new ways to document, reimagine, and relate to the performing body.

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