

Co-Creative Practices in AI Improvisation: Redefining Agency in a Solo Performance

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Abstract

This paper examines human-AI co-creation through a hybrid solo performance for double bass, modular synthesizer, and Somax2 (IRCAM). Built in Max/MSP, the system integrates corpus-based artificial agents that act through analog oscillators, MIDI corpora and audio corpora. Using a practice-based approach, the work connects performance theory, interaction design and technological development, focusing on the negotiation of autonomy between human and machine. Rather than treating the system as a tool for unidirectional control, the performance frames agency as an emergent relation between instrumental gesture, machine listening, and algorithmic response. It addresses the performer's shift from controller to meta-improviser, outlining strategies for adaptive behavior, real-time corpus recording, and distributed musical decision-making. Ultimately, this work contributes to the discourse on embodied cognition, liveness and contemporary human-AI musicianship.

1 INTRODUCTION

In my practice as a double bassist and electronic musician, a need has emerged to move beyond the rigidity of traditional interactive systems toward a more flexible, co-creative dialog. This performance explores the use of Artificial Intelligence (AI) agents to manage complex electronic environments within a solo context, while preserving the improvisational freedom required for spontaneous musical expression.

The work is situated within a lineage of computer-assisted improvisation, live electronics, and interactive music systems, from George Lewis' seminal *Voyager* (Lewis, 2000) to contemporary generative environments such as Omax, ImprobeK (Nika et al., 2017) and Somax (Assayag et al., 2024). Within this field, the central issue is not only how a system responds to a performer, but how a performer learns to act within a dynamic ecology of human gesture, machine listening, memory, and sound generation.

A focal point of this work is the *negotiation of autonomy* (Deshpande and Magerko, 2024). Rather than claiming intrinsic machine agency, I approach agency as an emergent and relational condition: the artificial agents influence musical decisions through their capacity to listen, retrieve, transform, and propose sonic material in real time.

This practice-based study investigates how AI redefines the performer's role, shifting it from a *master-controller* to a participant in a distributed creative process. The paper contributes an account of meta-improvisation in AI-assisted solo performance, showing how formal control, instrumental gesture, and local machine autonomy are negotiated during live performance.

2 METHODOLOGY

The work is grounded in an interdisciplinary method that combines computer music, the phenomenology of performance, and interaction design. The case study is my solo

setup: a hybrid ecosystem of acoustic double bass, modular synthesizer, and laptop. Data collection is qualitative, based on a research journal and iterative analysis of rehearsals and public performances. The verbalization of this process follows two tracks: *autobiographical design* (Neustaedter and Sengers, 2012) and the phenomenological observation of artistic practice. In this framework, practice is not merely the object of study but the primary instrument through which new knowledge is generated.

3 PERFORMANCE ECOSYSTEM

In this solo performance the instrumentation forms a hybrid ecosystem: an acoustic double bass, an analog modular synthesizer, and a laptop hosting the control system. The double bass signal is captured via a condenser microphone and ceramic pickup, then split; one feed provides acoustic monitoring, while the other is routed to Max/MSP for real-time feature extraction and signal processing. The system uses *Somax2* (IRCAM) to manage the interaction. The extracted descriptors include pitch, chroma, and MFCCs, supplemented by custom descriptors for loudness, spectral centroid and onset density. While the native Somax2 descriptors enable the system to navigate its musical memory, the additional descriptors modulate timbral parameters in the modular synthesizer via CV, as well as performative parameters in the Somax2 players' configuration. This creates a triangular interaction structure — performer, computational agent, and electronic instrument — where sonic outcomes emerge from a continuous negotiation between human intent and algorithmic response. The software architecture comprises one *influencer*, which listens to the double bass, and four *players* acting as artificial agents. Two agents utilize MIDI corpora to drive the modular synthesizer's oscillators and gates, while two utilize audio corpora for rhythmic and melodic textures. The performance follows an open score that defines a macro-form, using textual and graphic instructions to guide the evolution of both human and artificial behaviors. A further feature of the system is the real-time corpus recording (available in

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Somax2 version 2.7). The system captures the live double bass input, allowing the AI to utilize fragments of the immediate past as an expressive language.

To manage this complexity while playing the bass, I utilize tactile and foot MIDI controllers (Intech EN16 and Morningstar MC6) to trigger behavioral presets and adjust the players' parameters. These interfaces help maintain the interaction as a fluid, physical dialogue rather than a static process.

4 DISCUSSION

Analysis of the research diary, conducted over a year, reveals a complex picture of co-creative dynamics. A recurring observation is the necessity for the performer to actively manage the system's macro-parameters. Since artificial agents do not autonomously reconfigure their high-level behavior, the performer must act as a *meta-improviser*, guiding the AI's state to ensure formal development. This produces a specific tension: the AI provides local, reactive autonomy, while the human manages the overarching musical narrative.

This reflection highlights the divergence between human and machine musicality. Somax2 operates through a logic of *syntax without semantics*; it follows surface relationships with the sonic flow — pitches, timbres, densities and temporal patterns — without access to the cultural or expressive meaning of the improvisation. To navigate this gap, strategies for the *autonomous reconfiguration* of player behaviors have been implemented, increasing the system's flexibility and unpredictability. These strategies include mapping specific audio descriptor values to parameter shifts, utilizing loudness and density thresholds to trigger behavioral presets, and the dynamic activation or deactivation of corpus regions according to real-time timbral analysis.

Consequently, playing with the system requires a state of *radical presence*. I cannot rely on fixed routines but I must continuously interpret the machine's behavior in order to align, contrast or redirect its proposals. This mindful listening develops through practice, directly impacting the performer's physical gestures. The result is a fluid spectrum of interaction: at times, I exert tight control over the environment; at others, I grants the AI the space to lead, accepting the unpredictability of its algorithmic logic as a primary creative driver.

5 FUTURE DIRECTIONS

This project shows how AI-assisted solo performance can be understood as a practice of negotiated agency. The performer's role expands from instrumental execution to the real-time regulation of an adaptive ecosystem, in which musical form emerges through the interaction of gesture, memory, and algorithmic response. Further development will involve the integration of neural networks and Variational Autoencoders (VAE) implemented via Python for the macro-control of machine behaviors. By navigating a learned latent space, the system could move beyond discrete presets toward a continuous, multi-dimensional mapping of performative states. This trajectory points toward a more symbiotic relationship, where the boundaries between human intent and algorithmic generation continue to blur in an increasingly organic, hybrid ecosystem.

REFERENCES

- Assayag, G., Bonnasse-Gahot, L., and Borg, J. (2024). Cocreative interaction: Somax2 and the reach project. *Computer Music Journal*, 46:7–25.
- Deshpande, M. and Magerko, B. (2024). Reframing computational co-creativity: An embodied socio-cognitive lens. In *Proceedings of the 15th International Conference on Computational Creativity (ICCC)*.
- Lewis, G. E. (2000). Too many notes: Computers, complexity and culture in voyager. *Leonardo Music Journal*, 10:33–39.
- Neustaedter, C. and Sengers, P. (2012). Autobiographical design in hci research: Designing and learning through use-it-yourself. In *Proceedings of the Designing Interactive Systems Conference (DIS)*, pages 514–523.
- Nika, J., Chemillier, M., and Assayag, G. (2017). Improtek: Introducing scenarios into human-computer music improvisation. *Computers in Entertainment*, 14.