



# Anastatica: a Musical Experience for Algorithm, Live Coder, and Audience

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*Anastatica* is a musical experience for musician, algorithm, and audience that combines performative elements with the characteristics of an installation. It explores, in real time, the relationship between human performers and generative algorithms, allowing them to interact constructively or destructively using the same language and influenced by non-deterministic factors. Each performance is thus laced with randomness. Through this interplay of acousmatic, aleatoric live coding, the piece questions the nature of artificial intelligence's involvement in modern society and the illusion of choice in the digital age.

**Keywords** live coding,  
artificial intelligence,  
algorithm, participation,  
installation, performance

## Description

There exists an intriguing tendency towards absolute automatization in the post-digital world. In its most extreme form, this phenomenon can birth dualism between humanity on one side and algorithmic, autonomous, and generative processes on the other. The effects of this ontological dichotomy are often subtle. Individuals are presented with rigid, fully formed choices, which provide nothing but illusions of action in limited domains. Most often, direct confrontations with real decisions are avoided through a person's submission to their own tools. But in those cases when the confrontation does happen, it entices various anthropotechnic manifestations, from augmenting cooperation to degrading disharmony. These philosophical and technical ideas behind *Anastatica* are explored in (Pošćić and Kreković 2020), while technical details and insights into the generative algorithm are described in (Kreković and Pošćić, 2021).

## The Performance

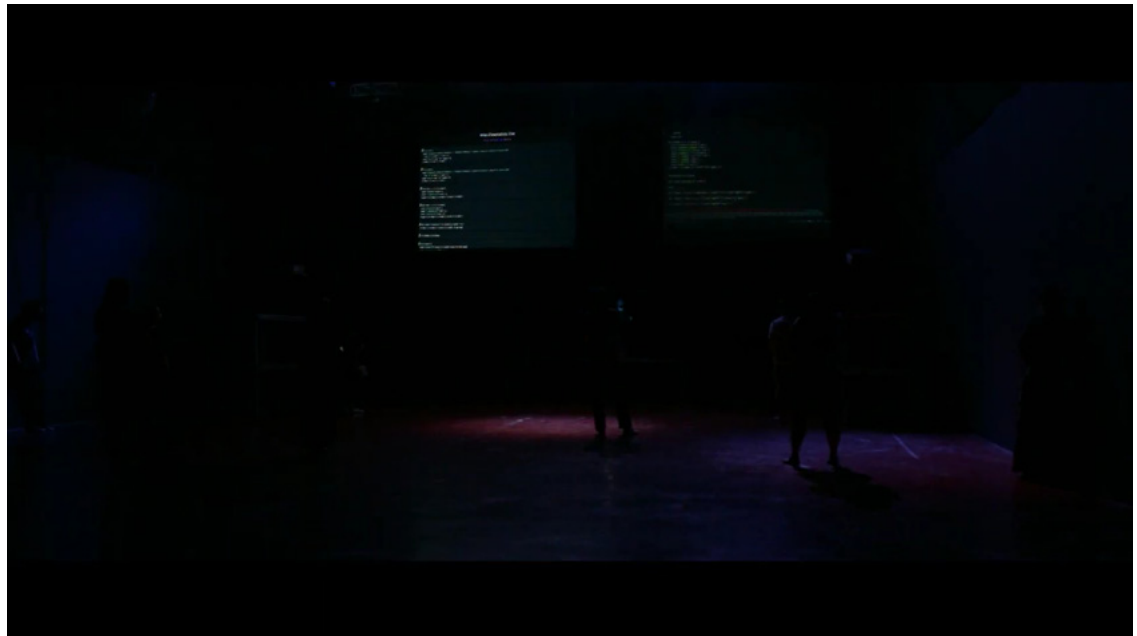
*Anastatica* is a musical experience which combines performative elements with characteristics of an installation. It is a real-time experience that draws from the relationship between humans and a generative algorithm. The algorithm generates lines of code that manipulate audio samples and create music. This seemingly endless generative process, which might start even before the audience is introduced to it, is joined by a human performer that improvises and alternately builds upon and destroys the generated music. Using live coding and other computer music techniques, the musician creates an accompaniment for the algorithm, switching his influence back-and-forth from a background to a foreground presence. They improvise and intervene in the algorithmic results, adapting to the ever-changing flux of machinic acousmatics and exploring various modalities in the relationship between harmony and disharmony. Meanwhile, the interactions between musician and algorithm are projected on a screen, as is common for live coding performances (shown in Figure 1).

At certain, partly random points, the performance opens itself for input from the audience via a web-enabled interface. Then, *Anastatica* becomes an interactive installation that extends the original duopoly into democracy and anarchy. The audience is given a chance to manipulate the computer-generated code, with the choice between augmentation and erosion left completely to each individual. The musician's role gradually fades, returning the performance to its original state of infinite algorithmic possibility.

Apart from the innermost source code makeup of the algorithm, the aesthetics of the performance are largely determined by the samples employed in the preparation process: audio recordings of a violin and electro-mechanic piano. By choosing these analog, organic and imperfect instruments, we clash the

rigidity and predictability of the algorithm with the flawed nature of the instruments, creating textures, harmonies, and rhythms. The end result is a novel musical experience, for passive and active audience members alike.

**Fig. 1.** An excerpt from the premier performance. Autonomously generated blocks of code are projected on a screen, while a human musician uses a separate instance of the same live coding environment. The audience changes selected parameters of the generated code using a web interface. (<https://youtu.be/2FsLpivJ8Fw>).



## Participation

The audience's participation is a crucial part of *Anastatica*. By observing combinations of electronic club music and academic tendencies, two metaphysically contrasting approaches can be identified in how humans interact with machines in the domain of music. Experimentation with various computer-human communication channels is the first of them. By employing techniques dictated by innovative interfaces, performers and their bodies are made to move and inhabit states which are unnatural and free of learned behaviors. This, in turn, encourages innovative modes of improvisation in live coding (Kreković and Pošćić 2019). Examples of such interfaces are the self-resonating feedback cello (Eldridge and Kiefer 2016) and various textile-based systems (McLean et al. 2017). The second trend in human-computer interactions is the employment of artificial intelligence to try and expand the spectrum of human capabilities on a cognitive-compositional level, where we find examples such as Holly Herndon's *Spawn* and resulting PROTO project (Sturm et al. 2019).

In its condensed form, *Anastatica* presents audience members with elements from both these approaches and gives them a chance to influence the performance directly. Each member of the audience can decide in which way to impact the performance, acting against or along with the algorithm and its non-deterministic variant of a pianola in the distilled role of Luigi Russolo's *intonarumori*. They do so using smartphones, via a two-way web interface piped

directly into the performance core. Depending on atmosphere and mood, the audience can derail the flow and act subversively against the musician and the algorithm, while participating in the creation of an interactive, extemporaneous installation. The outcome of the performance is indeterminate and context-dependent. It will vary depending on whether the collective mind veers towards dissolution or synthesis.

### Structure

A laptop computer is set on stage and generates music even before either the musician or the audiences enter the venue, giving them a sense of witnessing an installation with no beginning or end. Once the audience is seated, the musician appears and starts playing with and against the machine, influencing the algorithm itself by means of the laptop as a live coding interface. At specific times and intervals, the audience intervenes via modifications of generated code through a web interface. Ultimately, the musician leaves the stage, while the audience is left alone with the algorithmic ghost in the machine. Everything is in their control or perhaps nothing is. It's a short but endless segment. Curtain falls.

### Syntactic, Semantic, and Technical Considerations

The main idea behind *Anastatica* is to join humans and algorithms on a level playing field. This means that both organic and inorganic participants in the performance use and communicate through computer code that generates music. Under these premises, the choice of TidalCycles (McLean 2014) becomes an obvious one, due to its real time characteristics and compact syntax. Thanks to its architecture and orientation towards live performances, TidalCycles enables a human to express musical intentions in clear and traceable ways, while also being a language that's easily understandable to computers.

By "writing" TidalCycles code, the computer is no longer just an object. Instead, it becomes a subject that creates music, working on the same semiotic level as human participants. Here, computer code is in a natural position of shared medium between human and machine, but the specificity of *Anastatica* is the closeness of the participants' roles. The aspect of translating code into music – usually the main functionality of computers in music – becomes a corollary. It's the generative part that is key here, set in shapeshifting dynamics of antagonistic or complementary interactions.

Since it is expected that most audience members will not be familiar with TidalCycles, the web interface that exposes the inner workings of the generated code is simple and straightforward. It enables the modification of certain parameters or portions of the generated code and gives the algorithm the possibility to intervene in the audience's changes. Each modification is coupled with an

observable change in the music, dispelling audience suspicions that their actions might not have any real repercussions at all. Additionally, through the web interface, the audience can see which piece of code has been executed on a channel, modify it, change the sound of that channel, and implicitly influence where the algorithm takes them next.

Finally, while the performance does not question the basic extra-musical dimensions of live coding, it provides a peek into its inner workings, challenging the basic improvisational techniques contained in them.

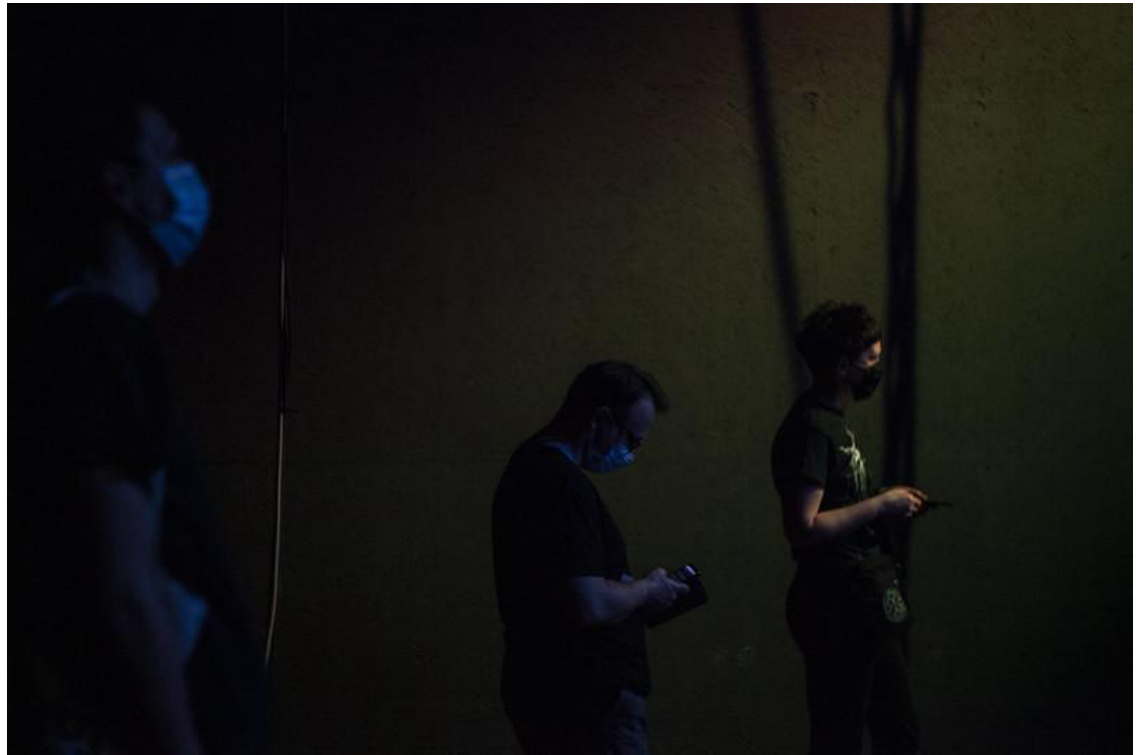
### Premiere Performance

Fig. 2. Photo showing the musician/live coder's screen and the web interface intended for audience interaction during the premiere performance of *Anastatica*.



*Anastatica* was premiered on July 4, 2020 at the Pogon Jedinstvo venue in Zagreb. Happening in the middle of the first wave of the Covid-19 pandemic, besides demonstrating the expected emerging interactions between performer, audience, and live coder (Grubor 2020), the performance also allowed for an interesting dynamic of distanced, mediated interactions during a time in which touches and physical contact became taboo. Additional photographs and videos can be found in the apposite appendix.

Fig. 3. Still from the performance video (<https://youtu.be/2FsLpivJ8Fw>) showing audience interactions.



Since each performance is inherently different due to non-deterministic elements and partly dependent on the personal and professional backgrounds of the audience, it's likely that the xCoAx's specific setting will lead to interesting and unexpected results in the outcomes of *Anastatica*. Frequented by a cross-section of artists, media theorists, philosophers, and engineers familiar with the field, the interactions and resulting flow will likely differ significantly when contrasted with previous performances in front of more general audiences.

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