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THOUGHT, TECHNOLOGY AND PERFORMANCE: LESSONS FROM THE FUTURE

Juan Parra Cancino

Juan Parra Cancino (b. Chile, 1979) studied Composition at the Catholic University of Chile and Sonology at The Royal Conservatoire The Hague (NL), where he obtained his Masters degree with focus on the composition and performance of electronic music. In 2014, he obtained his PhD degree from Leiden University with his thesis "Multiple Paths: Towards a Performance practice in Computer Music".

Juan's compositions, which include pure electronic and electroacoustic mixed media with solo instruments and ensembles, have been performed in Europe, Japan, North and South America. His acousmatic piece *Serenata a Bruno* obtained a special mention at the Bourges electroacoustic music competition of 2003 and, in 2004, his piece *Tellura* was awarded the residence prize of the same competition.

Juan is a founder and active member of *The Electronic Hammer*, a computer and percussion music ensemble devoted to the promotion, creation and diffusion of the music of the 21st century; he also performs in *WireGriot*, a duo of voice and electronics that seeks to (re)construct the repertoire for this medium.

Since 2009, Juan has worked on the topics of creativity and performance applied to electronic music at the Orpheus Institute (Ghent, BE). His current research focuses on performance practice in computer music.

Jonathan Impett

Jonathan Impett's professional and research activities, as trumpet player, composer and theorist, cover many aspects of contemporary musical practice. In the field of historical performance, he is a long-standing member of both The Orchestra of the Eighteenth Century and The Amsterdam Baroque Orchestra. He is also a member of the experimental chamber ensemble Apartment House. As a soloist, he has given premieres of works by composers including Scelsi, Berio, Harvey and Finnissy. He directed the live electronic chamber ensemble Metanoia and was awarded a Prix Ars Electronica for his development of the meta-trumpet.

Jonathan's compositions have been broadcast throughout Europe; a new CD of them will shortly be released by Attacca. His monograph on the music of Luigi Nono was published by Routledge in 2019 and he is currently working on a project considering the nature of the contemporary musical object, 'The work without content'.

As an improviser, Jonathan has played with musicians as diverse as Paul Dunmall and Amit Chaudhuri. His work in the space between composition and improvisation has led to continuous research in the areas of interactive systems and interfaces. The 'active sound space' project, in which he is currently involved, uses ALife populations of wave models to create interactive works combining aspects of composition and sound art.

Abstract: Thought, Technology and Performance: Lessons from the Future

Music, Thought and Technology (MTT) is a research cluster investigating the role of technology- and science-derived concepts in contemporary music practices: in technologically-facilitated music, of course, but also more widely, in the creation, understanding, criticism, representation, pedagogy and discourses of music. As practitioners, we pursue this work in the spirit of artistic research – through our own work as musicians – and the methodological ethos of 'critical technical practice' (Agre, 1995).

Musical works have much in common with the virtual or digital objects we now seek to understand and with our new world of augmented materiality (Massumi, 2002). They exist in a unique state of materiality/immateriality. While they are intensely bound to direct experience, to technologies, techniques and materials, this physicality can exist in multiple instantiations, they can be manipulated, engaged with and acted upon as cultural abstractions. In cultural terms, music is the area of human activity in which we deal with the virtual, with the constructive relationship between human affect and abstract structures or formal systems.

Technological models thus influence all aspects of contemporary thought and practice, while our long cultural experience of art music offers precedents for understanding digital culture.

In working not only with new technologies but with the models of thought they embody, performance, imagination and creation come into a different alignment. The situatedness and distributedness of the work have to be acknowledged. The relationship between performer and work is transformed, particularly when the performer retains creative ownership over the evolution of the work, or the work itself has 'intelligent' agency. How are these situations reflected in the act of performance? In its preparation, reception and repetition? The transductive nature of technological performance affords rich modes of representation, analysis and reflection. How do these inform the evolution of performance in particular cases in in general? We explore these aspects through case studies from MTT. Finally, we then consider what are the implications of such work for the performance and understanding of earlier, historical repertoire. Is 'technological' performance materially different to 'conventional' performance in a cultural context of shared models?

As traditional roles and contexts for performance are increasingly open to question, these issues are relevant to performers of all kinds of music. These widely-diffused models of thought are common to all contemporary modes of performance; indeed, they point to some important commonalities.

Thought, Technology and Performance: Lessons from the Future

Introduction: time, technology and potential

Music, Thought and Technology (MTT) is a research cluster established at the Orpheus Institute, Ghent, Belgium investigating the role of technology- and science-derived concepts in contemporary music practices: in technologically-facilitated music, of course, but also, more widely, in the creation, understanding, criticism, representation, pedagogy and discourses of music.[1]

The practices of contemporary music are many and diverse. Here we find our first lesson from working with technology: in attempting to make systems that interact with musicians in real time, we have to confront the technical fact that the spurious present must incorporate both the known and unknown pasts and the predicted and imagined futures. In programming interactive environments that aspire to respond and contribute meaningfully to performance situations, artists take account of a multitude of factors: the intentional, conscious behaviour of performers; analysis of their recent and historical behaviour; inductive predictive processes that imitate or complement; and musical situations they want to bring about that will somehow be contingent on the evolving performance. This technical challenge embodies the complex relationship with time that both composers and performers confront even in the most conventional contexts. Likewise, as we look at the range of our contemporary practices, we see that their shifting present involves the constant recreation and reimagining of past music alongside attempts to extend that line into the future.

In this respect, every musical act implies an interpretation of the state of music at the time of its enactment and a view of its potential development – it contributes to the evolution of the shape and dynamics of the space of music. By the same token, historical musicology at its best shares a fundamental property with sound art (at *its* best): as the imaginative creation of a space of potential, whether conceptual, behavioural, sonic, or any combination of these. Shared musical acts are thus performative by nature, exploring a particular instantiation of this space.

At the same time, researchers into digital culture are asking questions about the nature of digital objects and their relationship to human behaviour. Here, the conversation between music and digital media becomes bilateral; we have much to learn from each other. Music is a cultural activity in which we have a long history of dealing with fundamental dualities: with things that are at once utterly immaterial and intensely embodied and situated; with things that can exist in many places and in highly divergent forms simultaneously and yet retain their common identity; and with things of which any representation is a node in a network, an interface to an infinitely complex world via which we both apprehend that infinite complexity and reconcile it with the incompleteness of each individual representation.

As practitioners, the members of MTT pursue this work in the spirit of artistic research – through our own work as musicians – and adopting the methodological ethos of 'critical technical practice'. This term was coined by Artificial Intelligence theorist Phil Agre in his reflection on work in Artificial Intelligence.[2] Too often, he said, such work was presented in the metaphorical white coat of scientism – as if a particular piece of research was the result of the objective implementation of pure theory. Instead, there is a narrative, a sequence; there is personal, technical, social, professional and institutional context. Uncovering these modulating layers of ideology is crucial if we are to get a clearer view of what we are actually doing.

It is, of course, simple to imagine the history of music – at least of Western art music – as a history of the technologies of musical instruments. However, just as relevant to an

understanding of the performance of music are the conceptual frameworks within which musicians understand what they are doing. These frameworks - these operational concepts that sociologist of science Harry Collins describes as 'relational tacit knowledge' – constitute a sense of the possible, of the ways in which things in the world might operate, largely derived from science and technology (understood in the broadest sense).[3] They are rooted in the practical, the physical: the introduction of mensural notation shortly after that of the second-by-second clicks of the escapement action clock is a good example of this. Their evolution has continued to match that of technological progress more generally: developments in paper production through the eighteenth century meant that, while there are effectively no sketches by Bach, Beethoven drafted and stored rough material in much the same way that we might use an external hard drive; the piano keyboard – the music computer of the nineteenth century - provided a model for conceptualising tones and their relationships whether these are actually played upon it or not; and current computer manipulation of media has meant that the cut-and-paste, processing and looping of material is now the default way of perceiving its organisation for nerds and technophobes alike.

Performance, situation and distribution

The hybridity of our aggregate practices in MTT – scores, improvisation, synthesis, analysis, software, hardware, action, installations - obliges us to observe that each of these different modes of representation inscribes the musical object differently. We might look at technologies as modes of inscription. They have different implications for how the musical object (to agree a term for now) is situated in time and place, how it is distributed through time, space, technologies and social structures. They determine the shape of the space and the nature of the role afforded the performer. Modes of inscription that are superficially similar (two Max/MSP patches, two fully-notated scores), may afford very different spaces and roles.[4] However detailed, they are never complete. Furthermore, the form in which the object encounters the performer is only one moment of inscription, albeit an important one; the performance itself is another. So, in MTT, we think of technologies as modes of inscription, as the mediating vehicles of the distributedness and situatedness of the performed musical object.

Here are a few short examples from the work of MTT:

Nicholas Brown's *Vanishing Point* (2017) draws connections back to CPE Bach's *Abschied*, while projecting its sounds – filtered by history – into a future that is distributed through the mobile phones of the listeners.[5]

Nicolas Collins' *Roomtone Variations* (2011) lives entirely in the *hic et nunc* of the performance itself.[6] The resonant properties of the room are analysed, projected as notation and performed, changing those very properties in the process, such that the room becomes a living, inhabited sounding space.

In Jonathan Impett's *Spoken* (2016), compositional decisions are made entirely during performance by a dynamical system that itself evolves through the series of performances – performative events participate in the object as both response and material.[7]

The situated and distributed nature of these works is acknowledged in their instantiation and reception, in which performance, imagination and creation come into a different alignment from that normally encountered. The intertwined nature of the roles of composer, performer and instrument builder in computer music has changed the paradigm of how to negotiate these limits for conventional instrumentalists. Counter-intuitively, perhaps, the new situation has something in common with pre-industrial musical culture, in terms of the closer relationship between performance, composition and instrument-building. Practitioners today are faced with

challenges that go beyond the specialised 'mastery' of their instrument and demand the development of a relationship with an increasingly expansive set of tools and extensions to their original craft. Arguably, the advent of recording technology marked a first instance of these new contexts for practitioners: knowing how to interact with a microphone in the studio became not an added skill, but a necessity. Today, it is commonplace for instrumentalists to be confronted with the need to know not only how to use a microphone, but also how to control computer music patches, by means of triggering pads, foot switches or volume pedals.

This new performative context offers the opportunity to practitioners to revise their relationship to musical works, and to their practice. How are these situations reflected in the act of performance - in its preparation, reception and repetition? There is a strong paradox in technology-based music today: although it is undeniable that the tools and techniques used in the creation of these works are derived from recording techniques, there is an inherent (and sometimes even desired) impossibility of acquiring/capturing this repertoire. From the technical-dependent to the 'in-the-moment' dependent, from the use of dedicated spatialisation/sound diffusion setups (Wave Field Synthesis[8], Ambisonics[9]) to the merging of prescribed and improvised musical languages in a score, creators seem to seek the generation of an elusive experience, one that leaves the listener with the illusion that the work has more dimensions than can be captured in conventional recording.

What are the implications of such work for the performance and understanding of earlier, historical repertoire?

Interpretation in computer music

As already seen, computer music practice demands that practitioners merge, or blend, in one person the roles of composer, performer and instrument builder/technician. At present there is almost no tradition of computer music practitioners being trained in, or focused on, the specific demands and possibilities of the interpretation of live electronic repertoire. Nevertheless, in practice, composers often become the performers of their own works; they become logistically bound to the presentation of their own music in front of an audience. Furthermore, composer/performers have also become the designers and builders of the instruments they play. Facilitating the creation and performance of works dealing with electronic instruments from the position of the interpreter can be used as motivation to develop a performance practice - a new interpretative practice - in which this new combination of technical and musical skills can be put at the service of others.

The consummate computer music practitioner operates flexibly as composer, performer and instrument builder, as required. Within this intertwined profile, the act of interpretation takes on distinctive and novel aspects. Whereas, in a conventional music setting, interpretation might be thought to be primarily the preserve of the performer, the electronic music practitioner is potentially able to apply interpretative actions across the full spectrum of their skills. In the process, there is an increased opportunity for experimentation within the sphere of interpretation. Such experimentation may remain based upon, or, rather, may variously give emphasis to, composition, performance and instrument building, whether individually or in combination; however, the dynamically fluid way in which it may do so frees it from rigid adherence to these categories and makes it an important source of interpretative innovation.

In the light of this, it is perhaps helpful to develop a terminology that seeks to capture the range and scope of this new, dynamic and flexible interpretative field. At MTT, we have identified three possible interpretative modes for the performance of pre-existing repertoire in ways that go beyond the reproduction of a traditional set of 'interpretative' tasks; that is to say, three methods for an experimental take on interpretation. The idea was that, for each of these modes,

the skill-set of a composer, a performer, or an instrument builder would dominate in determining the experimental approach, but nonetheless, the skill-sets of the other roles would be still present. The three categories we developed are as follows:

- (Experimental) interpretation informed by compositional skills, which we initially called “re-appropriation”, since it is about identifying salient creative factors and applying them to the resolution of musical problems in performance. We have subsequently given this the name "gloss".
- (Experimental) interpretation informed by performative skills, which we called “re-interpretation”, since it is about identifying the interpretative challenges presented by a work and adapting them to the electronic media used in performance. We have subsequently called this "analogy".
- (Experimental) interpretation informed by digital lutherie, instrument building and other ‘technical’ skills, which we called “re-construction”, since it is about identifying the technical features of the setup in an early work, the friction between the creative impulse and the limitations of the original technology and the recreation of not only the positive features but also the constraints of the setups, in order to preserve the friction as an issue to expose, and deal with, in performance. We have subsequently called this "simulation".

The development of interpretative skills brings with it the inherent challenge of searching for suitable repertoire that either explicitly demands the expertise of a computer performer in charge of the electronic media component of the piece, or presents the potential for such a musician to contribute his or her skills to the performance of music not written for electronic instruments.

In *Multiple paths: Towards a performance practice in Computer Music*, Parra presents three case studies serving different initial needs and skills, detailing occasions on which he became familiar with, and helped develop, performance tools and techniques.[10] Each of these case studies responds to one of the three categories outlined above for understanding the notion of interpretation: re-appropriation/gloss, where the compositional element is emphasised; re-interpretation/analogy where the performative element dominates; and re-construction/simulation, where the technical dimension is paramount. For the purposes of this article, we shall take just one of these categories – that of re-interpretation/analogy – and demonstrate in greater detail, by means of a case study, how it may function.

One possible path: interpretation as analogy - on Morton Feldman’s *The King of Denmark*

In order to understand interpretation in computer music practice as an act of musical analogy, this discussion will focus on experimenting with the interaction between what it is possible to derive from traditional instrumental practices and what escapes the norm of a traditional instrumental discipline.

A personal method for exploring and challenging these potential points of connection (and collision) has been to define a historical and aesthetic context based on the interpretation of music that, although not conceived to be performed live by electronic instruments, is suitable for it, given the relationship between its conceptual framework and its manifestation in sound. Identifying such repertoire requires an analysis of the musical challenges present in the score, as well as an evaluation of the features and constraints demanded from a specific traditional instrument, and how these could be translated into electronic media. The other important element when selecting potential repertoire is to consider the relationship that the composer

proposes between the musical identity of the composition and the performative challenge. Once the challenges to the traditional instrumentalist proposed in the score are identified, the next step is to seek a possible answer to the question of why the composer is posing this challenge and, from there, to restate the challenge, framing it as a question and generating a possible answer in relation to electronic media.

Solo percussion pieces, in particular, lend themselves to in-depth exploration of this kind, as they tend to focus on using and combining diverse sound sources, thereby generating a rich timbral texture. This is something that is not only equally feasible for a live computer system but also allows one of the unique qualities of electronic media – its almost infinite timbral resource - to shine. On the other hand, the interpretative challenges presented to a percussionist can serve as an interesting point of departure for the computer performer, as the rather clean one-to-one relationship between physical action and sonic manifestation can be emulated, contrasted and commented on by a computer music practitioner. Finally, the solo percussion repertoire has a history that, in many ways, parallels that of computer music in its ongoing evolution from effect – or novelty – towards maturity.

An example of a solo percussion piece that lends itself to being re-appropriated by electronic instruments is Morton Feldman's *The King of Denmark* (1964). The score consists of a grid of densities, timbres and registers and, although it has a set tempo, in the words of the American percussionist Steven Schick:

> […] no rhythmic coherence emerges. Sounds simply float out, detached and weightless. One instrument has no more sonic gravity than another does. A small bell weighs the same – takes up the same acoustical space – as a large gong.[11]

The King of Denmark presents its performer with the challenge of balancing controlled and decontrolled elements. Feldman divides the musical parameters at the disposal of the percussionist into these two categories, providing instructions as to the interpretation of dynamics and articulation (always with the same extreme softness, on the verge of not producing a sound), tempo register and duration. Rhythm and pitch are left unspecified. Pitch becomes a quality absorbed by the timbre of the instruments that have been chosen by the interpreter for his or her setup. Rhythm is somewhat framed by the prescriptions of the other parameters, in as much as the natural resonances of the instruments – their constantly soft dynamics and the way they overlap – suggest the need for a sustained, stable unfolding of the piece.

Parra's solo computer version of *The King of Denmark* aims to transfer the notion of silent resistance into the world of computer music by creating an interface between performer and instrument that varies in responsiveness according to the instrumental densities defined in Feldman's score.[12] In this way, the timbral palette remains consistent, as in the original, but the uniqueness of electronic media reveals itself through the emphasis on their disjointed nature - such as in the relationship between physical action and sonic manifestation and in the potential negation of the spatial cause/effect relationship between sonic impulses and resonances. This approach allows Parra to preserve the original challenges posed to the interpreters by the piece, while recovering a feeling of uncertainty towards the sonic manifestation of each sound. Whereas, in the acoustic percussion version, a restrained physical effort might cause a particular action to be too 'soft' to be heard, in the case of the computer music version, the intensity and densities of gestures might displace a sound, making it arrive too 'early' or too 'late'. By focusing on the fragility of the audibility of *The King of Denmark* but shifting that fragility from dynamics to time-displacement (or responsiveness) the piece maintains an essential aspect of its nature while presenting a new challenge to its performer. In this way, it has been possible for Parra to emphasise a feature characteristic of electronic instruments (the

nonlinearity between physical action and sonic manifestation) and to present it as a tool for expressiveness and performative theatricality.

Conclusion

Technologies change the distribution and situation of musical acts and, in the process, our perception of these aspects as they would appear to us in 'familiar' circumstances. When working with current technologies – computational tools that prefer clear instructions - we find ourselves in a state of anamnesis – of remembering things we no longer knew that we knew. In performance, musicians are constantly dealing with the precision and nonlinearity of transduction, that is to say, of the means of converting physical action into sound. In doing so they make a further mark in the inscription history of a particular object, a new node in the network it draws across personal and cultural histories (a Popper-derived observation that goes back to Ligeti).[13] Each act of performance is an acknowledgement of the situated, distributed nature of music.

As shown in the example presented here, computer music has the capacity both to connect with and to extend the cultural networks already established around acoustic repertoires. Its own precision and nonlinearity are different from those of its acoustic counterparts but may be conceived as analogous to them. Moreover, the technological freedoms which it confers allow precision and nonlinearity themselves to be the subjects of creative choice and fertile experimental potential. If there are indeed 'lessons from the future' that computer music may convey to music practitioners more generally, then they are likely to reside within this fresh, and liberating, perspective upon the resistances and challenges of converting instructions, through actions, into sounds.

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1 See https://orpheusinstituut.be/en/projects/music-thought-and-technology

2 Philip Agre, 'Toward a Critical Technical Practice: Lessons Learned in Trying to Reform AI', in G. C. Bowker et al., eds, *Social Science, Technical Systems, and Cooperative Work: Beyond the Great Divide*, (Mahwah, NJ: Lawrence Erlbaum Associates, 1997), p. 132

3 Harry Collins, *Tacit and Explicit Knowledge*. (Chicago: The University of Chicago Press, 2010), p. 86

4 For more information on Max/MSP, visit https://cycling74.com/ (last accessed on February 7, 2020)

5 More about Nicholas Brown's *Vanishing points* available at http://nicholasbrown.co.uk/portfolio-2/vanishing-points-2017/ (last accessed on February 7, 2020)

6 More about Nicolas Collins' *Roomtone variations* available at https://www.nicolascollins.com/texts/RoomtoneScore2017.pdf (last accessed on February 7, 2020)

7 Live recording of Jonathan Impett's *Spoken* available at https://www.youtube.com/watch?v=9jwDbJ_vy8o (last accessed on February 7, 2020)

8 More information on Wave Field Synthesis available at https://gameoflife.nl/en/about/about-wave-field-synthesis/ (last accessed on February 7, 2020)

9 More information on Ambisonics available at https://www.creativefieldrecording.com/2017/03/01/explorers-of-ambisonics-introduction/ (last accessed on February 7, 2020)

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13 György Ligeti, 'Pierre Boulez: Decision and Automatism in Structure Ia' *Die Reihe* 4 ("Young Composers"): 1960, p. 61