

Enter_phase: Negotiated Agency with Live Electronics and Interactive Audiovisuals



Ilya Ziblat Shay
ziblatilya@gmail.com
Filmuniversität Babelsberg KONRAD WOLF,
Potsdam, Germany

Enter_phase is a live-electronics work featuring an interactive audiovisual interface. The system responds to sound input, processing and generating audio and rendering visuals in real time. The work establishes a reciprocal dialogue between performer and computer, where the musician both shapes and follows the audiovisual feed, and the audience witnesses the dynamic interaction with the interactive digital score. Patterns of rhythm, pitch, and input density form a visual data field that partially reveals the underlying machine-listening and audio-processing algorithms, while a live video of the performer adds a gesture-mirroring layer shaping real-time decisions. The work situates digital musical instruments as experimental platforms, exploring negotiated agency and performative materiality. Drawing on traditions of graphic and algorithmic notation, the work examines multimodal perception, highlighting how interactive audiovisual systems transform the production, experience, and understanding of music in computational media contexts.

Overview



Fig. 1. *Enter_phase*, version with zither.

Enter_phase is a live-electronics work that uses an interactive audiovisual interface. Implemented in SuperCollider, the system performs real-time audio generation and visual rendering in response to sound input. The work establishes a reciprocal dialogue between the human performer and the computer, in which the musician both shapes and follows the audiovisual feed, the latter acting as an interactive digital score. The audience witnesses the performer–system interaction through real-time audiovisual output. The work is suitable for any instrument or number of instruments (Fig. 1, 2), and xCoAx 2026 features a version for bass guitar.

Fig. 2. *Enter_phase*, live performance with Catchpenny ensemble (The Hague, The Netherlands).



Keywords: Interactive Audiovisual Systems, Live-electronics, Human–computer Interaction, Digital Musical Instruments, Multimodal Perception, Digital Animated Notation.

A key feature of the audiovisual system is its three-way configuration involving musician, system, and audience:

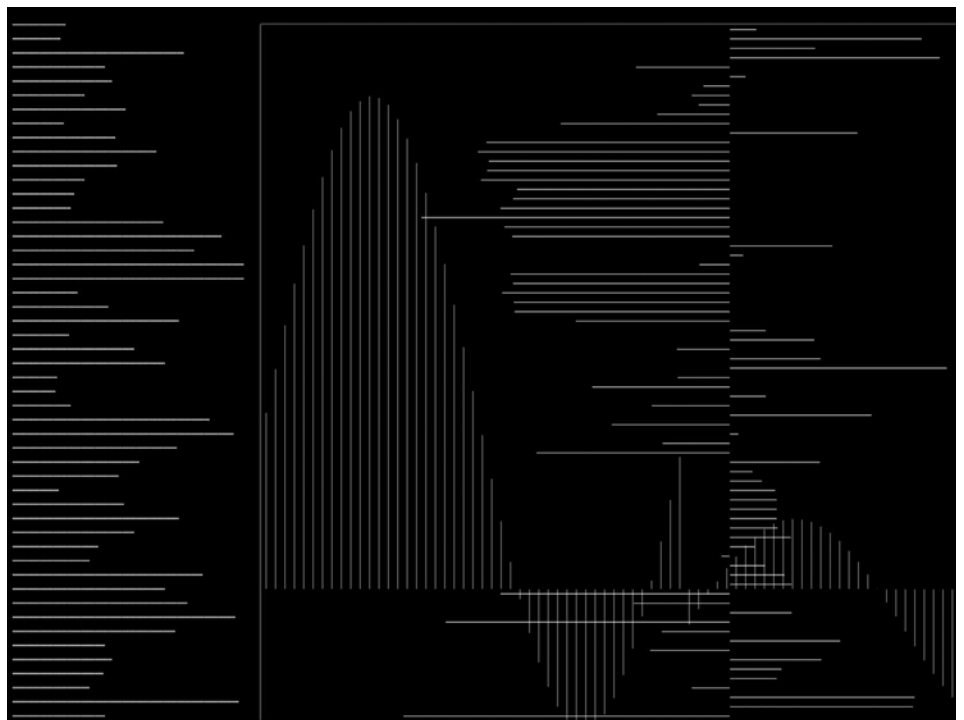
- The computer analyses audio input, rendering it as visual data while simultaneously generating sound;
- The audiovisual feed acts as an improvisational interlocutor: the musician responds to the sounds and visuals while generating sounds that are fed back into the system;
- The audience experiences this exchange through the visual and sonic environment.

This triadic feedback also informs the technical side of the discussion: how the machine-listening algorithms register the input, how the digital audio is being processed, and how the audiovisual mapping shapes the performance.

The Control Interface

The interface affords a sense of agency over the system's responsive features. It visualises the underlying machine-listening algorithms as continuously updated patterns of rhythm, pitch, and input activity. In [Fig. 3](#) (left panel), rhythm is represented by vertical lines whose length corresponds to inter-onset intervals (time between detected onsets, in milliseconds). Pitch is visualised on the right panel as horizontal lines whose length corresponds to frequency (Hz). Input activity is shown on the right panel, where vertical lines above and below the “equator” indicate accumulated onset density. This data matrix is generated from a circular buffer – a continuously overwriting collection of stored values. The audio-derived data drives live processing, including FM synthesis parameters and the rate of triggered events, as displayed in SuperCollider's post window ([Fig. 4, 5, 6](#)).

Fig. 3. The visual data interface in SuperCollider.



Negotiated Agency, Between Control and Interplay

The algorithmic processes draw on a complex array of sonic materials and structural relationships, creating a live-electronic environment that the musician inhabits. Together with the audiovisual interface, the performance becomes a form of navigation within a musically responsive system. The music unfolds along an emergent, ever-evolving path, rather than following a procedural execution of an interactive experiment.

While playing (with) the system, I experience a constructive tension between exercising a more instrumental control over the system and focusing on the musical and improvisational interaction. I often find my attention divided between these two different performance modalities. On the one hand, agency over the interactive features of the system is explored: the audiovisual interface reinforces this dynamic by encouraging the exercise of control over the computer through reading the visual interface and shaping the output sound by “administering” recorded data. On the other hand, I also recognise a different kind of interaction, which is based on sonic gestures and constitutes an improvisatory interplay with the computer. This latter mode requires, in a certain sense, setting aside the more immediate visualisation of my gestures; instead, I find myself working towards creating an emergent musical form that combines my own sounds with those of the computer. The outcome of this constructive tension repeatedly surprises me in musically engaging ways. It positions the computer as a responsive counterpart that, while not human, operates through its own modes of listening, musical memory, and decision-making processes. The system becomes involved in the real-time structuring of the music.

In addition to the data matrix, a processed live video (in Processing language) of the musician can be integrated as a background layer. This layer is also subject to interactive, machine-listening algorithms: the higher the input’s activity or density level, the smaller the pixels become, so that, while at complete rest, the image is distorted through coarse pixelation (Fig. 4 and 5). Watching oneself perform produces a hypersensitive visual field – an additional layer of information that shapes decisions in real time. The entire process is also visible to the audience: a performative situation that exposes the inner workings of the processing algorithms while staging the musician’s self-observation, akin to looking into a mirror (Fig. 6).

Fig. 4 and 5. The musician’s processed image as a background to the visual data interface. Two pixelation rates, showing a more clear representation of the musicians, and a more abstract one.

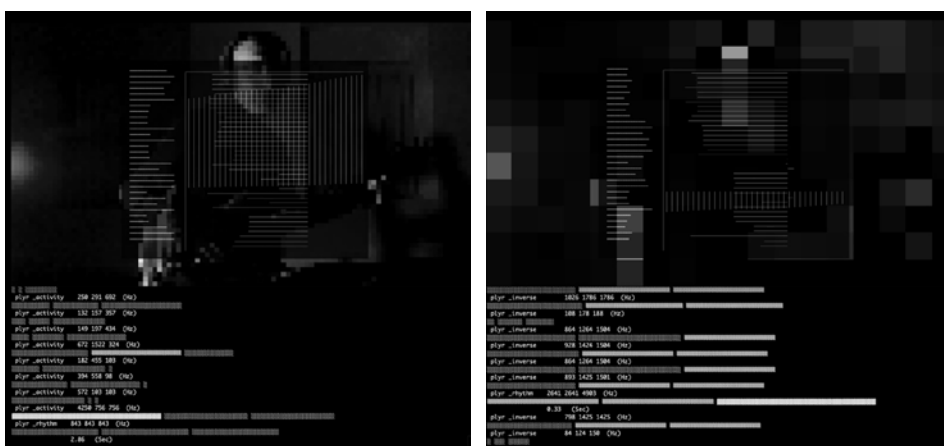


Fig. 6. The musician's image and the visual interface, with SuperCollider's post window as background.



Enter_phase serves as a case study for the role of interactive audio-visuals in shaping musical experiences: the visuals augment the sonic, mediating the real-time interaction taking place on stage to the listener-viewer. The computer acts as a connecting node between the performer's actions and the audience's perception, structuring a hybrid physical-digital space co-inhabited by both. Between the stage, the image of the musician performing, and the various data mappings (graphic representation, post-window text-based elements), an intermediate space is created, inhabited, and explored by both musician and audience; a space that functions as a site of negotiated agency and performative materiality.

Theoretical Discussion: Audiovisual, Multimodal Thinking

The work seeks to create a space – both artistic/experiential and conceptual/theoretical – for experimenting with audiovisual, multimodal thinking in composition and live performance. It engages with fields such as human-computer interaction and digital humanities by positioning artistic experimentation as an interdisciplinary mode of inquiry informed by ontological concerns. The basic assumption is that “the [audiovisual] interface is ultimately something beyond the screen, [...] a gateway that opens up and allows passage to some place beyond” (Galloway 2012). The capacity of interactive audiovisual systems to open up paths of experimentation and exploration makes them an ideal starting point for both technical and critical discussion. Also relevant here is the application of the term *diegesis* (originally from film studies), in reference to the “physicality of the link between sound and image [...] Diegesis is where audiovisual relations happen” (Boucher and Piché 2020). The performance observes the spatiotemporal universe, facilitated by the machine-listening and audio-processing algorithms, in which sounds and images are perceived as part of the same environment. An-

other relevant notion is the imperative to “make technologies visible: to pay attention to them, look for their presence, and engage with them critically” (Carvalhais 2022). The ways in which interactive audiovisual systems enable experimentation and exploration make them a productive site for this kind of critical discussion in digital media theory and creative computation. *Enter_phase* contributes to the critical discourse by examining the effect of seeing our own rendered image on screen on our sense of agency and behaviour.

Digital Musical Instruments and Performative Materiality

Likewise, the conceptualisation of digital musical instruments as experimental platforms for critical inquiry provides a theoretical framework that informs the discussion. Through questions of negotiated agency, the performance is situated as a site of knowledge production that frames digital musical instruments as epistemic objects rather than neutral tools, whose open-ended nature enables the emergence of further knowledge (see Rheinberger 2007). One related concept is the notion of handles, intended to confront the abstractness of the computer head on. Each link between performer and computer has to be invented before anything can be played. But these ‘handles’ are just as useful for the development or discovery of the piece as for the performance itself (Ryan 1991).

Another important notion is performative materiality, which “emphasises the production of a work as an interpretative event,” (Drucker 2013), articulating how objects and systems take shape through situated, interpretative practices. Both ideas demonstrate how digital music instruments should be understood as actants in the musical process – be it composition-through-coding or performance; as such, the work becomes a case study of both digital system design and computer performance practice, investigating how perception, interpretation, and decision-making are shaped by real-time computational mediation.

Interactive Notation, a Non-representational Approach

The work’s visual output brings into the discussion the topic of music notation. Historically speaking, interactive notation in music and media art emerged from early experiments that blurred visual design and sonic performance: for example Cornelius Cardew’s graphic scores that emphasised performer agency through graphic interpretation; Laurie Spiegel’s algorithmic-visual compositions with the VAMPIRE system; or Xenakis’s *Mycenae Alpha* created with the UPIC system, translating hand-drawn images into sound. These foundational works inform today’s screen-based and interactive tools, linking musical notation with the work’s interactive, digital animated and algorithmic environment.

Along these lines, *Enter_phase* suggests a non-representational approach (Boyd & Edwardes 2019, Hope 2025) to notation, one that seeks to exceed a direct and potentially over-simplistic relation between what we see and what we hear. As asserted by Croft,

if the mapping is too explicit, too transparently one-to-one, the result is not only tedious but may have the effect of shifting the procedural into the foreground, turning the piece into a lamentable ‘showcase’ of the technology (‘Look – I do this, and the computer does that!’). (Croft 2007)

In this sense, notation is explored beyond its traditional musical practice: as an interactive element, a hybrid monitoring display and a performance feedback, and as an actant in an emergent musical dialogue. The non-representational approach also becomes pivotal as a mediating platform between the stage and the audience. As Kyriakides asserts,

transparency is created between the score and the audience, where the code used by the musicians is shared with the listener. Whether the information that is shared with the audience is relevant or significant in any way in enhancing the experience of the work might be questionable, yet the possibility of sharing the blueprint of the music gives the audience the opportunity to engage in multiple ways. (Kyriakides 2026)

Notation functions as a tool for engagement and for negotiated agency – both between musician and computer, and between stage and audience. It unfolds a musical improvisatory path as an interpretative event (linking back to performative materiality), as much as it constitutes an invitation for the audience to engage with interactive technology through the audiovisual staging of machine listening.

Concluding Note

Coming back again to the tension between guiding the system and playing with it, *Enter_phase* explores the liminal spaces between the materiality of the audiovisual system, the way it interacts with a human musician, and the processed sound. By investigating the role of interactive audiovisual systems within the field of live-electronic music and contemporary/experimental composition practice, I aim to expand our perception and understanding of the links between sound and visuals, through a multimodal perspective – one that listens to and sees the world at the same time.

Links. The work is available online:

Enter_phase (bass guitar)

<https://vimeo.com/showcase/12207859?fl=so&fe=fs>

Enter_phase (various instruments)

<https://www.youtube.com/playlist?list=PLFpz7hZaBblhacuTTrgff-CHeFK9dZTgk3>

References

Boucher, Myriam, and Jean Piché.

2020. "Sound/Image Relations in Videomusic: A Typological Proposition." In *Sound and Image: Aesthetics and Practices*, edited by Andrew KnightHill. Routledge.

**Boyd, Candice P.,
and Christian Edwardes, eds.**

2019. *Non-Representational Theory and the Creative Arts*. Palgrave Macmillan.

Carvalhais, Miguel.

2022. *Art and Computation*. V2_Publishing.

Croft, John.

2007. "Theses on Liveness." *Organised Sound* 12 (1): 59–66. <https://doi.org/10.1017/S1355771807001604>

Drucker, Johanna.

2013. "Performative Materiality and Theoretical Approaches to Interface." *Digital Humanities Quarterly* 7 (1). <https://www.digitalhumanities.org/dhq/vol/7/1/000143/000143.html>

Galloway, Alexander R.

2012. *The Interface Effect*. Polity Press.

Hope, Cat.

2025. "Why Animated Graphic Notation? (Part 1: Reading a Line as Music Notation)." cathope.com. Accessed May 12, 2026. <https://www.cathope.com/blog/2025/whyanimatedgraphicnotation1>

Kyriakides, Yannis.

2026. "Beyond Paper: Attributes of the Media Score." Exposition no. 3298908. Research Catalogue. <https://doi.org/10.22501/koncon.3298908>

Rheinberger, Hans-Jörg.

1997. *Toward a History of Epistemic Things: Synthesizing Proteins in the Test Tube*. Stanford University Press.

Ryan, Joel.

1991. "Some Remarks on Musical Instrument Design at STEIM." *Contemporary Music Review* 6 (1): 3–17. <https://doi.org/10.1080/07494469100640021>