

Re-Embody, Engage, and Resist: Creative Strategies for a Latin American Cyborgism

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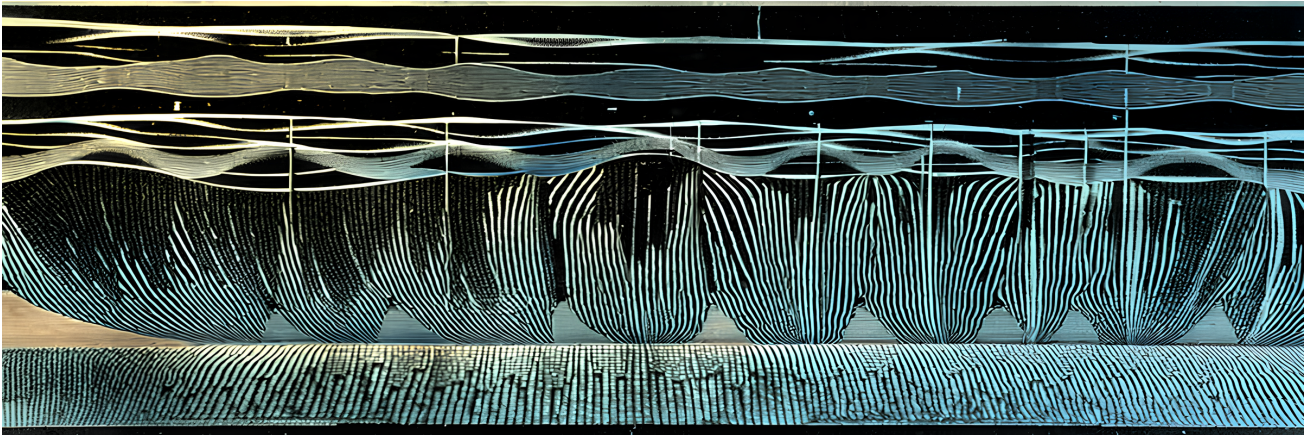


Figure 1: Artwork inspired by motion, sound visualisation, and submarine life surrounding Tierra del Fuego.

Abstract

This paper explores the role of gesture in body politics and cyborg narratives within contemporary arts discourse, particularly as it relates to NIME and the overlapping fields of creative computing, performance arts, and research-based artistic practices. By examining how machine co-creation redefines our comprehension of embodiment in present-day society, it posits that adopting a neutral stance under the guise of scientific development is problematic, especially from the vantage point of the Global South. The triggering premise is that gesture studies tend to portray it as both natural and encoded, innate yet conventional, culturally-specific and universal. And whilst substantial literature exists on gesture as a tool in NIME, much less attention has been given to the politics inherent to its capacities in contexts that are bound to academic and industrial innovation. Consequently, a situated and community-minded shift in our creative practices becomes crucial, lest we want the fruits of our labour become yet another accessory for techno-corporatism. By sketching out of a Latin American Cyborgism through three case studies in Chile, I demonstrate how gestures-in-the-machine can serve as socio-political signifiers, leveraging performance activism, telematic events, and civic tech initiatives to spark meaningful action.

Keywords

Gesture, Embodiment, Global South, Machine Learning, Co-creation

1 Introduction

De Rosa suggests that gesture is one of the obsessions of modernity [10], and we certainly bear witness today to a staggering amount of gestural technologies across various fields, including mass media, medicine [23, 26, 27], interspecies communication [5, 38, 55], robotics, and surveillance [24]. These developments raise vital concerns about the influence of technology on our bodies, habits, identities, and sociocultural narratives. Of course, the relevance of gesture is anything but new to the fields of NIME, human-computer interaction (HCI), and natural user interfaces (NUI), which is why it is essential to adopt an informed, critical stance on this matter.

Recall Visi et al.'s [54] rather pragmatic remark that “musical instruments can be seen as technological objects coupled with a repertoire of gestures.” Or consider the *Theremin*, which was not only the first electronic musical instrument to garner massive appeal, but also a pioneering medium for human-machine interaction through gesture. Fast-forward to our present day, with relatively recent developments in gesture capture, recognition, and prediction continuing to fuel computer interaction through machine learning (ML) algorithms.

Despite these historical developments, a quick survey of NIME literature reveals a sizeable neglect of gesture's relational nature [13], whilst another portion attempts to collapse it into measurable phenomena, relying on qualitative methodologies rooted in technoscientific discourse. Yet, as Phinyomark et al. assert [40], “the way humans move, and the cognitive control underlying this process, is inherently complex, dynamic, multidimensional, and highly non-linear.” Conversely, we should also take Adema & Kuc's [1] observation that “gestures arise [...] from the intra-actions between bodies, machines, and discourses”. This acknowledgment foregrounds how approaches to gesture in NIME remain limited—not on account of their recourse to numerical representations of movement, but rather because such phenomena resist,



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and may fundamentally elude, comprehensive modelisation. I therefore posit a constructive, holistic turn toward the cultural processes by which these movements acquire sociopolitical substance.

Ultimately, sustained experimentation with the *gestus ex machina* (gesture-in-the-machine) can lead to the assimilation of expressivities into our cultural milieu that were previously implausible. It is thus crucial to not only interrogate how technology conditions our somatic creativity, but to keep a critical eye on the biases that govern what we feed into it. This is particularly manifest in the AI era, where reliance on faulty, synthetic, or otherwise partial data must be approached with mindfulness, as it beckons alternative notions of embodiment and a redefinition of gesture itself. As we shall see, the NIME community has much to say in this respect.



Figure 2: Uncanny body representations generated through latent interpolation of a Marey “chronophotograph.”

2 Fuzzy definitions

So, what is gesture? For one, it is a notoriously elusive concept to grasp. Recall Gabara’s [15] hint that studies on gesture are scattered across myriad definitions, as it is “both natural and encoded, innate yet conventional, culturally-specific and universal.” Moreover, as Jensenius [22] pointed out over a decade ago, gesture is among the most ubiquitous buzzwords in NIME literature—a trend intensified with contemporary approaches to *musicking* driven by ML and ever more sophisticated sensing devices.

As Noel-Hirst et al. [35] note, much HCI research on generative AI music systems carry on this tradition, either focusing on the ‘control’ aspect of gesture [4, 16] or exploring human-adjacent interactions through judicious mapping strategies [41, 50]. Similarly, NUIs uphold the idea of naturalness through somatic engagement with electronic systems at varying degrees of intuitiveness. Yet, these framings risk oversimplifying gestures as mere physical actions aimed at tool manipulation, ultimately alienating us from its relational capacities.

An in-depth discussion of the many possible definitions of gesture within NIME far exceeds the scope of this paper [16]. However, even broader descriptions might fall short of capturing its full extent as a socio-performative process [36]. This narrowness is often rooted in industrial, psychosocial, and biomechanical discourses geared towards functionality that, by virtue of their parametric fixations, gloss over the richness inherent to gestural phenomena.

2.1 Subvert causality

A significant limitation pertains to taxonomical approaches, which, whilst valuable, also unwittingly cast restrictions on what we can and cannot conceive of when conceptualising gesture. These epistemological scaffolds materialise in technologies such as computer vision, ML classifiers, motion capture, and sensor infrastructures of various kinds, which in turn condition the raw material for foundational approaches in digital gesture processing. But this reliance imposes an additional layer of constraint and obfuscation: what is the purpose of working with gesture if every iteration will produce yet another mapping or parametric control scheme, and not something that *exceeds* these frameworks?

Of course, notable performers have levied these assumptions with an open resolve to experiment, and even subvert, what we have come to expect of *gestus ex machina*: Laetitia Sonami [14], Michael Waisvisz [12], Ataru Tanaka [47], and Marco Donnarumma [6], among others. Consider how HCI and NUI researchers devise systems that are meant to feel *natural*, perhaps pointing to the common stereotype of gesture as a vessel for intuitive instrumental affordances. However, both Waisvisz and Sonami have, at different stages, eschewed this assumption when developing contraptions that have since become archetypal in the community: the gestural hand-glove [43]—arguably a contemporary iteration of the *chironomic*¹ metaphor of manipulating energy with our hands.

Most remarkably, due to the engineering challenges of the time, these devices did not always respond as expected, which led to said inventors-musicians adopting a critical ethos: for Waisvisz, it was good that *The Hand* (1984) did not work *effortlessly*. Sonami’s *Lady’s Glove* (1991) performances conveyed similar acumen by destabilising sound-gesture expectations, whilst Tanaka’s *BioMuse* incursions (early 1990s) unveiled the nuances of action-perception by harnessing the neurophysiological origins of gesture from musculoskeletal impulses. All these efforts have exposed a far more intricate relationship between expression, causality, and intention than was previously assumed.

2.2 Gesture as data

Common parametric definitions of the *gestus ex machina* treat uni- or multimodal signals as some form of gestural *contour*, or even as a type of gesture itself. At any rate, gesture may be extrapolated to data insofar as we quantify signals derived from corporeal expressiveness and abstract them into mathematical functions, outlining how different perceptible parameters evolve over time—be they sound events, the pressure of a finger on a surface, the position of a body in space, or any other such behaviour.

Notable applications of this gesture-as-data conception can be found in Jensenius et al. [23], who developed a *Musical Gestures Toolbox* for researching music-related body gestures through sound, video, and motion capture. Similarly, the *Gesture Variation Follower* by Baptiste Caramiaux et al. [7], allows for real-time analysis of trajectory-based gestures from various input devices. More recently, several ML libraries, applications and toolboxes have surfaced for cross-modal parameter mapping and synthesis [14, 49]—with prominent historic examples being *Wekinator*, *CatART*, and *AudioStellar*. Notably, all these implementations highlight a modality-agnostic approach to gesture, as well as a tacit agreement to some degree of correlation between signal fluctuation and gesture expressivity.

¹<https://enculturation.net/the-digital-chironomia>

Perhaps following the tradition of Schaeffer and Smalley, taxonomical approaches in NIME have also paved the way for tools developed in conjunction with foundational theories on body movement [45] and language [18] that have fuelled transdisciplinary experiments since the 1960s. Notably, Laban Movement Analysis (LMA), which originated from dance studies, has long been established as a grammar for isolating and clustering bodily expression [6].

Yet, as much as LMA excels at scrutinising motion for its expressivity, it is not without its faults. Chiefly, this and similar constructs emerged from a cultural-historical context that idealised a ‘universal’ human body template, echoing all manners of Modernist misconceptions (from Leni Riefenstahl’s Apollonian aesthetics [30] to the *New Soviet Man* [25]), whilst inadvertently marginalising other somatics, including those of neurodivergent and disabled individuals whose ‘minor gestures’ Manning [31] so aptly describes. This epistemological bias is perplexing, as gestural behaviour is not only historical, but also a deeply subjective, corporeal and localised cultural experience.

2.3 Gesture as control

Gesture has also gained prominence due to its ability to seamlessly blend into the computational and epistemic structures that govern technological development. Taxonomical approaches accelerate this commodification, but also signal its own faults. For instance, the impact of a seemingly inconspicuous interface such as a mobile device is not limited to a temporary change in posture or gait, but on a massive embroidery of habits, discourse and dispositions. Hence, examining gesture-as-control in NIME requires attention not only to how these frameworks normalise parametric interaction with machines, but also to how they reshape our repertoire of everyday gestural expressions.

Interestingly, many of the tools born from such approaches can be used for more comprehensive transdisciplinary analyses (as we will see in the following section). Moreover, the relationship between creative control interfaces and commercial applications, such as *Kinect* or *LeapMotion*, underscores the social significance of gestures in artistic and consumer domains. This unrelenting use of ‘vintage’ hardware within the NIME, media arts, and creative computing communities speaks to the ongoing interest in mapping gestural parameters in meaningful ways, ranging from linear interpolations to more complex analytical or data-driven approaches that accommodate the intricacies of human movement.

In this context, the corporeality of artists plays a vital role, with the body taking over as a multimodal system where agency and affordance shape creative discourse. Taking from Manning and other author’s approaches [12, 47], a myriad physical movements—including tics, spasms, and other ‘illegible utterances’—can shape the creative outcome, deepening the connection between artist and medium whilst bringing forth fringe or unconventional forms of expression.

At this point, one can also find conceptual affinities between gesture and so-called *latent spaces*—an umbrella term in ML for abstract, high-dimensional representations that encode relationships and structure among data points without explicitly labelling them [4]. Likewise, gestures act as loci for tracing expressive pathways across sensory modalities, communicative registers, metaphorical mappings and cognitive affordances. In both cases, meaning emerges from dense relational patterns rather than discrete markers or isolated descriptors of world representations.

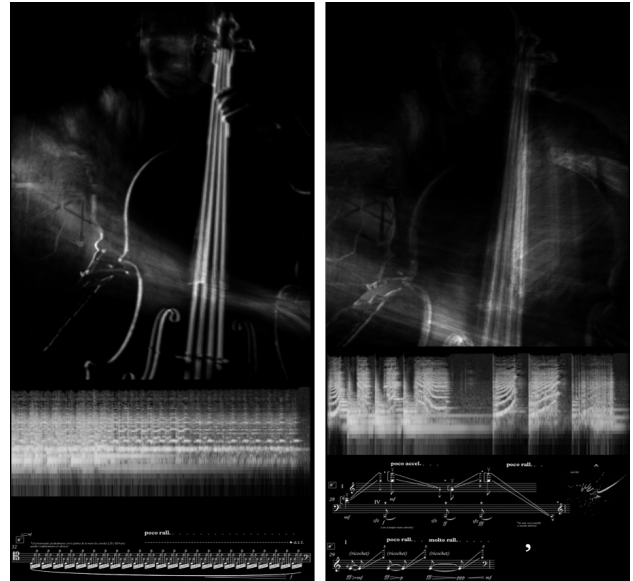


Figure 3: Interrelatedness and disparities in motion, sound, and notation for cello solo composition “Impulsos” (2017).

More crucially, gestures carry contextual weight: their trajectories and interpretations are saturated by the sociocultural milieus that produce them, so reading a gesture—like probing a latent space—demands attention to its surrounding lattices of practice, meaning, and power.

3 Cyborgian Gestures

Gesture studies well beyond the margins of NIME demonstrate the need to strike a balance between its digital operation (data, prediction, control) and its feedback processes of cultural manifestation and absorption. Notably, as noted by Maddalena [29], this tension between somatic instantiation, technical encoding, and semiotic excess is not incidental, but representative of gesture. By using the *cyborg* as an analytical tool, we can probe into the interplay between these categories, resisting the tendency to view them as separable entities or to unknowingly reify one over the other.

Reflecting on this notional elusiveness, we find a useful parallelism in Parker-Starbuck’s [39] Harawayan account of cyborgness as a “metaphoric concept to explore how not necessarily literal mergings between live bodies and technologies can destabilize various binaries: body/technology, able/disabled, even human/non-human and allow a reflection upon bodies emerging through this destabilisation in performance.” In this sense, Waisvisz, Sonami, Tanaka, and Donnarumma’s performances are cyborgian insofar as they use technology to cleave performance from performativity, leaving claims of naturalness and affordance subject to scrutiny. Their sonic articulation of movement—at once untamed and bodily anchored—resonates with Hayles’ [19] posthuman conception of subjectivity as assemblages arising from interactions with technical systems, thereby positioning gesture as a locus of agency.

As such, gesture becomes cyborgian when it registers this negotiation materially—i.e. when somatic movement is simultaneously technical input, cultural text, and embodied resistance to interface logic itself. The cyborg gesture thus refuses complete capture by the machine while remaining reliant on it, carrying

cultural memory and affective weight that no sensor can quantify, yet becoming perceptible through its very technological mediation.

Likewise, the cyborg figure allows reframing gestures as vital cultural artefacts that enable a politics of embodiment from seemingly unrelated material components, in a constant flux of transformative accumulation. Most critically, this cyborgian gesture is not a transcendent figure that escapes power relations; rather, it demarcates a temporary nexus from where these become *materially visible, and thus contestable*.

3.1 Gestus ex Latinoamérica

If we insist on wielding gestural technologies for the improvement of society, it is in part because the real peril lies in how technology is brandished to fortify existing structures of oppression. In the Global South, we are subject to this persistent yet often overlooked aspect of technological innovation, as it trickles down from research to industry, and from there to the grassroots. That is why I emphasise that, from a Latin American perspective—so far from Shenzhen and Silicon Valley—the unequal distribution of technological capital affords ample ‘latency’ to address gesture without compromising thought from action.

Thus, if cyborgness denotes how agency emerges through entanglement with technical systems, then a Latin American cyborgism asks: *entanglement on whose terms, and toward what ends?* As Aguilar [2] and Sued [46] remark, in the Global North, cyborg theory has largely celebrated the transgressive potential of the human-machine merger—thereby obscuring how technology becomes a tool of biopolitical control, where data colonialism, surveillance capitalism, and technocratic governance dictate the rules of bodily engagement.

Consequently, rather than serving as a metaphor for dissolving binary underpinnings, Latin American cyborgness refers to an assemblage that acknowledges its own hybridity as a concrete, material condition. Communities in this region are already enmeshed in imported technical systems designed to extract their data, monopolize access to resources, and constrain their horizons. Yet within these very structures, they cultivate practices that assert sovereignty, reclaim dignity, and envision alternatives by creatively repurposing their logics for collective resistance.

The Latin American cyborg is therefore a pragmatic figure for understanding how marginalised communities hack, improvise, and survive within infrastructures designed to exploit them [8]. In this realm, gesture ultimately becomes cyborgian because it defies full instrumentalisation: its somatic trajectories carrying cultural memory, colonial history, and a refusal that exceeds technical specification.

Lastly, it is worth noting that rather than drawing on essentialist invocations, this figure acknowledges how the colonial history and geopolitical positioning of each and every community in the Global South informs their own resourcefulness as technogenic praxis. This enables us to transform an otherwise abstract notion into a political and material interpretation grounded in specific struggles from which we can learn and deploy strategies elsewhere—indeed, echoing the assertion that ‘the uprising is a gesture without end.’[11]

4 Lessons from Chile

The framework outlined above finds concrete grounding in three Chilean case studies that stress how gestural technologies serve as vessels for situated, communal change, specifically in contexts

of revolt and ecological strife. By examining these instances—informed by recent developments in NIME and media arts where ML has been regarded a collaborator [48] and even an ‘ally’ for activism—we can position gestural technologies as embedded practices through which marginalised communities enact resistive change.

4.1 Case 1: Gestures of protest

Protest leads to collective phenomena that transcend individual desires in favour of a shared sentiment that may, or may not blossom into concrete social goals, but which ultimately appeals to synchronicities born from a dissonance of diversities [32]. This does not unfold solely in the physical space of protest, but also through myriad digital platforms from where it is able to adapt to other local, cultural, and national contexts. A notable example of this is the urban performance “Un violador en tu camino” (A rapist in your path, hereafter *Un violador...*)² by the feminist interdisciplinary collective *Lastesis*, which arised during the 2019 revolts in Chile to reframe sexual and gender-based violence as a matter of state violence.

Un violador... is a brief yet poignant performance (~2-3 minutes) that combines chant and choreography to disrupt public space in an unambiguously confrontational manner. In its original iterations, the performance featured a compact matrix of bodily, aural and visual gestures that metonymically referenced institutional gender violence in Chile, deploying deft juxtapositions of sensuality and brutality, festivity and rigour, fluidity and abruptness. This tactical counterpoint carries over to the other elements of the performance and the chant itself, which comprises six verses sung a cappella with simple and direct lyrics³ that parody the Chilean police’s anthem. The effect is caustic yet catchy—a skilfully crafted pastiche of contrasts that accounts for its success in both grassroots and mediatic terms.

In the context of a broader, transdisciplinary inquiry into gesture [16], *Un violador...* provides a compelling case study. The feminist impetus invites a layered auscultation of the sociocultural meanings woven into its gestural matrix. Moreover, its global resonance stresses its combative essence and the *conductive affectivity* of large ensembles of bodies mobilised for a common cause. Whilst all these aspects warrant thorough examination (and much scholarship has engaged with them [51]) our focus centres on how gestural technologies contribute to analysing these prism-like interventions, encompassing everything from kinaesthetic identification to viral media propagation.



Figure 4: Pointing (b) and voice-occluding (d) gestures in Cartagena and Mexico City (2019), respectively.

To this end, an intermodal analysis of the collective movements was conducted with the ‘Motiongram’ [23] tool and an

²<https://youtu.be/7xqwy3ELlBY>

³<https://letraschile.com/colectivo-lastesis/un-violador-en-tu-camino>

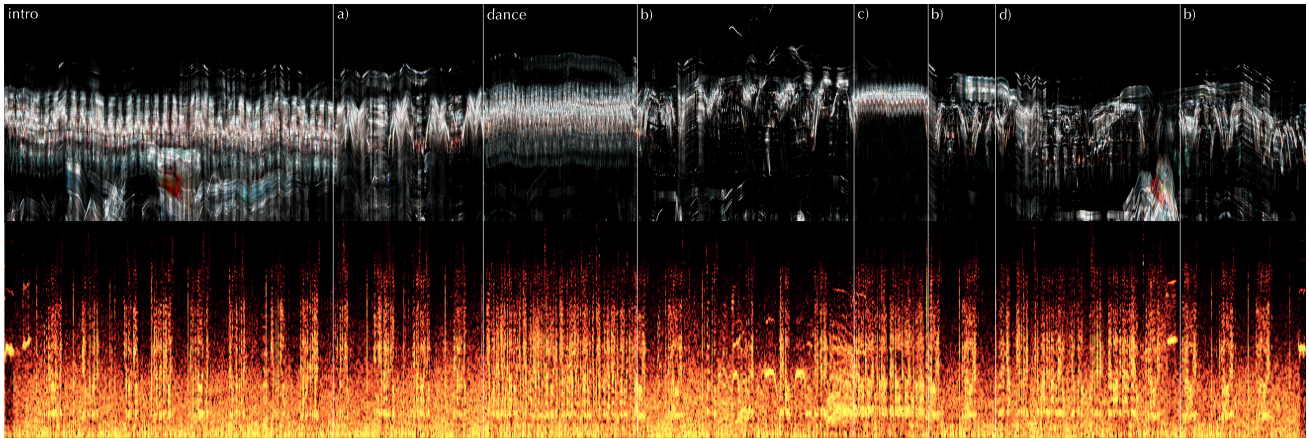


Figure 5: The vertical axes over the graphics reveal the structural alignment between motion and sound.

audio spectrum visualiser synced to a video recording of *Un violador...* in Viña del Mar, Chile (2020).⁴ Building on an understanding of the overarching context, the more nuanced aspects of semiosis, sociocultural significance, and political intent were incorporated into this mixed-methods approach to support a thorough evaluation of the data conveyed. Figure 5 reveals the gestural components of the performance as follows: a) the gesture of crouching, alluding to sexual assault against women during police arrest amidst the revolts (and the Pinochet Dictatorship); b) the gesture of pointing with the finger; c) the gesture of raising a clenched fist; and d) the gesture of covering the mouth.

Despite the symbolic density of this gestural repertoire, its multimodal somatic dimensions enable us to identify distinct sections structuring the choreography: (intro) the general contours of the group of approximately 30 participants oscillating pendulously; (a) an ‘X’ shape corresponding to the crouching gesture; (b) increased, recurring kinetic intensity linked with dance, combined with upper curved contours that signify the fixed, pointing gesture parallel to the declamations; and (c), a compact, repetitive contour associated with the raised fist. Notably, (d) proves more ambiguous, which can be attributed to the low kinetic energy and the limited physical action employed.

Turning to the semantic dimension of gestures reveals that the less distinctive shapes and patterns are often aligned with body postures that rely heavily on iconic and paralinguistic relationships. A key example is the act of pointing a finger (b) whilst blindfolded and shouting in unison “The rapist is you!” This gesture symbolises accountability, targeting those responsible for institutional gender violence—police officers, judges, and the president. Likewise, it can be read as a direct rebuke to the public to raise awareness about the role we all play as voices with the agency to either condemn or be complicit in this form of violence. Going back to the Motiongram, the contours reveal a scanning of the crowd with the finger, suggesting some degree of interplay between the kinetic, acoustic, and semantic components with regard to breadth or scope [21].

A less clear relation occurs at the end of the performance, with the paraphrastic singing of lines taken from the Chilean police anthem. Interestingly, whilst covering the mouth (d) may suggest amplification, akin to Aleksandr Rodchenko’s “Books!” (Книги!), it actually teases a metonymy of voice suppression typical to Chilean body language. Here, the hand’s placement

signifies selective communication, directing the message toward a specific audience whilst excluding others—namely, the police. Notably, this gesture’s contours are among the least revealing in the motion-audio analysis, particularly due to the performers maintaining a firm, stationary posture.

With initiatives such as *Un violador...*, the cathartic yet controlled use of the body exemplifies how an organised takeover of everyday urban life can diffuse boundaries within public and digital spaces, whilst simultaneously reinforcing emotional exchange among collective bodies. In a similar vein, the deployment of gesture analysis tools—coupled with nuanced contextual sensitivity—constitutes an affirmative riposte to surveillance technologies that seek to constrain, rather than construct, new realities amongst people.

4.2 Case 2: Embodying corpora

Over the last couple of decades, numerous experimental works in NIME have engaged with ML-driven systems. Many of these navigate virtual data topologies that simultaneously grapple with the complexities of hyper-information and enable creators to circumvent physical constraints through telematic technologies. It can be argued that reimagining protest in these digital spaces opens up new avenues for civic sovereignty, selfhood and inclusion. And perhaps less evidently, but equally important: in such data-driven scenarios, personal media libraries (*small data*) can become affordances through deliberate design of creative interfaces [44].

Indeed, technological memory in intermedia spaces of revolt facilitates the formation of a shared history, fostering a sense of unity through eras and borders, even when we are physically distant. Gabriel Vigliensoni’s *Despertar telemático* (Telematic Awakening, 2019) [52], exemplifies this idea. Unable to pour unto the streets due to living abroad, he utilized various gestural and ML technologies to engage in a form of ‘telematic protest.’ The project consisted of three interrelated processes: sound design through the curation of a sound *corpus*, the consolidation of a gesture-sound interaction system, and the performance per se. The end result amalgamated diverse semantic and phenomenological layers of protest—a virtual yet affective space in which Vigliensoni could reconstitute micro-gestures of sound from bodily movements via concatenative synthesis.

⁴https://youtu.be/-pDZlZ6wq-0?si=CxQwQk_haVaA3vGv

Whilst *Despertar telemático* drew from various sources, including interviews and Salvador Allende's final speech, the majority came from field recordings of the revolts. The author employed *AudioStellar* to detect specific timbral qualities in short, pre-processed clips. These qualitative descriptors were then compressed using ML, enabling their organisation into clusters within a two-dimensional sound corpus. He then interacted with this corpus using a *Leap Motion* device, which captured his hand and finger movements through a cross-mapping scheme that entangled his chironomic gestures with the sound material.

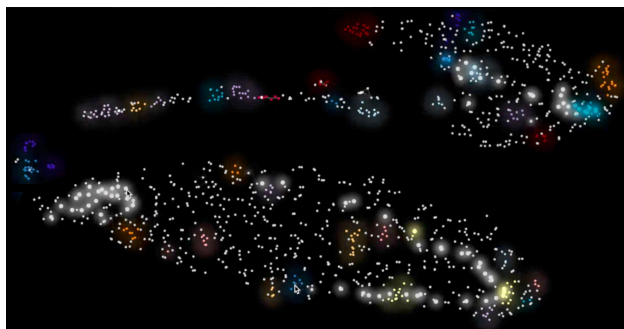


Figure 6: Revolts represented as a two-dimensional, scintillating sound corpus traced through the performance.⁵

As Ahn et al. note [3], navigation through such spaces becomes a compositional act in itself by the combination and reshaping of sonic shards and shackles. Interestingly, the sound corpus representation mirrored an aerial (or drone) view of a protesting crowd, where each distinct patch represented distinct sound classes—perhaps unwittingly evoking the experience of watching a manifestation from a screen. Thus, by being controlled through a highly abstract system operated via Vigliensoni's hands, the composition served as a sort of demiurgic, passive meta-gesture—an eminently posthuman form of chironomy. In other words, this topological representation of revolts effectively embodied a collective physical presence, generating dynamic data frontlines that expressed their shape through gestures that were not immediately apparent by aural means.

The relational complexity between physical gesture, performance space, and sound corpus plays a crucial role in the overall effect, particularly when viewed through a cyborg lens. Furthermore, the shifting quality of this interaction is accentuated insofar as the intention to “participate telematically in demonstrations” [52] is constantly challenged by its own virtuality. Of being everywhere and nowhere at the same time; or, for all intents and purposes, not being present at the site of direct action. This paradoxical—and assumedly frustrating—condition underscores the contemporary situation of teletechnological embodiment, which Nijenhuis [34] describes as being “at the centre of a world without relation to the ground, where the horizon as a natural limit of vision has been overcome by radars and satellites [and] we are transhorizontal [...], deterritorialized in the true sense of the word”.

After the sound design phase, Vigliensoni seeks to subvert this logic through the unrelentingly spirit of dance. He introduces a new layer of sound featuring a simple, pulsating techno beat with a minimalist arpeggiated melodic sequence.⁶ At this stage, the momentum accrued situates him in an environment

that is both virtual and physical, “as if he were fighting in the streets.” Conversely, the act of tracing aural landscapes in the air through an infrared device has less to do with the urgency of the gutter than with the pensive, and ultimately simulacral setting where these textures are crushed into sound collages of the revolts. Nonetheless, the artist's gestural performativity ex machina ultimately yields a dynamic process of hatching and re-territorialising sound in a particularly affective manner.

4.3 Case 3: Ecopolitics of gesture

Beneath all interpretations of gesture lies a rupture from normative dichotomies, underscoring the ontological continuity amongst mind, body, and environment. The final case study exemplifies this notion by examining sound, community and ecological awareness through cross-modal experiments and acoustic energy analyses carried out in a four-session workshop of three hours each. These sessions centred on noise pollution affecting a marginalised neighbourhood and its surrounding ravine ecosystem in the port city of Valparaíso (hereafter the *Ravine Project*⁷).

Brimming with paleobotanical treasures and historical artifacts, this neighbourhood also contains a major freight highway that links the port with inland areas. Due to significant traffic noise, in 2025 we developed the workshops in collaboration with a local ecoactivist organisation, using a ‘civic tech’ methodology to chart this and related concerns. This approach was born from the need for accessible artistic practices that leverage technology whilst also embracing lo-tech and *no-tech* strategies. In this case, the aim was to blend technology and activism by fostering group discussion, deep listening methodologies, in situ freehand sketches, affective accounts, and field recordings, among others. By the end of the workshop, participants and residents would feel empowered to voice their concerns about the highway, culminating in the creation of a group podcast.

In this context, and partly inspired by Feminist AI's XR Intelligent Protests (2016-2017),⁸ I began experimenting with a bespoke sound visualiser system known as the *Murzinograph*, [17]⁹ which is based on *small data*-friendly [53] convolutional neural networks. At its core, the *Murzinograph* maps spectrograms into a navigable, 3-dimensional latent space using autoencoders, thus probing the acoustic environment in ways that render our affective-perceptual responses to sound comprehensible at an intuitive level. In this case, by focusing on ‘ecotones’ (contrasting acoustic signatures within a same area), it provided spatiotemporal insights into how soundscapes are shaped by varying degrees of human and environmental intra-actions. By compressing these unfolding fluctuations, users are also able to generate synchronised animations.

As Rodrigues notes, the soundscape field has evolved significantly from documentation to creative output via basic editing and playback [42]. In this vein, I experimented by directly manipulating the field recordings to compress their temporality by $\frac{1}{4}$ and beyond, with and without pitch adjustment—essentially, an ‘aural timelapse’ of the areas. These modified recordings were then fed to the model, yielding slightly different shapes from the same original input—a form of data augmentation.

Notably, the visualisations offered an alternative method for bioacoustic monitoring when compared to traditional spectrograms and similar time–frequency transforms. In the workshop,

⁷For a detailed essay, see: <https://tsonamiediciones.cl/el-ruido-en-la-quebrada>

⁸<https://www.feminist.ai/intelligent-protests-1>

⁹<https://gustavoguzmancom.wordpress.com/murzinograph>

⁶<https://youtu.be/Big0K9GPWwM?si=PDZXj5y7cS0vnE>

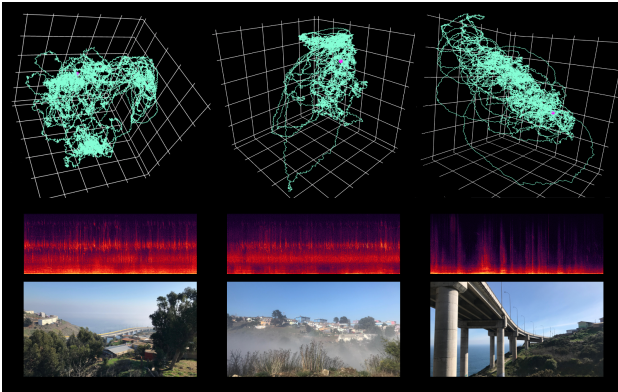


Figure 7: (left to right) High-diversity overall; higher intensity contrasts; and more evenly spread magnitudes.

which involved 12 participants with no prior knowledge of acoustics or signal processing, this turned out to be illuminating. The system provided a sort of ‘snapshot’ of sonic events, which reinforced conversations around the perceived continuity of certain sound forms based on trajectory and amplitude—e.g. trucks morphing into grunts, motorcycles into hummingbirds, and then atomised into grains of radio-like interference. Notably, a couple of the participants remarked how these perceptions correlated with the feeling of contour [20], demonstrating a particularly gestural understanding of the energetic nuances within the ravine.

Interestingly, the system’s output trajectories and shapes not only resembled some of the participants’ sketches of sound, but also highlighted a gestural dimension that underlies both our understanding of ‘vibrant entanglements’ and the machine’s own renderings through digital transduction—i.e. a practical rendition of Mazzola & Andreatta’s topological understanding of gesture as “the unfolding of formulae in space-time.”[33] In other words, by visually expressing the ecotonal entanglements conveyed through sound pressure waves, the Murzinograph harnesses on the gestural capacity of these trajectories within the latent space [9, 56].

The outcomes of these experiments highlight key insights in NIME on how to render Anthropocene disruptions intelligible by means of embodied user interaction [28]. As noted by Norman et al.[37], such forays represent a “shifting from interfaces to interfacing to create arenas for action”, rather than merely tools for predefined purposes. Moreover, whilst the Murzinograph is not devised for immersive interaction, it arguably aligns with Hyoju Ahn et al.’s account of other environmentally-centred interactive systems that successfully make invisible data perceptible through simple navigational actions in 3D space [3], translating environmental complexity into critical insights.

In its current form, the Murzinograph represents a modest step forward in ecological media research, offering a fresh perspective on the multiple layers of entanglement embroidered within an ecosystem. Nonetheless, this kind of practical development may be significant, as it helps to convey technologies aligned with an ecopolitics that rejects anthropocentrism, instead casting us as one set of voices within an ontology of continuities that does not distinguish between humans, technology, and nature.

5 Conclusions

There is still much to be done in the field of gesture. Whilst computational approaches frequently treat gestural expressions as

abstract, isolated signals, the cases presented here emphasise their value within their social, ecological, and political contexts. They also caution against technocentric assumptions prevalent in NIME scholarship. That is to say, rather than prioritising metrics of kinaesthetic empathy [20] or animal ‘style transfer’ under the guise of interspecies communication [38], a holistic account of gesture may encourage more deliberative stances toward technological entanglement in our lives.

This is particularly evident in the Global South, where empowering communities to understand, manage and produce their data is ever more crucial, and digital resistance becomes an issue of mutual care. Chilean and Latin American artists, researchers, and technologists navigate unique obstacles that compel them to innovate, and the capacity for gestural technologies to amplify local discourse demonstrates how emergent forms of protest become possible—as illustrated by *Un violador...* and *Despertar telemático*. Likewise, integrating ML with lo-tech artistic practices can facilitate civic engagement and access for marginalised groups, as exemplified by the *Ravine Project*. Across these cases, embodied knowledge proves instrumental in exposing social ties and asymmetries of power.

The cyborg figure matters here precisely because its hybridity is not merely metaphorical but also material—and in this context, *gestus ex machina* constitutes a politics of resistance against technocratic impositions, weaponising its very hybridity as emancipatory praxis. Gesturing toward a Latin American Cyborgism therefore implies rethinking notions of sovereignty, identity and corporeality, raising issues in how we deal with gestural technologies and their modes of usage—which is ultimately the question of *what we feed to a given system and, more importantly, for whom and why*.

We will continue deploying strategies that dismantle technocorporatist narratives, underscoring the necessity for alternative visions of co-creation. In this landscape, the call to action is clear: re-embody, resist and engage with our futures through a communal lens, organising for the rapid shifts ahead. And whilst this paper has centred on signals, bits, and algorithms, I trust that many of the ideas presented will inspire alternative processes devoid of computational substrate. I invite practitioners to experiment with these ideas ‘offline,’ either through scores, drawings, choreographies, or whatever other creative means they devise to cultivate responsible, accessible, and politically attuned gestural relations. Free association, psychedelia, ritual, and magic are all more than welcome.

6 Ethical Standards

This paper complies with the NIME code of ethics and does not conduct any experiments involving human or animal subjects. The datasets employed to train the machine learning models were obtained from open-access repositories and from private data collections produced during workshops, with the informed consent of all participants.

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