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Composing the Unstable Self: Three Orders of Distributed Agency in the Halldorophone practice, between Post-instrumental Identities and Intra-active Negotiation

Abstract

This article examines from the perspective of practice-based research how the Halldorophone (an electroacoustic feedback instrument designed by Halldór Úlfarsson) can disrupt embodied biases inherent in traditional instrumental practice and enable new models of distributed composition. Drawing on Karen Barad's concept of intra-action and the feedback theory, I present an auto-ethnographic analysis of how the Halldorophone is able to generate a system of distributed compositional agency across human-instrument relations, compelling a shift toward a post-instrumental identity: a fluid subjectivity emergent from human-non-human collaboration rather than derived from mastery of a particular instrument.

This process stemmed from my residency as guest Composer at Elektronmusikstudion (EMS) in Stockholm in late 2023, which further developed into a research project, culminating with the release of the album *Electroacoustic Works* for Halldorophone (Karlrecords 2025).

Across this process, three orders of distributed agency emerged: the first, gestural interaction with the instrument during recording, where feedback systems possess autonomous generative capacity; the second, compositional interaction with recorded material processed through granular synthesis, structured as a continuous feedback loop between listening and intervention; and third, the performative interaction in acousmatic contexts, where I create laptop-based setups whose ultimate sonic outcomes remain unpredictable.

Through the analysis of my methodology and the resulting works, I aim to demonstrate how engaging with instruments designed for distributed composition offers performer-composers the means for liberating creative perspective from design-historical constraints while cultivating new relationships to agency, control, and artistic identity.

Introduction: The Problem of Embodied Bias

As a classically trained cellist, I spent decades internalising gestural vocabularies and technical approaches, establishing a somatic relationship with the instrument that was foundational to my identity as a musician. This embodiment was necessary for developing the technical proficiency required by my course of studies. However, when I began composing my own music, I discovered a troubling creative constraint: those same gestures inscribed in my body through years of training, repeatedly led me toward producing what I can only characterise as cellistic music, predictable music, circumscribed by the design-historical biases embedded in both the instrument and my embodied relationship to it.

Every time I approached the cello with a compositional idea, my hands already knew what to do. That knowledge became a creative foreclosure. The instrument's affordances, combined with my embodied expertise, closed off certain compositional horizons before I could even perceive them. This points to a broader condition facing performer-composers: how can we compose beyond the boundaries established by our instrumental training when that training constitutes our primary mode of musical thinking?

My research with the Halldorophone emerged from a sustained search for ways to liberate my compositional perspective from these inherited biases. The Halldorophone, I discovered, offered not merely a different instrumental perspective, but the opportunity for a fundamentally different ontological relationship to instrumental practice itself, one that distributes compositional agency between human and non-human actors, without centralising it in the performer's intentionality.

This article presents an auto-ethnographic account of a practice-based research, initiated by my residency with the Halldorophone at Elektronmusikstudion (EMS) in Stockholm, and further conducted around the composition of a series of works, titled *Electroacoustic Works For Halldorophone*. I examine how the Halldorophone's design, developed by instrument designer Halldór Úlfarsson, and articulated through the principles of Feedback Theory, structurally enables what I will call distributed composition, and how engaging with this distribution system revealed the potential of a post-instrumental identity no longer anchored in mastery of historical cellistic techniques.

Central to my argument is the identification of three orders of distributed agency that operate across my practice with this material: first-order agency in gestural interaction with the Halldorophone during recording sessions at EMS; second-order agency in

compositional interaction with recorded material through granular synthesis in my Berlin studio; and third-order agency in performative interaction through acousmatic laptop-based setups whose sonic outcomes I cannot fully predict. These three orders demonstrate how distributed composition can be cultivated through instrument design and through the deliberate structuring of creative processes that resist total authorial control at multiple scales.

Theoretical Framework: Feedback, Intra-action, and Distributed Agency

Feedback Theory and the Halldorophone's Design Philosophy

Rooted in feedback theory articulated by Magnusson, Kiefer, and Úlfarsson (2022), the Halldorophone implements feedback as its core structural element. Each string's vibration is captured by dedicated pickups, amplified, and routed back through speakers in the instrument's body, creating recursive signal flows that circulate and accumulate complexity. In this design philosophy, such feedback systems possess "a life of their own" (Kiefer, Overholt, and Eldridge 2020), characterised by agency, autonomy, and unruliness. This agency transforms the instrument from a passive tool into an active participant that distributes creative authority across the human-instrument relationship.

The Halldorophone has been designed to open a channel of distributed composition between instrument and musician (Úlfarsson 2018), as an instrument that structurally redistributes compositional agency. As Magnusson, Kiefer, and Úlfarsson observe, the "unruly" nature of feedback instruments introduces "notions of resistance, conversation, collaboration, agency, autonomy" as new performative parameters (2022, p. 3). This design philosophy positions the Halldorophone within a broader field of self-resonating vibro-tactile instruments (SRIs) that have emerged in recent NIME (New Interfaces for Musical Expression) research, including Alice Eldridge and Chris Kiefer's Feedback Cellos and Adam Pultz Melbye's feedback-actuated Augmented Bass. What distinguishes these instruments is their fundamental reliance on feedback not as effect but as primary sound generation mechanism, creating what Eldridge, Kiefer, Overholt and Úlfarsson characterise as instruments that demand negotiation with "stimulating uncontrollability" (2021).

The structural redistribution of agency through feedback has been theorised independently in the ecosystemic practice-based research of Agostino Di Scipio, whose concept of the audible ecosystem frames sound as the emergent product of an entire system —the acoustic environment, the performer's actions, and the machine's behaviour— where no single element holds authorial primacy (Di Scipio 2003). This ecosystemic framing is particularly relevant for understanding the Halldorophone's design logic and the broader context of this research, since feedback structurally enrolls the environment and the instrument's material behaviour as co-compositional agents.

Intra-action and Material Agency

To theorise ontological implications of this distributed agency, I draw on Karen Barad's concept of agential realism and intra-action. Unlike interaction, which presumes pre-existing, bounded entities that subsequently engage with one another, intra-action describes a mutual constitution where boundaries between self and other, human and instrument, performer and composer are not given in advance but enacted through ongoing material engagement (Barad 2007). This framework helps articulate why the Halldorophone disrupted my compositional constraints in ways that simply "trying to play differently" on the cello never could. With traditional instruments, the relationship remains fundamentally hierarchical: the performer executes compositional ideas through an instrument serving as tool or medium for human intention. The cello, in this sense, is designed for a particular distribution of agency. Its design history, from gut to steel strings, from baroque to modern bow, from being held between the calves to endpin-grounded positioning, encodes specific performance practices, repertoires, and sonic/cultural expectations. When I play it, I activate centuries of design decisions that shape what becomes thinkable, playable, composable.

The Halldorophone refuses this hierarchical distribution. Its feedback system means that control cannot be centralised in the performer. Instead, agency is continuously negotiated between human and non-human elements. I can propose sonic conditions (tunings, gain levels, initial gestural prompts) but what emerges depends on the instrument's material response, which then shapes my next intervention, which alters the system's behaviour, generating recursive loops of mutual influence. This is a negotiation (not interpretation) that my embodied cello technique cannot dominate because the cause-effect relationships I have internalised through my decades long practice on the cello simply do not apply.

Methodology: Three Orders of Distributed Agency

My engagement with the Halldorophone material operates across three distinct, yet interconnected orders of distributed agency, each characterised by different modes of control, unpredictability, and collaboration between human and non-human: the first one emerging from direct instrumental practice, the second from studio practice, the third from performative practice. These three orders constitute an ecology of creative practice where agency is continuously negotiated at multiple scales and through different temporal frames. Specifically, the context of this configuration resonates with what Di Scipio and Sanfilippo defined as ecosystemic agency in live performance, where agency is understood as distributed across the entire signal chain—instrument, processing system, performer, and acoustic environment (Di Scipio and Sanfilippo, 2019). Where their practice is grounded in the signal environment, my

three-orders ecology extends this principle across temporally distinct stages of composition, studio processing, and performance.

First Order: Gestural Interaction and Real-Time Negotiation



The Halldorophone at EMS
©Martina Bertoni 2023

At EMS Stockholm, I worked with a Halldorophone featuring four main strings and a set of four sympathetic strings, each with dedicated electromagnetic pickups routing signal to a double speaker system integrated into the instrument's body. This first order of distributed agency emerges in real-time gestural interaction with the instrument's feedback systems.

My methodological approach involved deliberately abandoning traditional cellistic techniques to engage the instrument's agential capacities. Rather than approaching the Halldorophone as a cellist would approach a cello, I approached it as a generative organ. I tuned the strings according to harmonic series relationships, employing tetrachordal scales across the four main strings and sympathetic strings, to establish fields of resonant potential. These tuning structures created the conditions under which feedback could trigger and sustain itself.

My primary interface became the signal faders rather than bow or left-hand technique. By modulating gain levels for individual strings, I could control the threshold at which feedback ignited and the complexity of resulting interactions. This shifted my role from executor of predetermined gestures to curator of emergent sonic behaviours. When I did employ physical interventions (minimal string strumming or plucking) they functioned as perturbations to initiate or redirect the feedback system rather than as direct methods of sound production.

The predictable relationship between gesture and sonic outcome, the very mechanism that had constrained my previous compositional experiences, was severed.

At this first order, agency is distributed between my actions —tuning choices, fader movements, occasional physical perturbations— and the instrument's material behaviours —feedback accumulation, harmonic resonances, threshold dynamics. I cannot predict precisely what will emerge, yet I am not passive, indeed I am actively negotiating with a system that possesses its own generative logic.

Second Order: Compositional Intra-action and Processing / Recording Process and Material Traces

The Halldorophone I used featured a dual speaker system (no line output). I recorded the sounds using two microphones (Neumann KM183) positioned in one of the EMS recording rooms, meaning that the raw recordings present traces of room acoustics, and audibly, my body sounds (breathing, minimal movements around the instrument). These sounds constitute evidence of the performer's body within the space, in the process of negotiating with a machine, and are the material traces of the enacted embodied collaboration.

[Halldorophone Raw Recording Excerpts Link](#)

Granular Synthesis as Second-Order Agency

Following the EMS residency, I returned to Berlin where I re-arranged and processed the recorded material through digital processing. As a main tool I used granular synthesis. This introduced a second order of distributed agency: compositional interaction with already-collaborative material, structured as a continuous feedback loop between listening and intervention. Using Robert Henke's Granulator (Max4Live, Ableton Live), I could isolate individual feedback events and expand them at micro-sonic scales, stretching their internal structures, foregrounding harmonic components barely audible in the original recordings, recombining and re-contextualising the material the Halldorophone and I had generated together. Crucially, this process was not one of detached authorial shaping. Each granular transformation produced outcomes that I could not fully anticipate — subtle artefacts, emergent textures from extreme time-stretching, unexpected harmonic relationships revealed through microscopic examination of waveforms. What I heard in each moment dictated the course of my next action. The boundary between my decision-making and the material's behaviour was not fixed in advance but continuously enacted through this listening-responding cycle. This is where the Baradian logic of intra-action extends into the studio. Rather than a hierarchical relationship in which I stood outside the material and reshaped it according to predetermined intentions, the second order involved mutual constitution: the sounds were conditioning my choices as much as my choices were conditioning the sounds. The Halldorophone's agency — its unpredictable resonances and threshold behaviours — remained embedded in the recorded material, and continued to exert agential pressure through the granular process. I was not escaping that distributed agency, I was operating within it, at a different temporal scale and through different



The Halldorophone recording set-up at EMS ©Martina Bertoni 2023

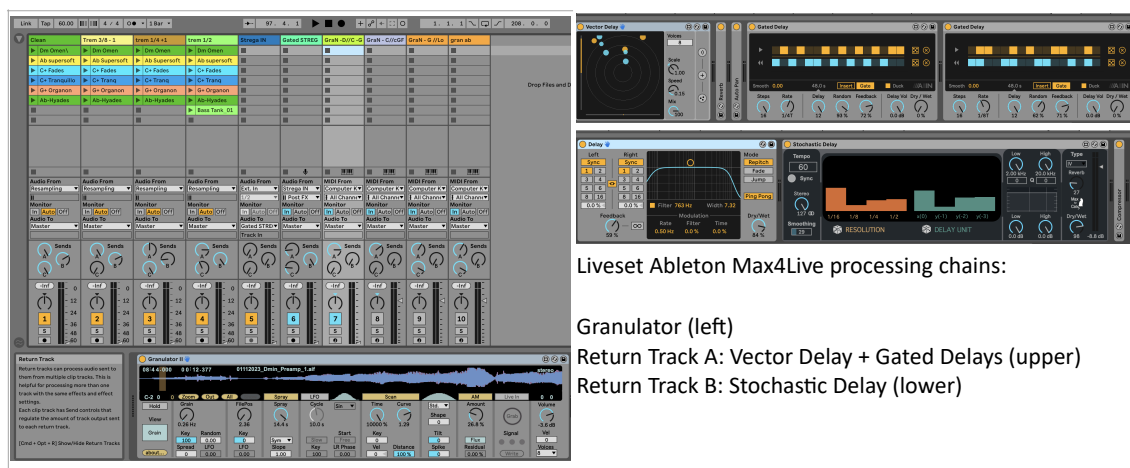
material means. At this second order, the intra-active negotiation shifts from real-time gestural exchange to a slower, iterative loop of transformation and response. The unpredictability does not diminish, it migrates into the granular process itself, producing outcomes that resisted total determination and that I could not have composed through intentional design alone.

Third Order: Performative Interaction and Acousmatic Unpredictability

The third order of distributed agency emerged in the context of live acousmatic performances of this material. I have developed a laptop-based setup for performing these works where I create systems whose ultimate sonic outcomes I cannot fully predict.

The performance system operates through Ableton Live 11 and controlled via MIDI, where each raw Halldorophone recording plays simultaneously through multiple parallel processing chains. The material is routed through Robert Henke's Granulator (Max4Live device), which I control via MIDI, but with parameter ranges that allow for drift and autonomous behaviour (grain size 20-ms, spray /random deviation of grain position set at 100%). All these materials are then processed through three return FX tracks featuring respectively:

- Three simultaneous gated delays (Max4Live device that creates sequenced gated effects based on probability algorithms), and a generative device where delay parameters modulate according to generative algorithms (Max4Live/ Vector Delay by Dillon Bastan).
- A stochastic delay based on semi-random stochastic patterns (Max4Live/ Creative).



Liveset Ableton Max4Live processing chains:

Granulator (left)

Return Track A: Vector Delay + Gated Delays (upper)

Return Track B: Stochastic Delay (lower)

I set probability thresholds, I can control the amount of signal I am routing, but I have no control on how the delay networks will cascade, combine and accumulate. The acoustic properties of each performance space function as active agents co-constituting the sonic outcome. Each venue brings distinct acoustic signatures, speaker

configurations, and audience presence — material conditions that interact with the processed Halldorophone recordings in ways I cannot anticipate nor control. Thus the space becomes active participant in the unfolding of the performance. In Baradian terms, the boundaries of the performing system (where my setup ends and the room begins, where the composed material ends and the live acoustic environment begins) become extremely permeable. They are enacted differently in each performance context, producing outcomes that are singular and non-repeatable.

This is what distinguishes the third order from a mere generative playback. The stochastic and probabilistic processes I have built into the setup do not simply produce random variation within a closed system. They interact with an acoustic environment that is itself active, variable, and responsive to the presence of an audience. Over performance durations of typically 45 to 50 minutes, elements like feedback accumulations, spectral reinforcements, and rhythmic convergences that I could not have predicted or composed in advance — all emerge. Each performance holds a unique identity, emerging from the intra-action between source material, processing architecture, and real-time decisions, remaining open to outcomes that exceed my intentions.

This third order completes a recursive cycle: I am simultaneously composer (having designed the system), performer (making real-time decisions within it), and listener (discovering what emerges from the intersection of system, space, and audience). The intra-active logic that structured the first-order negotiation with the Halldorophone and the second-order studio process here extends into the performance situation itself, enrolling the acoustic environment and audience presence as material agents in the constitution of the work. At each stage, agency is negotiated differently, producing a high degree of unpredictability, establishing a commitment to resist total authorial control.

This approach to performative system design aligns with Sanfilippo's development of time-variant infrastructure for autonomous music feedback systems, where higher degrees of complexity emerge from dynamical adaptivity (Sanfilippo 2018). A distinction, however, lies in the source material: where Sanfilippo's systems generate complexity from within the signal architecture itself, my third order circulates material that embeds the Halldorophone's first-order agency. The performance system becomes a further layer of distributed authorship, rather than its originating site.

[Electroacoustic Works For Halldorophone Album Link](#)

Three Orders as Ecology of Practice

These three orders of distributed composition constitute an ecology of creative practice. The first-order negotiation with the Halldorophone generates material that already embeds distributed agency. The second-order operates on the sonic

substratum of this collaborative material (the compositional level), introducing new layers of transformation, by extending and transforming the instrument's distributed agency through recursive layers of compositional and performative engagement. The third-order acousmatic performance circulates this multiply-authored material through new systems of unpredictability. What emerges across these three orders is a sustained practice of cultivating conditions for surprise, for outcomes that exceed intentions. It is important to stress that this is not to be intended as an abdication of creative responsibility but rather a deliberate methodology for liberating the compositional perspective from the foreclosures of embodied habits and design-historical constraints.

Discussion: Toward Post-Instrumental Identity

The engagement with the Halldorophone across these three orders of distributed agency precipitated what I can only characterise as a productive identity crisis, necessary, and profoundly disorienting. For years, my relationship to composition had been haunted by a relativistic ontology: I was "a cellist who composes." The noun defined me. Composition remained an activity determined by articulating a culturally and historically framed relationship. This hierarchical framing meant that when I composed, I composed as a cellist, with all the attendant biases.

Working with the Halldorophone across multiple modes of distributed agency, I could no longer sustain that identity. The instrument demanded a different kind of subjectivity: one no longer defined by mastery of technique, anchored in a defined instrumental tradition and established gestural vocabularies. The multi-scalar engagement with distributed composition revealed that a post-instrumental identity emerges through a commitment to distributed agency as methodology.

The term post-instrumental identity appropriately addresses this emergent subjectivity. Post-instrumental is not to be intended in the sense of "after instruments" or "beyond instruments," rather it indicates that identity is no longer derived from, or reducible to a particular instrument and its history. This identity is fluid, processual, and constituted through each encounter with systems designed for multi-scalar distribution of agency.

Distributed Agency as Creative Methodology

What the three orders reveal is that, in order to address one of the potential constraints facing performer-composers (the foreclosure of compositional imagination by embodied instrumental technique) distributed agency can be established and cultivated as a creative methodology that extends beyond instrument design. While the Halldorophone's architecture structurally enables first-order distributed composition, one can extend this principle by:

- Extending the distribution to the compositional actions, where transformations of source material cannot be fully predicted.

- Designing acousmatic performance systems, that introduce generative processes whose outcomes remain partially autonomous.
- Embracing the unpredictability at each stage.

This methodological commitment to distributed agency offers a response to the constraint of embodied bias. Rather than unlearning cellistic techniques or denying my training, I engage with systems (instrumental, compositional, performative) that prevent my embodied knowledge from foreclosing creative possibilities. The cello's design-historical biases remain inscribed in my body, but their deterministic nature becomes insufficient when confronting instruments and processes designed for autonomy.

From Mastery to Negotiation

Traditional instrumental pedagogy cultivates mastery as the ability to execute intended gestures with precision, to predict and control sonic outcomes, to minimise unpredictability. Post-instrumental identity is about generating responsiveness to collaborative process. It requires cultivating different capacities

- **Attentive listening to autonomous behaviours**, transcending the focus on execution.
- **Strategic intervention at moments of threshold and instability**, eliminating the need for continuous control.
- **Curatorial sensibility in recognising emergent potentials**, beyond compositional determinism.
- **Comfort with surprise**, as a positive byproduct of transforming performative anxiety about unpredictability.

Implications for Performer-Composer Practice

In the case of this auto-ethnographic analysis, the Halldorophone provided the initial disruption. Subsequently extending this network of distributed composition into studio processing and live performance created an ecology where no single stage permits total authorial control. This recursive distribution of agency across first, second, and third orders proved capable of generating creative outcomes that exceeded my intentions while remaining products of my deliberate methodological choices.

For performers-and/or-composers struggling with similar constraints (historical, gestural, compositional biases), this framework aims to suggest potential strategies to overcome difficulties in artistic practice: seeking instruments designed for autonomy, developing compositional processes that resist predictability, creating performance systems that transgress their designers' expectations. The goal is to distribute agency

across human and non-human agents in ways that open and expand creative possibilities.

Conclusion: Distributed Composition and Creative Futures

This practice-based research aims to contribute to the ongoing discourse on how instruments, through their materiality, design affordances, and constraints, actively participate in constituting musical knowledge and practice. The starting point is that instruments are non-neutral tools, they are active agents shaping what becomes thinkable and makeable. Yet this research also reveals that distributed composition can be cultivated as methodology across multiple orders of creative practice. The Halldorophone exemplifies how an instrument designed around distributed agency rather than performative control can disrupt hierarchical relationships between performer and composer, between embodied technique and creative freedom, between human intention and material possibility. The extension of this principle to the recording studio practice and the performative space aims to demonstrate that distributed agency can become a creative systemic strategy, that deliberately structures and embeds unpredictability into multiple stages of artistic process.

The three orders identified (gestural interaction with autonomous feedback systems, compositional interaction with already-collaborative material, and performative interaction through partially unpredictable acousmatic setups) constitute an ecology, where agency circulates (not centralises). At each stage, I make deliberate choices that shape outcomes while ensuring those outcomes cannot be fully predetermined: this is a cultivation of conditions for discoveries that exceed authorial intention and for genuine surprise.

The unstable self I have cultivated through this work, the post-instrumental identity emerging from multi-scalar engagement with a system that distributes rather than holds control, becomes a condition embraced. It constitutes an ongoing practice of unlearning certainty, of allowing material agencies to genuinely participate in creative processes. My extension of this principle across compositional and performative domains suggests that this transformation can permeate entire creative ecologies (from studio to stage, from recording to live presentation, from human gesture to autonomous algorithmic process).

As we develop increasingly complex, responsive, computationally mediated instruments and creative tools, we have opportunities to design new distributions of agency, new collaborative ontologies. The question is how deliberately and systematically we choose to structure distributed agency into our practices.

For performer-composers specifically, this research aims to suggest a path through engaging with instruments and developing processes that prevent embodied techniques from becoming deterministic algorithms, by maintaining openness to

compositional surprise at multiple scales.

This research aims to offer an ecological model of three orders where unpredictability, collaboration, and autonomous material behaviours become productive conditions for creative work that genuinely exceeds what any single author (human or non-human) could achieve. Equally, the Halldorophone demonstrates what becomes possible when we design and engage with instruments to transform the very subjects we are capable of becoming.

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