Early and Lost Works for Solo Percussion and Live Electronics

February 22, 2024, at 8 p.m.
Pollack Hall
555 Rue Sherbrooke Ouest

Sculpture Musicale (1913) Marcel Duchamp (1887-1968) 0'

Cartridge Music/Solo for Cymbal (1960) John Cage (1912-1992) 10'

...explosante-fixe..., version for vibraphone and live electronics (1990) Pierre Boulez (1925-2016) 20'

Coefficient: frictional percussion and electronics (1991) David Tudor (1926-1996) 30'

Stuart Jackson, percussion

Max Ardito, computer programming for *...explosante-fixe...*

Ezra Teboul, sound

Marcel Duchamp (1887-1968) *Sculpture Musicale* (1913)

In Duchamp's notes, *Sculpture Musicale* is described as "sounds lasting and starting from different points and forming a lasting sound sculpture."[1] John Cage would take this idea to make a piece for the Merce Cunningham Dance Company in 1989 with nearly the same title, *Sculptures Musicales*, and since then many other musicians have made their own realizations out of Duchamp's idea. If you read the notes further, however, the proposal quickly reveals itself as impossible: "Build one or more precision musical instruments which mechanically provide a continuous transition from one tone to another to be able to note modeled sound forms without hearing them (against virtuosity, and the physical division of sound recalling the uselessness of physical theories of color)."[2]

I first learned about this piece from an interview with John Cage, who claims that Duchamp started thinking about music "not as a time art, but a space art [and] made a piece called Sculpture

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[1] Duchamp, Marcel 1887-1968., Paul Matisse, and Anne 1943-2008 D'Harnoncourt. *Marcel Duchamp, Notes*. The Documents of Twentieth Century Art. Boston: G.K. Hall, 1983. 47, found in: Stévance, Sophie. "Les Opérations Musicales Mentales de Duchamp. De La 'Musique En Creux.'" *Images Re-Vues*, 2011.

[2] Ibid.

Musicale, which means, different sounds coming from different places and lasting, producing a sculpture which is sonorous, and which remains."[3] The additional prerequisite for it to be able to model sound forms while not resounding seems to have been left out by Cage, but it's also possible that Duchamp made some changes since writing down the idea in 1913.

Nevertheless, the realization I'll present tonight functions as a sound installation that will be heard before the concert begins. The realization is influenced by the pieces on the program tonight, as it relies on the principles of acoustic feedback to run. The subsequent pieces by Cage, Boulez, and Tudor all use feedback in one way or another, but it plays a particularly important role in the Tudor piece, who based nearly all of his compositions on feedback principles. The installation I've assembled tonight features acoustic feedback in a rather simplistic form: contact microphones on cymbals and aluminum trays, with an oscillating fan to cause disruptions and variations within the feedback system. Although it's possible to set this up to produce more or less stable feedback oscillations, the sensitivity of the system is vulnerable to external stimuli, making unexpected, but not radically different sonic results over time. The addition of the oscillating fan keeps the sounds changing, allowing for the system to continue playing different variations of feedback on its own. The interest I have in Duchamp's idea of a musical sculpture lies in the challenge of building an auto-poietic mechanical sound installation that performs itself. In the end, however, I still see music as an art form fundamentally connected to time, not space, and my experience in developing this realization confirms just how paradoxical Duchamp's idea remains.

John Cage (1912-1992) *Solo for Cymbal* (1960)

Solo for Cymbal is the title I've given for my realization of Cage's piece *Cartridge Music*, which is named after the use of phonograph cartridges to amplify small objects. This piece belongs in a series of graphic scores Cage composed in the 1960s for his close collaborator David Tudor, and which allow for the production of distinct realizations which can be given alternative titles depending on the material used for that realization. For example, in *Cartridge Music*, Cage suggests alternative interpretations which necessitate the use of different titles such as *Duet for Cymbal*, *Piano Duet,* etc.

The common theme that runs through all the different realizations that can emerge from this score is the amplification and transformation of very small sounds, and the live production of electronic

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[3] Jdavidm (@jdavidm8797), "John Cage about silence," YouTube video, July 14, 2007,
https://www.youtube.com/watch?v=pcHnL7aS64Y

music, which, in the context of the mid-twentieth century, was historically experienced exclusively as playback on tape machines through loudspeakers. *Cartridge Music* was an effort made by Cage to create a piece of electronic music that could be performed live.

The question of transforming small sounds to big ones can be traced back to Leonardo Da Vinci, if not further. Michel Chion makes this connection in his book *Sound: An acoulogical treatise*, and is worth quoting at length:

> In his famous mirror script, Leonardo Da Vinci wrote in his notebooks: "I ask whether a slight sound close at hand can sound as loud as a big sound afar off?" While the question went unanswered, Hugo, by comparing sounds of such different scale, echoed it. Eisenstein evoked the example of the cockroach about which we say that it is shot "in close up" if it takes up a large part of the image, whereas the same will not be said of an elephant that takes up the same amount of space or even fills the entire screen. This is because relative to our own scale, these two creatures are different sizes. The same goes for sounds: certain sounds, even when they are loud or heard from close by, conjure small sources.[4]

Chion expands the notion of turning a small sound into a large sound, opening up the complicated perceptual aspects of listening to certain sounds that, though quiet, may appear big if they are heard from a distance, and other sounds that may be heard at the same volume, but are perceived as small. For example, the sound of a dry leaf being crumpled just a millimeter away from one's ear will be relatively loud, but still categorized as small in our mind. Thunder heard from a great distance, though perceived at a lower volume, will still be considered a big sound.

In *Cartridge Music,* these typical perceptual categories get turned upside down with the use of piezo and phonograph cartridge microphones that are capable of transforming small sounds to big sounds. For this reason, many of the objects that are usually chosen in a realization of *Cartridge Music* are those that require amplification in order to be heard at all. A slinky for example, contains a whole sonic universe, but can only be heard if you hold the end of the slinky against your ear. The same goes for similar objects such as pipecleaners and piano wire, which, when inserted into a phonograph cartridge, can be amplified by a great degree, turning what would typically be considered a small sound into something more akin to thunder, when played through loudspeakers at a volume loud enough to reverberate through a cavernous space such as a concert hall.

The cognitive dissonance that results from using amplification to such a radical degree is what makes *Cartridge Music*, despite still originating from purely acoustic materials, a work of live electronic music. Despite the freedom given to the performer in *Cartridge Music*, the clear boundaries

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[4] Chion, Michel. *Sound: An Acoulogical Treatise*. Trans. James A. Steintrager. Durham: Duke University Press, 2015. 7

that Cage prescribes about which electronic devices, microphones, and loudspeakers are used and how they should be arranged in a presentation, provides for a focused sound world that renders the work recognizable despite the infinite variety of iterations that are possible.

One significant, and in some ways elusive aspect of *Cartridge Music* is the use of tape loops. In the score, there are three variables intended to modify the amplified sounds: volume, tone, and tape loops. In 1960, Cage was referring to the practice common in electronic music studios at the time of recording sound on a physical loop of magnetic tape. The loop enabled endless repetition of recorded sounds, with the possibilities of speed alteration or playing sounds in reverse. In the score, there is no elucidation of how one would record and manipulate tape loops in a live performance setting, although it is certainly within the realm of possibility.

In original realizations of *Cartridge Music,* performers simply played certain sounds repetitively when the score necessitated the use of a tape loop. Despite the fact that Cage owned and used tape machines in performances, there is no documentation or evidence I've found that he used tape machines in this way for live performances in *Cartridge Music*. Presently, it is relatively easy to add a delay effect to a sound picked up via cartridge or contact microphone and achieve the tape loop effect with an external device that automates this function.

In this particular realization that will be presented this evening, I gave myself the challenge of only using hardware devices that Cage may have had access to during the period in which it was created and performed, including using a tape machine to execute the loop transformations. The use of the tape machine became an incredibly interesting addition to the assemblage of resources used to create this realization. Suddenly, instead of playing repetitively when "loops" showed up in the score, I had to translate "loop" to some kind of action on the tape machine, which had now become a musical instrument in the context of the realization. Using delays or loops in software would not afford the same level of engagement. The ambiguous language that Cage uses in *Cartridge Music* allows for a certain level of interpretive freedom in translating commands to physical actions, as can be evidenced from studying David Tudor's early realizations of the work. This makes it possible, when using a tape machine, to translate the designation "tape loop" to mean any kind of action that may alter the current state of the tape machine, from recording sounds, to playing them back, changing the speed, or adjusting the speed by pressing gently on the motor. Learning the piece this way and developing the use of manipulating a live tape loop to realize this aspect of the piece has greatly expanded the possibilities of the work itself, which begs the question of why Cage or Tudor never tried this approach themselves, or why the tape loop variable in the score allows for such a wide array of interpretations that do not even require the use of a tape loop.

The realization I've assemble is thus a unique one, employing ideas borrowed from the historically informed performance movement, namely the use of period instruments, which has resulted in the paradoxical effect of discovering some new ways of interpreting the piece.

Pierre Boulez (1925-2016)   *...explosante-fixe...* (1986-1990)

Boulez's *...explosante-fixe...* was originally conceived as a memorial to the composer Igor Stravinsky, who died in 1971, and was first published as an indeterminate score in the form of a matrix of transformable musical material that could be realized by other musicians or composers. In the decades following this first publication, Boulez produced a number of different versions until a final version emerged in 1993 for MIDI flute, electronics, and chamber orchestra. All of the pieces in what is now known as the *...explosante-fixe...* family of works were either published or well-documented, with the exception of the vibraphone and electronics version, which will be presented tonight for the first time since 1990.

The vibraphone version was the 3rd piece in the series, and can be traced back as early as 1976, in a letter where the performer of the piece, Jean-Claude Forestier, expressed interest in Boulez's idea to create a version of *...explosante-fixe...* for vibraphone and several synthesizers. Forestier would not receive a score until 1980, and though the vibraphone text would never change from then on, Boulez would continually run into scheduling difficulties for developing the electronic part for the work.

The ability to perform this work tonight has depended on an ongoing quest for information which began with my first visit in 2022 to conduct archival research at the Paul Sacher Foundation in Basel, Switzerland, where the Boulez papers are held. This first visit led to a small explosion of the emergence of scores, sketches, sources, and people that has been expanding ever since.

Before this first visit to the Sacher Foundation, little information was known about the history of this version, or the reasons for its removal from Boulez's catalogue. Through my archival research and conducted interviews with the performer Jean-Claude Forestier, it has become clear that Boulez was never satisfied with the electronic part. The first iteration of the vibraphone version was premiered in Basel in 1986, but the electronic part was done entirely by the head of the Südwestrundfunk (SWR) experimentalstudio in Freiburg, Hans Peter Haller, with analog devices, and with permission, but not direct input or supervision from Pierre Boulez.

When André Richard took over for Haller at the experimentalstudio a new digital version of the electronic part was developed by Richard and Boulez which premiered at the Verkehrshaus in Lucerne on September 5, 1990, as part of the Musica Nova series in 1990. Boulez, still not content with the

electronics, wrote to Forestier multiple times about his desire to continue working on a computer version of the piece, but unfortunately never found the time in his busy conducting schedule to devote the time that would be necessary to finalize it.

After the performance at Lucerne, Boulez wrote to Forestier the following month expressing his desire to rework the entire electronic part, with the goal of imagining the vibraphone as a kind of MIDI instrument. Although not entirely clear, he was most likely alluding to the technique of triggering MIDI samples that would be mapped to an individual note on the vibraphone, as a way of expanding the musical material of the piece and the timbral possibilities and range of the vibraphone. This also hints at Boulez's interest in employing score-following software, which would enable certain electronics cues to be triggered by individual notes on the vibraphone. Boulez also signalled his ambitious long-term goals for the completion of the work. He stated in no uncertain terms: "J'aimerais faire, à partir de ce texte d'E.F. une oeuvre qui pourrait vraiment tenir le coup à côté du Sacre du Printemps."[5]

Unfortunately, this would never come to pass. In subsequent letters exchanged in the following decade between Boulez and Forestier, both express the desire to find time for a sabbatical to properly work on this version, with Boulez communicating his hopeful plan to put together a computer version of the piece through the arrangement of a collaboration between IRCAM and the SWR. However, by the end of the 1990s, the hope of completing this work starts to run thin, as Boulez continually had to turn down opportunities to work on it with Forestier due to constant travelling for conducting engagements and other composition projects. Letters exchanged in the 2000s continue to mention the possibility of arranging a premiere of the final version of *...explosante-fixe...*, but despite Boulez's promise to Forestier, a final version would never materialize.

The version that is presented this evening is the result of a couple of years of archival research and decoding of sketches in order to render a performable version of the work. Since 2022, I've been working on a reconstruction of the 1990 Lucerne version with Max Ardito, who has taken on the role of programming the electronic effects in a max/msp patch. Much of this work has involved deciphering electronic notes and sketches left behind by Richard and Haller, some more cryptic than others, and we've come to a point where we have a version that feels ready for live performance and is extremely close to the version that was heard in Lucerne.

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[5] Letter from Pierre Boulez to Jean-Claude Forestier, October 10, 1990, Paul Sacher Stiftung. In English this roughly translates to: "I would like to do, from this text of E.F. a work that could really hold up next to the Rite of Spring."

Originally, the version that Jean-Claude Forestier performed throughout the 1980s contained six movements, but before the last performance in 1990 in Lucerne, he received the latest version of the score from Boulez which contained a total of eight movements. Boulez composed the last two, *Transitoire II* and *Transitoire III*, in 1989/90, thus completing all the sections in the original matrix score from 1971. Unfortunately, Boulez never got around to arranging for an electronic part to be added to these final movements, and they still have yet to be performed. This evening, we'll be presenting the original version that was performed by Forestier with the following six movements:

1. *Transitoire VI*
2. *Transitoire IV*
3. *Originel A*
4. *Transitoire V*
5. *Originel B*
6. *Transitoire VII*

In the near future, we plan to continue our work on this piece, and eventually perform all eight movements with electronics added as Boulez originally intended.

David Tudor (1926-1996) *Coefficient: Frictional Percussion and Electronics* (1991)

At the Getty Research Institute, where the David Tudor Papers reside, a note can be found written in Tudor's hand that succinctly describes the basic concept behind *Coefficient*:

> *Coefficient* is an electronic work, the product of electroacoustic transducers and special microphones. A variable feedback system between the two elements is influenced and changed by the performance of frictional sounds by a percussionist. A distinction is made between those sounds produced by friction, and those produced by impact.[6]

The variable feedback system refers to Tudor's practice of connecting the outputs of devices back into the inputs to create a cascade of signals from effects processors that were designed to transform sounds, not produce them. This became a significant feature in most of Tudor's music, but to my knowledge, *Coefficient* stands out as the only work that used amplified acoustic instruments as an input to influence a feedback network.

The rest of the papers that pertain to *Coefficient* are comprised of unfinished schematics, which delineate a kind of pictorial map that shows what kind of electronic devices are to be used, and how

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[6] Tudor, David. "David Tudor Papers." Los Angeles, CA. Getty Research Institute. Box 49, Folder 8.

they should be connected together. These schematics are often cryptic, and acronyms that label the different electronic devices to be used require some deciphering and educated guessing.

I've spent the last three years slowly identifying the devices that were originally used in *Coefficient* and assembling them all in the proper connective configuration. A recording of the work from the New York Public Library provides some clues as well and serves as an important document that I've used to test my sounds against the recording, as a way of confirming whether I have put the devices in the proper place within the feedback network.

Although getting the set-up right is of the utmost importance for reconstructing Tudor's music for live performance today, other details surrounding performance practice is also crucial. In D'Arcy Philip Gray's account of his reconstruction of *Web II for John Cage* (1987), he notes the importance of understanding Tudor's performance practice in relationship to his involvement with John Cage and the Merce Cunningham Dance Company on the one hand, and his training as a classical pianist on the other. Tudor was always trying to straddle the line between controlling the unstable systems he developed, and increasing the instability once he felt he had a certain level of control.

In a review of the album *Pulsers/untitled* by Tudor, Joseph Paul Taylor notes that "Tudor puts a lot of people off needlessly by insisting on heavy-metal volume levels at his concerts."[7] Although this is an important fact to be aware of, I want to argue that this insistence was probably not entirely needless. Knowing that Tudor performed his pieces at loud amplitudes, it's equally critical to note that he would do this with the loudspeakers pointed at the walls or ceilings in order to envelop the physical space he was in,[8] which of course would require a certain decibel level to do sufficiently. In addition, I've discovered from my own experiences with feedback oscillation that there is a direct correlation between gain settings and variability in the behavior of the feedback network, meaning that a certain amplitude ceiling is necessary in order to hear the full range of variety that is produced by the circuitry.

I also suspect that this propensity to play at loud volume levels also had something to do with enhancing the sensation of sound through touch, which is particularly noticeable with low frequencies.[9] This would make sense in connection with the *Rainforest* series of works by Tudor, which features found objects used as speakers set-up in an installation setting, inviting listeners not only to hear the

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[7] Taylor, Joseph Paul. *Computer Music Journal* 9, no. 4 (1985): 71–72.

[8] Conversation with Phil Edelstein, February 3, 2024.

[9] The connection between technological music making and tactile sensing is explored further in: McCartney, Andra. "Soundscape Works, Listening, and the Touch of Sound." In *Aural Cultures*, edited by Jim Drobnick, 179–85. Toronto, ON: YYZ, 2004.

sounds produced through the ears, but feel the vibrations of the sound through touching the objects. It would make sense that this desire to experience sound through hearing as well as touch would persist in some way throughout subsequent works. As Andra McCartney puts it: "Hearing is done not only with the ears, but also with every fibre of our beings as vibrations of sound move into our bodies. Sound touches us, inside and out, and this feeling of being touched by sound is heightened by technology; when microphones amplify and record sounds, they not only involve the ears, but also every other part of the body."[10]

Though this would not happen at every single performance, in her memoir, Carolyn Brown recalls the painfully high decibel levels that would sometimes be produced from the musicians during Merce Cunningham Dance Company performances, arguing that Cage's scores never explicitly called for loud volumes, but thought it irresponsible of Cage to let others realize his music at painfully high decibel levels, blaming the "Live-Electronics Jockeys who call themselves musicians," most likely referring to David Tudor and Gordon Mumma without naming them directly.[11] Despite Cage's defense of the deafening cacophony as part of the soundscape of everyday life (subways, jackhammers, sirens, etc.), Brown suspected that Cage "hated what emanated from [the Cunningham music pit] as much as [she] did." This anecdote reveals quite a lot about Tudor's performance, especially when one takes into account that the indeterminate scores for electronics that Cage wrote throughout the 1960s were written for Tudor. Cage would even go so far as to claim that he and David Tudor were the only ones who could realize his indeterminate scores properly.[12]

Further evidence suggests Cage enjoyed hearing his music played at loud volumes, and one account brings back this enjoyment of loud music to an experience of sensing sound through the body. Cage recalls the performance of his piece *Fontana Mix* by the percussionist Max Neuhaus, who devised a unique version that produced sound entirely through acoustic feedback generated by contact microphones on timpani: "Max Neuhaus plays a version of my *Fontana Mix* which is superbly physical. You hear it through your whole body. And as for me, my knees start shaking. Others put fingers to ears and make their ways out. Not all, but many."[13]

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[10] McCartney, Andra. "Soundscape Works, Listening, and the Touch of Sound." In *Aural Cultures*, edited by Jim Drobnick, 179–85. Toronto, ON: YYZ, 2004. 179

[11] Brown, Carolyn. *Chance and Circumstance: Twenty Years with Cage and Cunningham*. Northwestern University Press paperback ed. Evanston, Ill.: Northwestern University Press, 2009. 364

[12] Ibid. 266

[13] Kuhn, Laura. *The Selected Letters of John Cage*. Middletown, CT: Wesleyan University Press, 2016. 321

In later performances of his own music, Tudor would sometimes push loudspeakers to their absolute limits. In one particular performance in Buffalo, NY, Tudor was performing with the Merce Cunningham Dance Company in an old theatre that had vintage Western Electric loudspeakers from the 1930s. John DS Adams recalls the story in an article in *MusicWorks*:

> During the sound-checks before the show, one of the speakers acted up. The cone in the speaker would periodically stick, bringing the sound to a grinding halt. A member of the local crew, familiar with the problem, would swiftly leap up and smash the cone with his fist, bringing life back to the speaker. During performance, *Toneburst* revved up and the sound system sang the sounds of Tudor with majestic authority. After a few minutes, however, the finicky speaker dropped out. Tudor and his engineer, John Fullemann, were discussing whether or not someone should go up and kick-start the speaker when, before they could act, smoke and then flames shot from the speaker! Tudor grinned from ear to ear and cranked up the levels a little bit more. The audience backed up a few rows and made for the exits. One brave attendee grabbed a fire hose and moved toward the speaker, but the aged hose left a trail of its own dust. Eventually the fire was extinguished. Merce and his dancers continued throughout all the commotion and at the curtain, the applause was deafening. Tudor always enjoyed when his music "sliced" and "sizzled" but that night he outdid himself.[14]

Performing any of Tudor's music today is not an easy task. The literature that is left behind by Tudor does not exist in the same format as the typical musical score that can be purchased or checked out at the library, and then, with the proper instrument, realized by anyone with the right training. His music eludes the established symbolic ordering that is typically used to document musical work with any kind of permanence, and yet, there is an entire body of musical literature left behind by Tudor that has not been heard in live performance for several decades. It is my hope that more musicians will take up the archival work necessary to bring all his music back to life again in the near future.

-Stuart Jackson

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[14] Adams, John D.S. "Spirit Beyond a Life." *Musicworks* 69 (December 1997): 13–17. 17