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# Networked Collaborative Performance: Frugal Strategies and Cultural Impact of Technology

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## Abstract

This panel considers the integration of technologies such as internet communication and collaboration tools, devices for human machine-interaction, live audiovisual media processing, and live coding within the creation of contemporary performances and the development of practices. The participants reflect on actual projects, and on the theoretical underpinning that informs and motivates such performances. In particular, the notion of frugality comes to the fore, noting the effect of open-source and DIY technologies on social and cultural practices within existing power structures.

## Keywords

Networked collaboration, frugal innovation, technology, dance, interaction, habit.

## Introduction

The integration of technologies such as internet communication and collaboration tools, devices for human machine-interaction, live audiovisual media processing and live coding of performance, has led to the emergence of new fields of creativity in performance arts. Such "art/technology, dance/technology and new media art - the cross-over performance and science assemblages" [1] give rise to the premise of "bodily motion and non-verbal communication, understood as changing repertoires of emotional expression and cognition, constitute a foundation of sustainable cultural diversity, a changing matrix of embodied knowledge in permanent formation" [2]. At the same time, this body-focused approach is complemented by projects and communities such as the Algorithmic Pattern Catalogue by Alex McLean [3] and the live coding community [4]. As these technologies are maturing and becoming more widely accessible to different social groups in various countries, an assess their impact in social processes is needed, through the building of cultural narratives or through the creation of means for recording, study, transmission and transmutation of cultural practices.

As open-source software and human-machine-interaction hardware become more accessible, more culturally diverse groups put them to artistic uses. However, collabora-

tion across cultural and disciplinary borders poses a host of problems not just of technical but also of cultural communication. In this context, this panel discussion investigated the impact of internet collaboration with live coding and other live interaction technologies on culture and the new kinds of art forms that arise from it, especially under the perspective of frugal innovation, i.e. the combination of technical skills, economy of means and an intuitive approach to technology.

The premise that this panel ultimately raised as a challenge, is that such work requires a global approach on the technical, organizational, social and cultural aspects in order to be sustainable. As Birringer states, technology is inseparable from the social. In the field of interactive performance arts, this gains particular significance, because of the fragile and crucial role that communication plays in the collaborative creative process. The objective of the panel was to illuminate the different aspects of this field, technological, aesthetic, social and philosophical, to show from various perspectives how all of these aspects are interrelated, and to identify the central challenges and strategies involved in creative collaboration and research in this field.

To this purpose, the panel brought together artists, technologists and educators that approach this topic from different perspectives in order to report their experience as practitioners and to discuss how the combination of these technologies changes the way in which we collaborate in these cross-over performance and science assemblages. Each panelist was asked to report on related aspects in their recent work, from the perspective of their practical experience, and give examples from their own work.

## Panelists' Abstracts

**Iannis Zannos.** Open source software and a rhizomatic bottom-up approach to artistic creation can help boost creativity and innovation through networked collaboration. As Vilém Flusser and Friedrich Kittler have noted, recorded image and sound have already been added along with text as carriers of meaning in contemporary technological culture. The increased availability of open source software and hardware as well as online tools for sharing knowledge related to these technologies, coupled with the proliferation of technologies for sensing our environments and bodies through measurement devices open up the promise of integrating program code and its logic-mathematical substratum into these cultural creative processes. Sharing real-time performance practices involving sensors with data over the internet can play a key role in effecting this transition and help widen the cultural semiotic horizon beyond text-sound-image and onto code and abstract forms. Collaborative performance of the internet creates new virtual space where these aspects can be integrated and new meaning-generating mechanisms can arise. This inevitably leads to new kinds of communities that re-interpret given contexts and go beyond traditional identity barriers.

**Pavlos Antoniadis.** On the biopolitics of networked and collaborative music performance: from biopower to noopower, the new wet markets and an enactive definition of touch.

Objective of this short but dense provocation is to provide a set of statements and questions on networked and collaborative music performance from the point of view of biopolitics. Biopolitics refers to both the classic Foucauldian [5] definition of biopower, that is: power over life processes, as well as to the renewed frame of Lazzarato's [6] noopower and Neidich's [7] neuropower, the power over minds and brains through digital data that, crucially, capture and alter life processes. The categories of bio- and noopower merge in what the US American sociologist Shoshanna Zuboff [8] calls body rendition: any form of capture, control, coercion, abstraction, training, constraining, disciplining, monitoring, surveillance, simulation, emulation of the body, as the core of cognitive capitalism and its pandemic acceleration.

The notion of body rendition raises the following questions:

A. First, what is lost in relation to the non-networked, live, participatory performance, in terms, thus, of biopower: the collapse, in part or in whole, of the feature characterized by Maurice Merleau-Ponty [9] as *intercorporeité* and *interanimalité*, the collapse of the sheer cohabitation of a physical space by multiple animal bodies, with all the implications of their shared biological, physical and social processes, including the physics of a post-phenomenological multimodal interaction "beyond the peep-holes of the senses" [10]. The sum of these features constitutes the primordial wet market of musical activity, the biologically defined autopoietic [11] substratum of liveness [12], whose cancellation constitutes a major act of

biopower exertion, a sacrificial slaughtering [13] of the animal bodies of musical performance.

B. Second, we need to think what happens after this collapse in terms of noopower, that is the appropriation and filtering of embodied experience, which is translated into digital data through sensing and is transmitted through communication protocols, before its mapping onto another modality, usually sound or vision, without excluding other possibilities like vibrotactile excitation, reproduced in a new physical space. Questions of rendering, questions of sensing [14] and questions of mapping [15] arise. Do rendered data represent or embody accurately the modalities communicated? How are data correlated to other modalities technically and aesthetically, including the danger of an oculocentric [16] abstraction of all communication through screen-based interfaces. Questions of political economy are also raised: What's the use and exchange value of the produced data, what remains to the platforms and protocols used as infrastructure for the transfer; questions of surveillance and copyright of these intimate data; the ways, finally, in which the platforms and the social condition force bodies and minds to behave in specific ways; their inherent and designed constraints and affordances, which are not only physical, but also social and political and economic.

C. Third, crucial becomes the question of the new hybrid spaces, the new wet markets of music, defined by Yann Moulier-Boutang [17] as the nexus between wetware, network, software and hardware. I've theorized [18] these interactions in terms of a renewed, enactive sense of touch, as the dimension per se that interconnects physical presence, intercorporeality, social interaction, physical vibration, energy circulation and affective potential. Is a Derridean [19] deconstruction of the normative perception of touch as physical contact, through its enactive rethinking in terms of movement coarticulation, multimodal diffusion, limit experiences and body transparency, possible through networked collaborative performance?

A final word will be on the nature of communication: could we assume networked and collaborative performance as metacommunication, as a ludic gesture or commentary on the conditions of real, not mediated interactions? Could it denote a completely different, mutually inclusive, existential register, with its own unique affordances and meanings, where abstracted physical and biological processes constitute a metalanguage beyond the information channels of disembodied intersubjective communication, beyond a surrogate reality? Echoing Brian Massumi [20] and Gregory Bateson [21], can we imagine a new animal politics for networked and collaborative music performance?

**Johannes Birringer.**

< <https://www.youtube.com/watch?v=57FCnYyBDLs> >

**Haruka Hirayama.** I will discuss my experience as composer through experiments with intermedia performance forms that involve collaborations with dancers and actors, focusing on the challenges of integrating sensors and other technical media into my work and of forming pieces within a setting of networked collaboration.

**Jean-François Jégo.** Beyond the artistic and experimental scene, Networked Collaborative Performance is increasingly present in general public events. For example, massive online events like Travis Scott's concert event in 2020 brought together more than 12 million online spectators playing with their avatars on the "Fortnite" gaming platform [22]. Even if these numbers are probably overestimated by their creators, there is a craze for such a collective experience, particularly during periods of confinement and curfew in the pandemic context. These events are capable of bringing together spectators and allowing them to interact with each other by chatting with text, triggering expressions from their avatar or voting for the continuation of the show as proposed, for example, by the "Wave Metaverse" platform [23]. These content creators attempt to be inclusive for attendees by offering cross-platform software to access the event via smartphones, laptops/desktops, or virtual reality headsets. But the interactions remain quite limited which offer a few participatory narratives. In addition, due to the technological constraints of the platforms and the number of users connected simultaneously, the game-like aesthetics remain predominantly low-poly. Finally, such events tend to promote globalization even if they remain difficult to access for participants from developed countries.

Frugality could be an interesting paradigm for reconsidering a more inclusive and therefore truly collaborative network performance. The concept of frugal innovation invites us to rethink the complexity and cost of the creative process in digital arts [24]. It combines technical skill, economy of means and a naive and intuitive approach [25]. We are currently observing it in developing countries and in third places of creation such as fablabs or makerlabs. This approach based on principles of inclusiveness refers to the notions of autonomy, tailor-made, sustainability and common goods. It also echoes the practices of the Do-It-Yourself community: for example, the Jerry Do-It-Together [26] is a computer assembled from a plastic container and computer components from electronic equipment waste. It gives a second life to this accessible material while making the means of communication and digital creation accessible to as many people as possible. Developed during collective workshops including stages of personalization and decoration, these "personal" computers make it possible to restore the singularity of the technical tool, and thus give it an integrated emotional value. This reminds me that certain artists, even before creating, shape their tools, attach themselves to them, and thus accentuate their durability.

This approach provides greater control over data flows and the platform dependency that is at the heart of the attention economy. This could address the problems of cognitive spillover and data privacy that are at the heart of "surveillance capitalism" defined as a "new economic order that claims human experience as free raw material for hidden commercial practices of extraction, prediction and sales" [27]. Frugal innovation would provide different access to technologies, reconsidering the computing power and Internet bandwidth needed with the aim of reducing the digital gap. In addition, it is an opportunity to imagine new radical aesthetics, by re-examining 2D rendering (like the inspiring work Videoplace by Myron Krueger [28] de-

veloped in the 70s) or by using, for example, simple particle effects as new atoms or galaxies. It is also an opportunity to focus on the expressiveness of the body with a motion capture system using the IMUs we could find in any smartphones, simple video cameras or the reuse of gaming hardware (like the Nintendo Wiimote gamepad or the Microsoft Kinect body tracking camera) still functional but considered obsolete. The challenge remains to encourage creative glocalization between local and global creation, to welcome the diversity of ideas and practices, to share expressiveness and to make singularities resonate... collectively [29].

**Peter Nelson.** I am concerned with the ways in which digital and networked technologies impact on the strategies through which we encounter other living beings and the ecosphere that coexists with us. How do digital and networked technologies participate in these processes of encounter? Following William James, one could propose that each element in such a network consists of a set of habits of interaction where those habits are instantiated personally, socially, and technically. Within the notion of technical habits, I am including the algorithms and the data corpuses that set up the resources and available responses of digital machines and their networked components. Social habits would now have to include not just human cultural practices but also those technical elements that actually surpass the extension of the human body and reside properly within the domains of the social, and the digital. It is also clear, most particularly within the technical infrastructure that provides the ground for networking and digital access, that political power structures play a dominant role in habit formation.

Habit seems to me to be a useful conceptual basis because, in the words of Pierre Bourdieu, habits are "principles which generate and organize practices ... that can be objectively adapted to their outcomes." [30] In other words, habits are both subconscious and malleable. In that sense, they are open to the sorts of reconfigurations that we are considering as the topic of this panel. And their malleability is evident across the domains in which they appear: personal, social, and technical. My colleagues explore some possible developments of technical habits, but I want to end by considering the ways in which habits themselves might be re-formed. Here I will refer to Xenia Fedorova's notion of 'tactics' [31]. Tactics depend on diversion and trickery, and in our scenario they hinge on the circumstances of the frugal: making do, and, in particular, making do with less, not just as a response to an ecosphere in need of de-growth (*décroissance*), but also as a way of challenging habits formed within a dominant system that circumscribes our encounters - with one another and with the ecosphere - with opaque and often duplicitous excesses.

My question, therefore, is: how can we re-form our habits of interaction in ways that allow us to experience real encounters, with real narrative consequences, across the domains that digital networks make possible?

**Dana Papachristou.** Post-modern thieves of fire. As a sound artist and researcher, working on the field of socially engaged art and workshop based art, my contribu-

tion in this panel treated the convergence of technology and the human delving into aesthetics and politics. I drew upon new media possibilities and artistic practices so as to analyze the relation between the technical and the human in contemporary art. Many new available technologies not only create a condition for processing, recording, producing or enhancing physical techniques, but also assist in transforming physical practices and establishing new human-machine spheres, with connectivity playing a very important role.

Technology, linked to humans from the beginning of their existence, becomes a global medium created by them which also radically alters them, making it impossible to distinguish the boundary between "the empire of man and the kingdom of technique" [32]. Thus, the human-technology distinction is unfounded [33], while the position that humans invent while the technological tool is invented has become obsolete [34]. In a macluhanian sense, we are altered by our technology to such an extent, that we become different human, thus using different tools and inventing different technology to accompany us to our everyday practices.

At the same time, conditions are created in which technology can - and must - function as a space for political and social action [35]. My main interest is how these arrangements apply into contemporary artistic practices, and most importantly how we can use them as weapons and tools, to subvert current hegemonic practices with which we struggle in our lives. How can we act through our artistic research and practice, and, most importantly, towards which direction should we steer our actions? Can we use tools as weapons and weapons as tools, making art function as a war machine? And against whom? Could we work towards a delezian anorganic, asubjective, and asignifying course of artistic practice, in order to provide a service to our societies and establish spaces of care inside our communities?

In both my academic and artistic work I have worked towards the social aspect of art, knowledge and technology: in workshop based works, in geo-located audio walks including narratives of communities, in working on music and sound art together with the Deaf and Hard of hearing, in ethnographically informed artistic research and more. Through artistic practice we can reclaim and occupy technology, resulting in art as Bataille's Acéphale, lacking the hierarchical head, or as a contemporary Prometheus, post-modern thieves of fire, tactically deceiving and undermining. I propose to investigate the common line of flight of the weapon and the tool [36], as the possible common roles of the technology and art as weapons and tools.

Moreover, I suggest using all available media (open-source, DIY, frugal, off-the-shelves, offline), so as to form new non-centralized networks. But also using the existing ones in any way we see fit and useful. In short, to reclaim and occupy. Furthermore, to avoid placing dependence on the positive or celebratory facets of networking, community building, or resilience, because connectivity itself as a condition is not enough to provide art with a social impact, or to create a network. Connectivity has also led to data, digital and physical surveillance, monitoring, constant lifelogging, the birth of the self-managerial subject - the one that never sleeps and always works, that is always anx-

ious, as the Institute For Precarious Consciousness wrote in its "We are all very anxious" article [37]. Connectivity is the weapon and the tool of the power arrangement, with which we live together, under or despite of, in very unequal terms.

The challenge at hand extends beyond the simple democratization of media; it represents an endeavor to regain control over the production process. It signifies a societal progression from being passive participants in the vast web of lifelogging systems reliant on crowdsourcing to becoming proactive contributors, shaping our own narrative on our own terms. In pursuit of this goal, it becomes evident that mere connectivity, while crucial, is not sufficient.

**Stella Paschalidou.** Music making is a genuinely embodied process [38]. And this can be even more the case in so-called oral music traditions, which –unlike Eurocentric music—do not rely on written notation. Knowledge is instead (almost) exclusively transmitted directly from teacher to disciple through live demonstration and imitation, while they sit face-to-face in close proximity in the same room. Such a case is Dhrupad vocal music, a subgenre of North Classical Indian music. Most importantly, it is not just the sound that is transmitted over music lineages but hand movements too [39], and therefore visual engagement is paramount.

Slow melodic glides abound in Dhrupad, and melodic movements are conceived of as paths and trajectories performed in an 'imaginary pitch space' [40]. These are also accompanied by hand movements in the real 3-dimensional space, however not just as a melographic representation of sound [41]. Students will often admit that hand gestures can help them reproduce melodic movements that they would otherwise find hard to do. And although typically gesturing in Dhrupad is not taught explicitly, students do tend to move recognisably like their teachers.

Fast forward to our post-Covid times, the younger generation of Dhrupad vocalists is happily relying on the internet to teach through widely available platforms that are not specifically targeted to music tasks. Most will simply use average, domestically available technology, or even simple audio calls when the bandwidth is too limited to support video. Some will sit in close proximity to the camera with only their head appearing on video, while others will move a bit further away to make their upper body visible. Hence, visual engagement with the teaching process is changing and it poses the obvious questions:

- Can the sense of presence of the face-to-face in-situ teaching be somehow retained or supported in the online context?

- Are we going to miss something in the long run, in terms of music style inheritance?

- Is it possible to effectively capture, transmit and convey salient movement information through the screen? How is this going to shape our conception of oral music traditions? Or do we need to come up with suitable technologies for new types of visual representations?

- And finally—in the context of frugal innovation and the democratisation of technology—what types of custom-made, widely affordable, domestically-accessible software and hardware technologies would we need to develop to

better support the teaching needs of oral and less represented music traditions?

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Pavlos Antoniadis is a pianist, musicologist and creative technol- ogist from Korydallos, Greece, Associate Professor of Music Communication and Technology at the University of Ioannina, Greece and a collaborator of the team interaction-son-musique- mouvement at IRCAM, Paris since 2014. He holds a prize-win- ning PhD in musicology from the University of Strasbourg in co- direction with the IRCAM, an MA in piano performance from the University of California, San Diego on a Fulbright Scholarship, and an MA in music studies from the University of Athens. He has conducted post-doctoral research at EUR-ArTeC, Université Paris 8 and at the Technische Universität Berlin – Audiokommun- ikation as a Humboldt Stiftung Fellow. His research interests in- clude complexity, embodiment, multimodality, sensor-based in- teractive technologies, artificial intelligence and biopolitics, with a focus on technology-enhanced learning and performance for musics of the 20th and 21st centuries.

Johannes Birringer is an independent media choreographer and artistic director of AlienNation Co., a multimedia ensemble that has collaborated on various site-specific and cross-cultural perfor- mance and installation projects since 1993. He lives and works in Houston and London.

Haruka Hirayama is a composer from Murakami, Niigata, Japan. She studied composition and computer music with Profs Cot Lippe and Takayuki Rai at Sonology Department, Kunitach Col- lege of Music in Tokyo and received a B.A. and M.A. She also completed the research programme of Electroacoustic Composi- tion at NOVARS Research Centre of the University of Manches- ter under the supervision of Prof. Ricardo Climent. She is based in Tokyo, a lecturer at the Department of Media Design, College of Arts, Tamagawa University, Graduate School at Kunitachi College of Music, and Faculty of Policy Informatics, Chiba Uni- versity of Commerce.

Jean-François Jégo is an associate professor in the Image Arts & Technologies Department and in the INREV research team at the University of Paris 8, France. As a digital artist and researcher, I create and analyze, in regards of the concept of ecosophy, immer- sive and interactive experiences, artistic installations and digital performances hybridizing Virtual and Augmented Realities.

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Iannis Zannos has a background in music composition, ethnomu- sicology and interactive performance. He has worked as Director of the Music Technology and Documentation section at the State Institute for Music Research (S.I.M.) in Berlin, Germany, and Re- search Director at the Center for Research for Electronic Art Technology (CREATE) at the University of California, Santa Barbara. He has taken part at numerous international collabora- tive Media Arts projects and has realized multimedia perfor- mances both alone and in cooperation with other artists. He is teaching audio and interactive media arts at the Department of Audiovisual Arts and at the postgraduate course in Arts and Tech- nologies of Sound of the Music Department at the Ionian Univer- sity, Corfu.