TOWARDS A BORDER EMBODIMENT IN NETWORKED MUSIC

ALEJANDRO FRANCO BRIONES

Abstract (IT): Concettualmente ancorato agli studi critici sul confine e metodologicamente all'autoetnografia, l'articolo ripensa il significato dell'embodiment e dei confini nella Musica in rete (Networked Music, NM). L'articolo si articola in due parti. La prima esamina la letteratura sulla NM, analizzando la partizione strategica tra le pratiche interessate agli effetti emergenti delle reti, esemplificate dal live coding, e quelle orientate all'esplorazione della performance a distanza, esemplificate dalla musica telematica durante l'epoca pandemica. A partire da questa analisi, l'articolo indaga le forme di embodiment manifestate tanto dal live coding quanto dalla musica telematica: la convergenza di corpi in rete resi musicali e di corpi musicali resi in rete, che rivela come la crisi plasmi la NM in contrasto con la sua mainstreamizzazione. La seconda parte interroga la NM di fronte ai confini politici attraverso l'analisi di due casi di studio: in primo luogo, il progetto distribuito Indonesia-Scozia-USA Floating Gold; in secondo luogo, il mio ensemble in rete, Pirarán, che si estende tra Messico, Canada e, più recentemente, Svezia. Entrambi gli ensemble configurano la propria pratica musicale come una pratica che anticipa la mobilità: una pratica che si regge sullo spettro compreso tra l'interazione remota e quella in presenza. Nel caso di Pirarán, il metodo viene interrotto dalle restrizioni vistali, che costringono l'ensemble a un'embodiment spettrale, attraversata dal confine. In definitiva, questa analisi dimostra come la fragilità in rete — ovvero la crisi come metodo — e la crisi del confine si informino reciprocamente.
Keywords: musica in rete, musica telematica, live coding, corporeità, crisi.

Abstract (EN): Grounded conceptually in critical border studies and methodologically in autoethnography, the article reframes the meaning of embodiment and boundaries in Networked Music (NM). The article is structured in two parts. Part 1 reviews literature on NM examining the strategic partition between practices interested in the emergent effects of networks, exemplified by live coding, and exploring remote performance, exemplified by telematic music, during the pandemic era. From this analysis, the article analyses forms of embodiment that both live coding and telematic music manifest: the convergence of networked bodies rendered musical and musical bodies rendered networked – revealing how crisis shapes NM in contrast with its *mainstreamification*. Part 2 interrogates NM in the face of political borders through an analysis of two case studies: firstly, the Indonesia-Scotland-USA distributed networked project, Floating Gold, and, secondly, my own networked ensemble, Pirarán, which spans Mexico, Canada, and now Sweden. Both ensembles shape their music practice as one that anticipates mobility: a practice relying on the spectrum between remote and in-person interplay. In Pirarán's case, the method is interrupted by visa restrictions – forcing the ensemble into a ghostly embodiment traversed by the border. Ultimately, such an analysis demonstrates how networked fragility, or crisis-as-method, and border crisis inform each other.
Keywords: Networked Music, telematic music, live coding, embodiment, crisis.

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Networked Music stands at a paradox: while it produces tools, knowledge, and musical materials that challenge the need to gather in physical space for music co-creation, it also makes evident the fundamentally social and environmental character of music and how place is a determining factor in its development and enjoyment. In other words, networked music sustains a dialectical tension between copresence and tele-presence: a crisis that anticipates mobility regulated by border regimes. To clarify the problem, I refer to a text describing tele-musical performance between 1991 and 2007 by the composer Pauline Oliveros, in which ideological attributes of telematic music are revealed in the context of globalisation and neoliberalism:

> Why would anyone care to perform music between distant locations? If you are on the East Coast and the musician you want to perform with is on the West Coast then there is a reason. If it is possible to do such a thing then there is more reason. As the technology improves exponentially and ubiquitously then eventually there will be no reason not to perform music at a distance. Globalization gives us more reason. Making music together makes friends[1].

In this quote, a strange vision of a 'globe' divided into regions like a West and an East Coast emerges with ubiquitous technology that enables music-making friendship regardless of distance. But the world looked slightly different then. Overcoming the East-West division of the world from the Cold War but failing to consider the new

[1] Pauline OLIVEROS, *From Telephone to High Speed Internet: A Brief History of My Tele-Musical Performances* in «Leonardo Music Journal», Volume 19, MIT Press, 2007, p. 1.

division – North and South – requires asking to what extent Oliveros's globalised world appears as an idealisation rather than a concrete experience for all artists inhabiting it. After all, this narrative revolves around centres of cultural production in the USA: so, there is room to interrogate if the promises of telematic music – whether offered as a rhetorical gesture within a technical proposal or as a genuine aspiration – may be overstated.

Strategically, this paper breaks Networked Music into two overlapping streams. The first is live coding: music that foregrounds cybernetic integration, historically grounded in early computer experiments limited by the technology of the time, not necessarily remote. The second is telematic music: grounded in telephone-based performances before networked computing was viable, akin to the desire for distant connection. The former is concerned with networked structures, the latter with distributed performance – both shaping novel forms of music embodiment. As the Internet became central for everyday life, the interest in networked structures and the drive to perform at a distance overlap. Here such a convergence is termed Networked Music (NM). Considering these differentiated streams, NM produces turbulence that has become, more than an obstacle to be overcome or an anomaly to be solved, a method. Central to this method are movements measured as crossed thresholds. These movements manifest the impetus of NM for new musical forms and the technical ability of musicians to play with others at a distance. Beyond the challenges of the geographic distance and conceptual frontiers, NM's liminality-as-method carries an unavoidable political dimension: a border that must be crossed. This additional limit is built upon mechanisms that regulate mobility – not by building walls, but by having the border regime traverse bodies.

This article reviews literature on early networked and telematic music, as well as scholarship on NM during the COVID-19 pandemic, to demonstrate that the liminality-as-method of NM is largely evaluated by its capability to break formal or geographic limitations and thus to engender different forms of musical embodiment.

This criterion shapes NM as a frontier: expanding outwards, annihilating space through time. Yet it is precisely in these movements across spatial and sonic frontiers, through these transgressions of physical and conceptual boundaries, that the global disparities in boundary-crossing and embodiment are made apparent. This article argues that the field of NM necessitates a critical reimagination by foregrounding borders and mobility.

Grounded conceptually in critical border studies and methodologically in autoethnography, the article analyses the meaning of embodiment and boundaries in NM. The article is structured in two parts. In Part 1, the article reviews literature of NM exemplifying the partition referred to above and provides an analysis of live coding and telematic music during the 2020 pandemic crisis, paying particular attention to questions of embodiment in NM. In Part 2, the article interrogates NM in the face of political borders through an analysis of two case studies: firstly, the Indonesia-Scotland-USA distributed networked project, Floating Gold, and, secondly, my own networked ensemble, *Pirarán*, which spans Mexico, Canada, and now Sweden. Ultimately, such an analysis demonstrates how networked fragility, or crisis-as-method, and border crisis inform each other.

1. Networked and Telematic Embodiments

1.1 Early Networked Music and Telematic Music

This paper opens with a strategic partition between two strands in NM literature: early

networked and telematic music[2]. The League of Automatic Music Composers (LAMC), started in the mid-1970s, understood music as «a sonic representation of the behavior of an autonomous network; the interest of the work lies in nothing more than perceiving and enjoying that system's complex behavior»[3]. This music embraces emergence over idealised composition. Unlike telematic approaches, the network is agnostic to distance – albeit LAMC's technical limitations required copresence for feedback and immersion.

A key reference for telematic connections is Maryanne Amacher's *City-Links* (1967–1988), which used telecommunications to link two locations[4]. By juxtaposing distinct sound environments, *City-Links* collapsed places to create new aural environments, and the act of situated listening acquired a distinctly social character, interrogating embodiment and space-time in ways that would become urgent during the COVID-19 pandemic. Amacher's work, situated at the end of welfare state capitalism and the dawn of neoliberalism, exemplified the experimental promise of telematic connection fostered by the early 1990s' shifting geopolitical context. Unlike LAMC, Amacher used telecommunication, not computers, and her interest lay in connecting environments, rather than manifesting a network's emergent properties.

With the development of the Internet as 'ubiquitous' infrastructure, both research interests – to reveal a network's emergent properties and to connect distant places – have led to the creation of shared tools and strategies, making it increasingly difficult

[2] Eric C. LEMMON, *Telematic Music vs. Networked Music: Distinguishing Between Cybernetic Aspirations and Technological Music-Making* in «Journal of Network Music and Arts 1», 1, 2019.

[3] Tim PERKIS, *The League of Automatic Music Composers* in «History of the first computer network band, 1978-1983». Version of notes appearing with the 2008 New World LAMC CD release, 2008.

[4] Amy CIMINI, *Telematic Tape: Notes on Maryanne Amacher's City-Links (1967–1980)* in «Twentieth-Century Music» 14(1), 2017, pp. 93-108.

to distinguish one from another. As this convergence occurs, some limitations and affordances intersect: latency, digital compression, and transmission protocols. This general instability, rather than becoming an obstacle, is the condition that inflects the music making as a process. This is indeed how the field of NM is generally understood. NM encountered the COVID-19 pandemic drastically expanding the ability to create music on the Internet. As the field grows, it faces constraints that contrast in-person music-making conditions. This is a relevant observation in the context of the pandemic crisis, when in-person music-making was not an option.

1.2 Live Coding and Networks

Like LAMC, live coding organises as networks. It is programming as performance: screens are projected; code is typed live; audiovisual output is generated. The 'show-us-your-screen' ethos reveals agency against machinic generation. At its centre lies error and failure, resonating with LAMC: human-computer interactions as network.
Live coding has yielded notable forms of embodiment. Baalman observes that the practice «is influenced through its own side effects, transforming the code not only in the logical, programmatical manner, but as an embodied interface of the machine on our lap»[5]. Live coding turns the laptop – a labour instrument – into a musical instrument. Conventional human-computer interaction mechanisms, normally used for alienated production, are reshaped into creative artistic capabilities. The practice transforms the labour body of the white-collar worker, programmer, or academic into an audiovisual-artistic symbiont. From a networked perspective, the live coder's body,

[5] Marije BAALMAN, *Embodiment of Code*, in «Proceedings of the First International Conference on Live Coding», 2015, p. 40.

often represented on screen as a blinking cursor, is plugged into a computer that is itself a node of the Internet. While traditional musical performance resists web environments, for live coding, it appears organic: disembodied to the musician's eye but strangely embodied for the networked one, rendering musical the networked body. Many projects – laptop ensembles, crowdsourced collaborations, remote audience interactivity – demonstrate the organic relation between remote NM and live coding. However, the key point is not the specific settings of networked live coding but rather how networks – as infrastructure, conceptually and philosophically – remain central to its experimentation.

From its early days, live coding has emphasised networked communication, archiving, and documentation. A key to its success is its understanding of art as a circuit of invention and exchange. Inspired by Free/Open-Source Software, live coding anticipates a mode of production where moments of production and consumption collapse, minimising exchange circuits, and revealing new modes of relating[6]. Live coders share instruments, languages, libraries, and recordings freely, achieving near-full transparency. This circuit inherently relies on the Internet: live coding's commons. This non-commodified circuit of invention and exchange and its inclination to networked embodiments shaped the way live coding adapted to the COVID-19 lockdowns. For instance, a 24-hour networked concert of 15-minute sets, broadcast without interruption, had been planned before the pandemic and took place a few days after the first global lockdown, exactly as originally planned. An infrastructure and culture for relying on the Internet for music encounters existed within live coding prior to the pandemic. These pre-existing habits allowed for the easy emergence of projects for remote collaboration during the pandemic, such as online jam sessions, where live

[6] Alan F. BLACKWELL, Emma COCKER, Geoff COX, Alex MCLEAN And Thor MAGNUSSON, *What does Live Coding want?* in «Live coding: a user's manual», MIT Press, 2022, pp. 229-244.

coders gathered online to play music with each other. What deserves emphasis is live coding's continuous fascination with the emergent properties of networks regardless of remoteness.

The algorave movement is a specific cultural arena in which live coding, framed as a practice, unfolds. Algorave is the site of electronic dance music generated with algorithms; in it are found «sounds wholly or predominantly characterised by the emission of a succession of repetitive conditionals»[7]. This movement emphasises the importance of bodies on the dance floor, vaguely antithetical to remote music-making. However, the algorave movement has online events and relies on the Internet as basic infrastructure for its socialisation.

Live coding thus encountered the pandemic with an extraordinary capacity to adapt to lockdowns. Yet it is possible to identify a more insidious crisis to which live coding responds:

> In the last decade algorithms have crept into the public consciousness, such that they have become synonymous with harmful military, surveillance and big-data technology practices. In algorave, however, audience members are confronted with small and non-harmful algorithms inhabiting arts and social spaces, bringing people together through communal cultural experience. Through witnessing a fallible human interacting with an algorithmic process, code and technology becomes humanized[8].

Managing this tension, between harmful and humanised algorithms, has granted substantial social meaning to live coding and algorave: to face the crisis of accelerated

[7] Nick COLLINS & Alex MCLEAN, *Algorave: Live Performance of Algorithmic Electronic Dance Music* in «Proceedings of the International Conference on New Interfaces for Musical Expression», 2014, pp. 355-358.

[8] *Ibidem.*

technological development and ubiquitous networked computation through art-making. The fascination with emergent effects of networks resists this acute structural crisis.

Knotts claims that algorave moved «live coding out of primarily academic and experimental music contexts and towards mainstream music spheres […] resulting in a diversity of audiences, styles, and new technologies for live coding»[9]. Of key importance now is the emerging impact of the *mainstreamification* of live coding on its foundational attributes. The mainstream has its own circulation streams, some of the most prominent ones in social media. While live coding has relied on non-commodified circuits of invention and exchange, the mainstream offers streams for commodified exchange – markets in themselves[10] – where invention has zero value and surplus is extracted solely from circulation. The Internet is transformed from a medium for community and creation into a mixed medium for the circulation of 'content.' Mainstream communication produces its own forms of embodiment: the fragility and failure-prone dimensions of the networked body are negotiated when circulated through the mainstream by appending the logic of social media. Similarly, while experimental spaces are required to shape new cultural forms, mainstream culture is characterised throughout the neoliberal era as risk-averse[11]. The move towards the mainstream requires careful mediation with experimental spaces.

The networked embodiment that emerges from live coding thrives on failure and error. Live coding responds to crisis by absorbing it into its methods. Yet, displaced

[9] Shelly KNOTTS, *Live Coding, Algorave and The Hub: The Social and Political Dimension* in Brummer, Ludger and Robair, Gino (eds.). The Hub: Pioneers of Network Music. Kehrer Verlag, 2022.

[10] Nick DYER-WITHERFORD and Alessandra MULARONI, *Cybernetic Circulation Complex: Big Tech and Planetary Crisis,* Verso Books, 2025.

[11] Mark FISHER, *Ghosts of My Life: Writings on Depression, Hauntology and Lost Futures vol. 1*, 2014.

into the mainstream, it risks losing the very crises that define it, rendering it dull. The networked body, fascinated by networks' emergent properties and the frontiers it surpasses, appears distance-agnostic. In contrast, telematic music offers a form of embodiment preoccupied with performance through physical distance, an approach that reveals a different relationship to crisis, presence, and the material conditions of NM.

1.3 Telematic Music

From Amacher's *City-Links* to Oliveros' performances, the focus of telematic music is often on technological development and aesthetic exploration. In his survey of telematic connections, Tanaka offers a critical perspective with which the evolution of the field can be observed through transformations of concepts like liveness, authenticity, synchronisation (especially between video and audio), intimacy, etc. Central to his narrative is tele-trust, which he describes as «creating the artistic contact between musicians, and authenticity for the audience beholding the moment»[12]. Tanaka's account gives descriptions of moments of tele-trust yielding to marketisation and anti-democratic transformations in Western institutionality. For instance, festivals, once a cornerstone of democratic transformation, became massive markets for electronic music. Tanaka offers a specific story on participatory, telematic art facing both institutions overly worried about accountability and an audience

[12] Atau TANAKA, *Telematic Music Transmission, Resistance and Touch* in «International Journal of Performance Arts and Digital Media» 20 (2), 2024, pp. 177-195.

participation that can only be described as «information entropy»[13]. Telematic music's development is marked by telematic trust as well as escapism and alienation.

For Wilson, telematic music «is no longer a future genre. The global quarantine event of 2020 launched the concept of performing together over the Internet into the mainstream»[14]. Within this narrative again, the context of crisis is acknowledged as resolving into *mainstreamification*. In contrast to live coding, the music Wilson describes engages with distant performers and the embodied experience of musicians, treating the networked infrastructure as generally accessible. One key discussion of telematic music at the beginning of the pandemic concerned the Internet's limitations in replicating the in-person conditions musicians expect for music-making. While the live coder's networked body is latency-native and naturally attuned to data transmission, musicians abruptly in need to collaborate online often encounter frustrating conditions. Ultimately for Wilson, the goal is to naturalise telematic performance by embracing «working together over distances as a rewarding pursuit in itself, rather than some anomaly we must endure»[15]. While a certain familiarity with the affordances and limitations of networks is necessary to create the proper cultural conditions for its development, the over-normalisation of networked conditions for music-making warrants reflection. This raises a question fundamental for this paper: if crisis is central to telematic music, then what is lost for this music when a process of normalisation takes place?

[13] *Ibidem.*

[14] Wilson uses the term 'networked music performance'; while a discussion on terminology is warranted, I have chosen to group this work in the telematic music strand for this article. Rebekah WILSON, *Aesthetic and technical strategies for networked music performance* in «AI Soc.» 2020, p. 1.

[15] *Ibidem.*

Östersjö proposes the term tele-copresence[16] – a synthesis between copresence and tele-presence – as a contrast with in-person interactions, allowing him to discuss his *Isolation Journal* album and a set of improvisations between Canada, Sweden, and Vietnam as two telematic performance experiences during the pandemic. In the latter case study, he describes a stage in Hanoi with musicians connected to remote performers. This situation presents various forms of presence that shape a fragile environment in which the musicians operate and the audience observes them. I argue that the contrast between copresence and tele-copresence can be expanded into a spectrum if the live coding embodiment and the telematic embodiment are considered dialectically: from fully embodied, physically shared spaces to digitally mediated interactions where presence is mostly audible, partial, latency-rich, or fragmented. The emphasis here is on how interactions – whether digitally mediated or not – are embodied through networked technology. Telematic fragility is a key insight, as it is often felt as a crisis that musicians on the web must always consider.

Telematic performance oscillates between «a state of self-preoccupation and a state of unselfing»[17], engendering its own forms of listening described as corporeal, where technological, socio-political, and cultural concerns shape how presence is produced on the telematic stage. This tension between the performers' environment and the Internet's attributes produces a 'surplus' that excites the imagination while refusing to be completely understood as relational. The contrasting conceptions of embodiment between live coding and telematic music can be understood as, in the case of the former, rendering musical the networked body and, in the case of the latter, rendering

[16] Stefan ÖSTERSJÖ, *Isolation Journal: Remote Interactions in the Time of the COVID-19 Pandemic* in «Contemporary Music Review», 43(6), 2024, pp. 718-730.

[17] Franziska SCHROEDER, *Network[ed] Listening—Towards a De-centering of Beings*, in «Contemporary Music Review», 32:2-3, 2013, pp. 215-229.

networked the musical body. This fragile encounter is the site of NM that takes a further step into the embodiment proposed in this article.

1.4 From Networked Fragility to Crisis Body

For anyone who has performed through a network, the experience of crisis is painfully familiar. On the one hand, more than one live coder has experienced while performing the overwhelming complexity of the networks and their emerging effects leading to systemic breakdown. For networked live coding, the Internet's inherent instability aligns with its ethos of error and failure. On the other hand, the telematic connection always seems to be on the brink of collapse: where performers experience the consequences of latency or interruptions while transmitting data and signals. The connection may be confronted with any form of environmental resistance as it yields tele-trust, finds itself in a fragile state of tele-copresence, and transforms the limitations of the Internet into affordances. The inherent uncertainty of the Internet has become NM's methodological approach. In other words, the aim of a smooth Internet transmission that enables optimal conditions for NM has been mostly abandoned. Whenever someone attempts to perform through a network, they relinquish control and intuitively rely on the emergence of the network's effects. The embodiment that emerges from NM is one that carries crises with it: a crisis body.

In the post-pandemic era, the appeal to the mainstream found in narratives of NM appears as misplaced optimism about cultural transformation and NM's role within it. This paper argues that the growing ubiquity of online interactions and networked technology is a less compelling focus than the expansion of crises and the music that it engenders. Any appeal to the mainstream, I contend, is accompanied with stabilising technology, certainty, and standardisation. However, the stabilisation of NM seems at

odds with the very conditions of its emergence. Crisis-as-method[18], and its embodiments, are not interested merely in agency, but political agency. This distinction is at stake while thinking towards a border body: to acknowledge the political dimension of NM.

During the pandemic, the relationship between the lockdowns and NM can be read as a 'fix' – here understood as a superficial relief from an underlying structural issue – put in place to cope with social isolation. Since then, isolation has multiplied rather than diminished; it is worth reflecting on the role of NM in its persistence.

2. Traversed by the Border

2.1 Floating Gold

A performance combining telematic presence and networked live coding, particularly relevant in the context of crisis, is *Vortex: Reresik* by singer Peni Candra Rini, live coder Rangga Purnama Aji, and gamelan ensemble *Naga Mas*, together known as Floating Gold[19]. Utilising the online platform Estuary, *Naga Mas* has expanded Javanese gamelan practice into collaborative, networked, and telematic performance. Throughout the pandemic, this Indonesia-Scotland-USA distributed collaboration integrated the telematic presence of Javanese traditional singing, networked live

[18] Eugene BRENNAN, Introduction: Crisis as Method: Politics, Temporality, and Agency Free in *South Atlantic Quarterly*, 123 (2), 2024, pp. 231-254.

[19] Peni Candra RINI, Rangga Purnama AJI, Sen SEWELL, Heather STROHSCHEIN, J. Simon VAN DER WALT & Bill WITHMER, *Floating Gold: an International Collaboration through Estuary* in «7th International Conference on Live Coding (ICLC2023)», Utrecht, Netherlands, 2023.

coding inflected by Paguyuban Algorave Indonesia, and *Naga Mas*'s transnational gamelan music.

Floating Gold was presented at the 2023 International Conference on Live Coding as both a paper and a performance. The performance had a distinctive stage presentation: in the foreground of the screen Peni appeared in a well-illuminated and arranged shot, improvising vocal lines, while in the screen's background the platform Estuary is visible, with live coders' work being projected. In the paper, "global disparities in bandwidth" appear as an obstacle in their attempts to create a space with substantial liveness that would favour interplay and embodiment among the nodes in their networked ensemble. Two strategies were described to tackle this crisis: first, to group two members of the ensemble together so the shared technical expertise could enable good transmission conditions; second, to make use of Peni's temporary residency in a place where the global disparity of bandwidth is not a negative factor. It is crucial to note how residency and mobility emerge from this situation as both concepts and solutions to obstacles.

As a response, Floating Gold successfully articulates different music practices from a particularly situated perspective:

> A surprising and welcome outcome for us has been to affirm the strength and depth of, in its broadest sense, gamelan: to discover that the philosophies and practices that underpin Javanese music are strong enough to support and inform music made both live in a room with instruments and through a remote collaboration through the medium of livecoding[20].

[20] *Ivi*, p. 7.

What is key is the outstanding capacity of gamelan to transition from music «live in a room» to «remote collaboration». In this case, the crisis reveals the continuity between remote and in-person interplay, apart from the idea of networked interaction, as a rewarding pursuit in itself. What is fundamental is not the aesthetic or technical frontiers that expand knowledge production – which are tangible outcomes of this work also – but the necessity of movement among people, a factor that can fundamentally reshape how a problem is tackled, aesthetically or technologically.

2.2 Pirarán

Iván López (Morelia) and I (Mexico City, then Hamilton, then Luleå) started the ensemble *Pirarán* amid the COVID-19 pandemic. Like many networked ensembles, it began as a way to cope with isolation. The connection between Morelia and Hamilton was soon joined by Diego Villaseñor (Mexico City), forming a three-city trio that met weekly online. Although networked technology and remote interaction enabled our work, the ensemble's core interest was to gather in-person whenever possible. We organised yearly tours, meeting in 2022 (Mexico City and Morelia) and 2023 (Hamilton and Toronto). In 2024, we planned to meet again in Mexico, but a pending immigration claim barred me from leaving Canada, so we did not meet.

In summer 2025, the ensemble attempted to meet in Canada instead of Mexico due to my ongoing migration case. After considerable work, we scheduled three concerts and one artist residency across Ontario. One member, with an EU passport, was allowed to enter Canada without issue. The other, with a Mexican passport, had to apply for the visa program the Canadian state had recently reinstated for Mexican nationals. After months of waiting, the visa was denied, despite invitation letters from the university-hosted artist residency program and a prominent Canadian music festival. With time, resources, social capital, and money wasted, the tour seemed impossible,

even undesirable: the upshot was that one ensemble member could not enter Canada; another could not leave Canada. Yet, in such conditions, we were supposed to play music together. What makes this story interesting is that it is precisely a NM ensemble one of the few music configurations capable of surpassing this situation.

The *Pirarán* ensemble thinks often through displacement: the name comes from the Spanish verb *pirar*, conjugated in future tense, which has two meanings depending on the social situation of the speaker: either to escape or to 'go nuts.' At the heart of the ensemble is a psychedelic impetus to escape from the stale realism of this world. *Pirarán* performances are ghostly: a music that could have been but never was, a tour that could have happened but was denied. This spectrality infuses our telematic and networked connections, transforming them from mere technical arrangements into critiques of the conditions that forced them upon us. The networked condition, for us, is not a positive science but a haunting: a critique emerging from a crisis.

Drawing from popular modernism and traditional and experimental music, *Pirarán*'s interests are diverse: live coding language development, multilingual collaborative live coding, temporality in algorithmic music, tuning systems, audio mixing, spatial audio, synthesis creation, synthesiser performance, instrumental performance, and more.

The many interests of the ensemble require us to be flexible in how embodiment is treated. Initially, the ensemble favoured an acousmatic presence, with no attention given to revealing sound sources. Later, the ensemble developed both networked and telematic bodies that intertwined with audio-responsive visuals: not so much as a tool for representation but a trace of our gestures and intentions. In other words, video signals of the remote people playing acoustic instruments and/or synthesisers were conjured telematically, on screen visible to the audience, with the networked live coding environment juxtaposed. This is how Floating Gold has also staged their performances: the networked bodies turned musical and the musical bodies turned networked, a spectrum between copresence and tele-copresence as discussed earlier.

These embodiments have allowed us to address latency in a compelling way. The networked live coder can tolerate substantial latency and act as an underlying rhythmic infrastructure. Code is transmitted to synthesiser and instrumental performers rather than audio, and such code is evaluated in a program developed collectively, preventing loss of audio information. The synthesiser performer, more dependant on synchronicity, can then interplay with minimal latency. Our workflow makes the ensemble's output contingent on the node with the most fragile bandwidth – not solving the 'global disparities in bandwidth' problem stressed earlier but centering it and adapting to it. It is clear from our experiments that the synergy between networked and telematic bodies yields interesting forms of NM.

From the beginning, online rehearsals and performances have been only one part of our interests, as already mentioned. Hence, any configuration has had to work with everyone in the same room and/or with everyone in different rooms. Take the previous description of our workflow: if all musicians are in the same room, the configuration still works allowing for even more effective ways to monitor the output; if all are remote, tasks can be distributed to maintain a similar sense of interplay, spreading the cost of bandwidth as necessary. All our configurations aspire to be distance-proof.

As *Pirarán*'s main interest is not to create music through a network, but to experiment with our shared and individual interests, it has been fundamental to, at some point, share acoustic space and evaluate our music through a common listening experience. Beyond fostering camaraderie, dense in-person sessions ground the research and provide clarity. However, it would be unnuanced to defend specific aspects of in-person music-making as essential. I argue that the fact that we change and move is what makes the project so generative.

The distance-proof approach has proven effective if evaluated from a technological or aesthetic perspective, yet ineffective in anticipating forced immobility due to borders. As underscored in the autoethnographic vignette, the ensemble was abruptly hit with a visa restriction that has since forced us to always include a remote component in our

presentations. Beyond technical expertise or aesthetic sensibility, the border sent us back to square one, to yet another unevenly distributed global crisis, impeding a future to flourish. Thus, in addition to the networked body and the telematic body, our networked presence carries with it a border embodiment – a lost future haunting the ensemble.

2.3 The Border Crisis

According to Cox, borders manage barbaric noise and articulated speech determining who is legible and who is not within a nation-state[21]. This is an analysis that overlaps the study of sound, music and border regimes, demonstrating the value of studying music through the lens of migration and critical border studies. Reflecting with critical border studies makes visible an apt distinction between a border and a frontier. Frontiers, defined by colonial expansion, are meant to be disrupted; borders are mechanisms for immobility. In academic settings, the frontier is a metaphor for the advancement of knowledge production. To think critically through borders is to favour encounters conducive to rethinking epistemology. Music-making motivated by networked interactions is limited by actual borders and the frontier mentality that dominates conversations around music.

Contrary to common representations of the globalisation process, neoliberal globalisation has multiplied, rather than suppressed, borders. This does not mean that the nation-state and its limits have remained untouched. Rather, it clarifies how borders are not mere mechanisms to block the passage of people but «central devices

[21] Christoph COX, *The Politics of Sound: Flows, Codes, and Capture*, in «Resonance: The Journal of Sound and Culture», Vol. 1, 2020, pp. 225-243.

for their articulation»[22]. The wall as a border metaphor is less useful for discussing borders as a system that juxtaposes spaces, connecting and disconnecting, and transforming accordingly. With the multiplication of borders, a paradoxical condition is now an everyday occurrence for many people: the body that is traversed by, rather than traverses, borders. At the core of this paper lies the question of whether NM is conducive to social connection or whether it furthers isolation. The answer seems obvious if we understand NM as a mechanism to 'jump walls,' to break geographic or conceptual barriers. However, we risk missing important insights on how NM operates as a device to expand or suppress the circulation of people in a world of hardening borders – a device that has a specific relationship with power structures. Thus, it is no longer sufficient to think of NM as merely frontier music.

Beyond exclusion, borders are composed of multiple mechanisms that regulate mobility. Among them, the most relevant for this article is commodified inclusion: the process through which people are permitted to cross borders only under conditions of political and economic exploitation[23]. This framework illuminates the bittersweet conclusion of *Pirarán*'s 2025 tour, with some members in-person and others remote. What does it mean to make music in such a state of fragmentation? Despite the genuine support of all the tour's hosts, there is a troubling question: without the capacity to recognise this work as legitimate, what does it become? At what point must it be acknowledged that the conditions for transnational music collaboration are under immense pressure – and what would such recognition demand from festivals, conferences, universities, venues, and other institutions?

[22] Sandro MEZZADRA and Brett NEILSON, *Preface* in Border as Method, or, the Multiplication of Labor 2013, p. IX.

[23] Harsha WALIA, *Introduction*, in Border and Rule: Global Migration, Capitalism and the Rise of Racist Nationalism. 2021.

The discursive control around borders is also a relevant mechanism that regulates mobility[24]. The border, rather than the site of a 'migrant crisis,' fosters a manufactured crisis of displacement and immobility. In the case of NM, discursive control acquires a different form. NM is often evaluated by the capacity to create a connection, with tropes of technical skills, technological advancement, or new musical artifacts and styles. The fact that there is a connection becomes more important than what the connection carries: not only the embodiment of a musician but also, with them, another context and its political dimensions. Whether the technical aspects of a performance fail or succeed, the legibility of what is communicated is obfuscated by the connection itself. This illegibility acts as a form of discursive control: the audience, overwhelmed by the technological aspects of the performance, cannot listen fully. This refusal is more a side effect of habits of frontier listening or listening to the emergent effects of networks – which tend to foreground technical or aesthetic advancement – than a rejection of what happens in the performance. How can the presence and legibility of the remote musicians overcome such listening habits? Similarly, the connection matters, but not due to only technical or aesthetic reasons. The connection alludes to the capacity of the Internet to break the isolation that lately pervades it. NM conveys borders, and, more importantly, it conveys that the connection matters precisely because of borders.

3. Multiplication of the Imagination and Networked Music

This article has argued that live coding and pandemic-era telematic music explore conceptual and geographic boundaries, producing novel technological and aesthetic

[24] *Ibidem.*

outputs with considerable success. While this success is tangible in the way it integrates crisis, it also reveals critical issues. It is urgent to consider NM's drift into the mainstream as a cultural expression of the multiplication of crises, not their resolution. Considering networked imagination and crises as recursively intertwined, the *mainstreamification* process involves tearing NM from its broader conditions of uncertainty – which may reduce its critical edge.

The two case studies examined in this article, which posit networked and telematic embodiments, reveal that NM that involves live coding and telematic music-making have the potential to address and unpack border crises beyond the exploration of conceptual frontiers and geographic limits. These cases exemplify the need to think of ensembles as remote and distributed but also as music processes that anticipate in-person encounters. This condition flags a new dimension that networked musicians face: the improper distribution of resources in the form of unreliable bandwidth in some places: a problem that, for now, can be 'fixed' by moving to places with better infrastructure; and by performing in the bitter and strange situation in which a performer is not permitted to be in the same room, or country, as the audience or their bandmates.

So, borders matter. It would be tempting to simply understand borders as walls dividing people. Such a baseline would be simple to connect with NM, as the Internet would represent a medium for musicians to 'jump walls' or 'expand frontiers.' But the logic of borders is complex, shaping the way people with different passports interact within a country as well as with people in different places. Drawing from critical border studies has allowed this article to consider the ways in which the logic of borders can re-signify NM and articulate distinct forms of embodiment: the networked body, the telematic body, the crisis body, and the border body, all relevant for music-making. More importantly, engaging with NM from a critical border studies perspective reveals the underlying rationale of the field as a simple attempt to advance the frontiers of knowledge production. What is striking is that NM has a unique

potential to operate precisely in the way border-crossing bodies do: to provoke encounters that multiply perspectives, forms of imagination, and caring friendships – as Pauline Oliveros wished.

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