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The Developmental Influence of Both Musical Notation and Wind Instruments on Electronic Music and Music Software

University of Denver

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Annotated bibliography

This annotated bibliography is meant for you – the person who wishes to learn more about electronic music and its roots. I argue that electronic music is a legitimate form of music, and despite films depicting machines and robots as cold and lifeless they have the potential to be humanistic and wonderfully expressive. Perhaps one day, sooner than later, electronic instruments will be quintessential for orchestras in the near future. Until that day these series of sources are critical in informing electronic music enthusiasts the history behind electronic music and synthetic sound.

In my argument, one of the ways to prove electronic music's artistic legitimacy is acknowledging its lineage within Western music. The history of electronic music, the subjectivity in music notation, and the technological advances in wind instruments all derive from the innate pursuit to organize and create new sound. The notation programs used today that play back what you insert in the software is no different in principle than a Byzantine liturgy "programming" singers to sing the desired neumes during mass. The "update" from neumes to staff notation granted composers the "software" language to organize wind instruments to play more complex phrases. In response, wind instruments "upgraded" themselves – adding or subtracting keys, refined their tuning, or pitching their tonal centers down to Bb or up to Eb – to perform difficult passages with ease. Those that didn't update – like serpents, ophicleides, and sudrophones – were replaced in bands and orchestras by their updated counterparts.

When compared to the history of Western music in its entirety, the existence of electronic music and its materials are relatively new. Similar to jazz and its origins in documentation, most of the raw, original sources for early electronic music are in the form of recordings. Even though electronic instruments and recording devices were invented as early as the 1900's, composers, sound engineers, and music groups like Pierre Schaeffer, Kraftwerk, and John Cage use the same attention to detail to carefully craft their desired sound in the same manner as the acoustic musicians that came before.

It wasn't until the late 1960's when scholastic journals and monographs began to discuss the origins of electronic music and its impact on music to follow. At the same time, the experimental use of electronics in early rock and roll bands began to hit the top of record charts in the US and Europe. Some sources embrace the electronic traditions and promote its future involvement alongside acoustic music. Others warn of electronic musics' artificial existence, lackless expression and fixed media as dehumanizing and uncanny.

Before you proceed to the resources below, I pass onto you my advice for researching this or similar topics: Electronic music from the 40's, the 80's, and today in the 2020's come to no

surprise as being drastically different in terms of audio quality, quantitative resource materials, and in compositional and performance practice. The predictions for what electronics could become has changed so drastically over decades that there is no telling what will develop by the 2040's. Yet one thing remains the same throughout all these periods in history – the mindset for electronic music is seen as being "without limits," where the possibilities for capturing and creating organized sound are endless. Be critical when listening to older recordings, think of how both electronic and acoustic music mediums have or could have complimented each other over the decades, and by the end reflect on your core beliefs for what you think music is, and whether all sounds – naturally occurring or synthetic – are inherently musical.

1. Cage, John. "Imaginary Landscape No. 1." Track 2 on *John Cage: Credo in US / Imaginary Landscapes / More Works for Percussion*. Wergo, 2001. Accessed November 12, 2022. https://open.spotify.com/album/3dKxENTwybmyMN0QESSK5P.

John Cage (1912-1992) is an American composer and music theorist who challenged the fundamentals of music performance through avant-garde orchestration via silence and indeterminacy. Cage's contributions in indeterminacy through non-traditional instrumentation are best showcased through his works featuring electronic compositions. Even though the piece was written in 1939, *Imaginary Landscapes No. 1* is written for 2 variable-speed turntables, frequency recordings, muted piano and cymbal. By preparing the piano this way, the acoustics are able to blend with the soundscape of the recordings. At the same time, the prepared audio and turntables are manipulated in a way to match the piano and cymbals. This melding of acoustic and electronic music mediums not only demonstrates the delicate work done by John Cage, it also paves the way forward for musicians to carefully craft synthetic sounds with advantageous instrumental technique. Even though the melding of acoustic and electronic sound mediums is a John Cage compositional trait, the imagination reinforcing *Imaginary Landscapes No. 1* and other later works are reminiscent in practice to the creation of organized sound found in both Luigi Russolo's Manifesto, *The Art of Noises*, and the *Musique Concrète* manifested by Pierre Schaeffer.

2. *Grove Music Online.* "Score Notation of Early Music with Conflicting Bar-Lines (Monteverdi, ed. H. Leichtentritt, '12 fünfstimmige Madrigale'; Leipzig: Peters, 1909)." Accessed 29 Oct. 2022. https://www-oxfordmusiconline-com.du.idm.oclc.org/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-8000004673.

This snip-bit from this edition of "12 five-part Madrigals" shows that even with what notations are common, there can still be some confusion laid in part interpretation. The note heads and beams line up vertically with where the beat is, but reading music horizontally the odd mixing of time signatures and bar lines can make reading this madrigal confusing if you're not careful. Regardless of the vocalist's discipline, the notation should make it easy for the performer to read,

while obtaining the desired musical expression and effect. Even with fairly modern notational symbols, this example shows that even with the period notation, the notational music language can still fabricate confusion.

3. Depeche Mode. *Violator.* Sire Records Company – 9 26081-2, March 19, 1990. CD.

New wave music groups through the 1980's like Duran-Duran, Tears for Fears, Hall & Oates, and A-ha maintained their popularity through their use of synthesizers and electronics alongside guitar, bass, drums, and vocals. Even though these groups utilized the music equipment at the time, very few bands distinguish themselves as being purely "electronic." Similar to the electronic group Kraftwerk, Depeche Mode takes inspiration from the expressive capabilities of electronic instruments to create their music. More specifically with Depeche Mode to formulate synth with the more heavy rhythmic emphasis used in rock and roll.

Their album *Violator* uses methods for producing electronic musical elements similar to many new wave bands. Dialing up the equipment to the next level, Depeche Mode use various synthesizers, drum pads, and distortion pedals used by guitar and bass in their creative process. The vocal lines delivered by Dave Gahan and Martin Gore are minimalistic yet rhythmic, focusing the attention toward the rhythm section and their groove. Because of this, the accompaniment expresses consonance and dissonance through the use of glides, bends, and effects like reverb, delay, and echoes. Even though the use of electronics is unconventional through a classical lens, the overall form and inspiration for their songs derive from traditions of dance, rock and roll.

In the same year of *Violator's* release, it hit the top of the record charts in the *UK Independent Albums*, *Productores de Música de España* (Spain), *IFPI Greece*, *Syndicat national de l'édition phonographique,* and *Belgian Entertainment Association*. In the US, *Violator* was the first Depeche mode album to enter US record charts, reaching top 10 on the *Billboard 200* and staying there for 74 weeks. Because of their success in both the US and European record charts, Depeche Mode solidified their place as both an electronic music band and one of the most significant founders for the next evolution in popular electronic music called "Synth-pop."

4. Kraftwerk. "Computer Love." Track 5 of *Computer World*. Warner Bros. Records – HS 3549. May 10, 1981. CD

Even though Kraftwerk was formed in 1970, lead keyboardists Florian Schneider and Ralf Hütter met in the late 60's while participating in German experimental music at the Robert Schuman Hochschule in Düsseldorf. It was then after that the pair collaborated with other electronic enthusiasts and released a series of albums using traditional rock band instruments, flute, violin, and keyboards. By the time *Computer World* was released in 1981, it was their 8th album.

Computer World has themes of everyday digital devices and their effects in society. Several songs on *Computer World* depict the technologies of the Digital Age worthy of celebration and acceptance. Kraftwerk uses unconventional electronic devices as auxiliary instruments (ie. a

stylophone in *Pocket Calculator*, and a Texas Instrument (TI) language translator to generate lyrics). The use of sound sequencers by the drums and electronic accompaniment allowed musicians to turn digital sounds into expressive, improvised melodies.

All these elements as described above are showcased in Kraftwerk's "Computer Love." The lyrics themselves are minimal, rhythmic and syncopated with the drums and bass synth. This minimalistic expression in voice emphasizes the importance of digital accompaniment. Around 5:23 seconds in, there is an improvised solo by the lead synth, before returning to the theme and fading away. Despite the lyrics being repetitive, the rhythmic ostinato staying the same, and returning themes tethering the song together, the culmination of digital sounds and groove keep the audience's attention through the entire song.

By the time *Computer World* was released, Kraftwerk had already received international fame for outstanding performance and contributions to what would later be called hip-hop, post-punk, house music, and club music. In 1981 *Computer World* was 7th in Germany's *Offizielle Top 100*, and 32nd in US Billboard's *Top R&B and Hip-Hop Albums* music chart. The following year, Kraftwerk was nominated for the Grammy Award for Best Rock Instrumental Performance.

The successes of Kraftwerk is a pivotal period within the history of electronic music; where Schaeffer, Stockhausen, and Cage were avant-garde sound sculptures of electronic music, Kraftwerk innovated electronic music through the Digital Age and was the first group to successfully popularize the genre. Even though they use traditional methods for musical expression and form they created a sense of futurism using the technologies available to them.

5. Schaeffer, Pierre. "Pierre Schaeffer Interview," Interview by Tim Hodgkinson. Accessed November 12, 2022.
http://paul.mycpanel.princeton.edu/music242/shaefferinterview.html.

Most who are new into researching electronic music think only of musical instruments such as keyboards, drum pads, amps, effect pedals, microphones, sequencers, electric kazoo, triangle, and anything else you can plug in and generate sound. With the artificial, synthetic associations to electronic sound production, there is also a connection to its counterpart – nature and natural acoustics. Pierre Schaeffer (1910-1995), a French composer and sound engineer, captured the sounds and innate music produced in nature and spliced the different audio tapes to generate music. Known as "the father of sampling," Schaeffer defined this practice of unrefined recorded audio sampling as *Musique Concrète*.

In this interview, conducted by Tim Hodgkinson in 1987, Tim introduces himself with a question on the importance of Musique Concrète over 'Electroacoustic music.' The argument made is that electronic music is fabricated to be specific, controlled, and tempered, whereas Musique Concrète encourages the listener to find meaning and symmetry within the sounds materials. To Tim, *Musique Concrète* maintains humanistic elements like critical thinking with infinite combinations of captured sounds, and electronic music fills the absence of humanity with scientific rationale for the "technocrat."

Following the interview there is a very brief summary of both Pierre Schaeffer and Tim Hodgkinson, which then opens the floor for questions. Hodgkinson has his questions at the ready; he asks about Schaeffer's views on critics, followers, the music being made during certain periods in time. In response, Pierre Schaefffer recounts his personal music upbringing, the "occupation of the Viennese school," and the pursuit to break away from the 12-tone system. Hodgkinson raises another point, expressing his concerns on machines representing "purity, or perfection, which we in ourselves cannot achieve, and is therefore an escape from the human." Hodgkinson asks if Schaeffer's practices with "the machines" is humanistically expressive, to which Schaeffer replies indefinitely humanistic. Schaeffer expresses that *Musique Concrète* is not music, but a sculpting of sound to make "Sound Structures." When asked about his thoughts of rock and its pseudo-technological roots, Pierre Schaefffer claims that rock music is barbarous in nature. Schaeffer continues by stating the technological advantage to elevating rock music's violent sounds, and how that development is "dishonest," but following an age of barbarism comes a Renaissance. Pierre Schaeffer closes the interview by stating that he is not a musician, but a good researcher.

The questions asked by Tim Hodgkinson not only illustrate Pierre Schaeffer as an artist in soundscape, but also being well informed of the world around him. Schaeffer is grounded in his roots of capturing the inherent music within nature, while having opinions on Musique Concrète's opposition. However, between electronic music and *Musique Concrète*, Schaeffer does see the unlimited potential for both forms of electronic media to prosper as time and technology goes on.

6. Wellesz, Egon. "Early Byzantine Neumes." ***The Musical Quarterly*** **38, no. 1 (1952): 68–79.** http://www.jstor.org/stable/739594.

One cannot acknowledge updates and improvements to notation without looking back at what notation was before and seeing how much was changed. And as far back as the 9th century, early music was notated through neumes. Within the realm of Byzantine music, Egon Joseph Wellesz (1885-1974) is a significant scholastic benefactor. Not initially a musicologist, the Austrian-born Wellesz studied law for a brief time, then found his passions for music studies under Arnold Schoenberg and Guido Adler. After the success of his string quartets, ballets, and operas, Wellesz along with other music influencers founded the Internationale Gesellschaft für Neue Musik, later becoming the International Society of Contemporary Music in 1923. Almost in a complete contrast with his new music pursuits, Egon Wellesz worked in England on the Grove's Dictionary of Music, contributing most of his studies in Byzantine music and 17th century opera. He would later receive an honorary doctorate from Oxford University in 1932 and a fellowship at Lincoln College in Oxford, remaining there until his death.

There wasn't a universal notation, but there were set regional styles of notation throughout the Western world. Byzantine neumes between the 9th and 13th century are highly controversial in terms of neume interpretation, according to Egon Wellesz. The arguments emphasized by Wellesz are as follows: 1) early neumes were notated to help guide the cantillation, 2) early neumes

emphasize dynamic and rhythmic importance, and 3) between the the 11th and 13th centuries an update to an intervallic neume system led to more confusion on how to notate rhythm.

Unfortunately, there are still debates today over how Byzantine neumes and chants are to be historically performed. Even though the notational language has long since been updated, there are examples even in today's standardized notation that are the cause for discourse. In the case of electronic music's upbringing, although the medium between computer notation and written notions are respectfully different, the pursuit to organize sounds as intended by its creators are fundamentally the same.

7. Young, Thomas Campbell. "Wood-Winds." In *Making of Musical Instruments*, 2nd ed., 96–115. New York: Books for Libraries Press, 1969.
https://worldcat.org/title/45045?oclcNum=45045.

Thomas Campbell Young sought to present the craftsmanship and fundamental concepts of musical instruments in a pedagogical language fitted toward teachers, students, and scholars alike. Similar to the previous chapters, Thomas Young uses diagrams, written scenarios, and step-by-step directions to explain why and how woodwinds are functional. Even though Young is writing for a wide variety of students and scholars, the terminology provided assumes the reader has a higher music education in the realm of woodwinds. Although Young's remarks for woodwind functionality are pedagogically substantial, there is an insufficient amount of scientific reinforcement explaining how the shape of the reed affects the tone, or how a conical bore is different from a cylindrical bore. The only scientific explanations used are in his segments on tuning and temperature affecting pitch, and even then Young uses musical terms such as "pitch vibrations" instead of the scientific unit of sound frequency called hertz.

The process and concepts for wind instruments have drastically developed going into the 20th century. Thomas Young not only gives us the steps toward understanding and mastering the different instrument families, he also shows that when learning about music there is a fundamental grasp of science in studying an instrument. That pursuit to bring science and understanding into the practice room can be applied for the opposite – to welcome music into the field of physics and sound engineering. Which is exactly what avant-garde electronic composers encompassed in their literature.

8. — "A Note in Electronic Music." In *Making of Musical Instruments*, 2nd ed., 186-90. New York: Books for Libraries Press, 1969.

Interestingly enough, Thomas Young reserved the last few pages of *Making of Music Instruments* for electronic instruments and their music. Young explains the mechanical properties of oscillators and their means of electronically producing sound through a series of magnets, coils, and tone wheels. The electronic example Thomas uses is the Hammond organ, or "pipeless organ," named after its inventor Laurens Hammond. The recently made Hammond organ's revolutionary

expression with a wide variety of dynamics, swells, and imitations of other instruments impressed Thomas Young so much he positively concluded that this electronic instrument's "possibilities seem to be almost without limit (p.189)." Perhaps the Hammond organ's revolutionary technology to mimic certain instruments was the inspiration toward Karlheinz Stockhausen's elektronishe musick upbringing. Perhaps on the other side of the same coin the Hammond organ would have been challenged by Pierre Schaeffer as being merely a toy for the classical keyboardist, and not a proper tool for sound sculpting.

9. Stockhausen, Karlheinz. "An Interview with Karlheinz Stockhausen." Interview by David Felder. *Perspectives of New Music*, 16, no. 1 (Autumn - Winter 1977): 85–101. https://doi.org/10.2307/832850.

Karlheinz Stockhausen (1928-2007) is a German surrealist composer whose contributions in integrating live performance with electronics helped expand the repertoire of acoustic and electronic instruments. Like other pioneers who entered the field of sound art, Stockhausen first had classical upbringing in piano, oboe and violin. After completing his primary studies in 1947, Karlheinz Stockhausen continued to study music pedagogy and piano at the Hochschule für Musik Köln, as well as philosophy, musicology, and German Studies at the Universität zu Köln. Following his assistantship with German music theorist Hebert Eimert in the Electronic Music Studio of Nordwestdeutscher Rundfunk radio broadcasting station, Stockhausen began grounding and refining his compositional technique in both instrumental music and electronic music. After several years of well received live performances of his solo, chamber, and operatic compositions, presentations and lectures in electronics in seminars across Europe, and collaborative efforts to the field of *Elekronishe Musik*, Stockhausen was appointed as professor of compositional studies at the Hochschule für Musik Köln from 1971-1977.

By the time of David Felder's interview in 1976, Karlheinz Stockhausen was a prominent figure in the field of electronic music. David Felder brings attention to Stockhausen's works by asking about influences and inspirations behind the origins of certain compositional elements, such as the use of timbre and space, and the passage of time. Stockhausen responds by using natural and scientific examples for musical exploration, referencing previous composers like Webern and Mahler to explain his compositional technique in duration and space. Karlheinz Shtockhausen compares electronic music's early development and exploratory nature to that of medieval studies in music, saying that "the medieval synthesis of the highest sciences – of music, astronomy, mathematics – is again in sight (p. 94)." David's interview covers a wide variety of material used in Stockhausen's later works, such as *Gesang der Jünglinge, Sirius,* and *Aus den Sieben Tag*, and includes an addenda of the music program used at the world premier of *Sirius* the day before the interview. What is excluded in Felder's interview is the influence of science, philosophy, and nature on Stockhausen's choice of graphic notation style.

David Felder's interview shares how Karheinz Stockhausen encompassed several fields of study to elevate the subject of electronic music. This method of merging music through acoustic

and electronic mediums derives from both a natural curiosity and a pursuit of music knowledge. As Stockhausen explained, the exploratory nature in advancing music follows a long lineage in Western music, and the early discoveries in electronic music are no different in principle than the explorations conducted by precedents of medieval musicians. Contrary to the portrayal of *Elekronishe Musik* and *Musique Concrète* having sparring matches over which has superiority, Stockhausen and Schaeffer both respectfully acknowledge the inherent natural beauty of the world the sounds within it, and no method is right or wrong in conveying that message.

10. Taruskin, Richard. "Chapter 2 Indeterminacy: New Notations." ***Oxford History of Western Music: Music in the Late Twentieth Century.*** **New York: Oxford University Press, n.d.** https://www-oxfordwesternmusic-com.du.idm.oclc.org/view/Volume5/actrade-9780195384857-div1-002009.xml.

Richard Taruskin is a significant contributor in the field of musicology. His controversial writings on the history of Western music. One of his greatest contributions to musicology – *The Oxford History of Western Music* in six volumes – brought in a new perspective that challenged the preconceived perspective of the western canon. Initially receiving his B.A, M.A., and PhD from Columbia University, Taruskin was known first for his research in the historical performance practice of Gregorian chant, polyphonic music, and Baroque concertos. Tauruskin went on to receive several academic accolades for his research primarily in Russian opera studies and Igor Stravinsky. By the time Tauruskin retired from University of California, Berkeley, in 2014, he received the Noah Greenberg (1978), Alfred Einstein (1980), and Otto Kinkeldey (1997, 2006) Awards from the American Musicology Society, the Dent Medal (1987) from the Royal Musical Association, and was elected into the American Philosophical Society in 1998.

In this chapter, Tauruskin provides graphic scores from Earle Brown, Eric Salzman, and Sylvano Bussotti, who are directly influenced by John Cage's philosophies in indeterminacy. Through score analysis, Taruskin explains within graphic notation abstract shapes, lines, and space, there is an abstract sense for pitch, rhythm, tempo, and duration – the same abstract, indeterminable variables that are characteristic in indeterminacy. Not mentioning the performance discipline needed in the three examples, Taruskin mentions Cage's own compositional methods as being "precisely specified and tightly controlled," demanding higher discipline from the performers and being intolerant to the clichés associated with "open form" compositions.

Following the rules of indeterminacy, the examples by Brown, Salzman, and Bussotti demonstrate that even for "free form" to exist for the duration of the piece, there has to be some sort of organization and communication between composer and performer. Graphic scores are just another "upgrade" that help composers express and obtain their desired musical effects. Thanks to John Cage and several contemporaries, to carefully design a graphic score now meant to carefully orchestrate both sound and silence within an audible space.

11. Mumma, Gordon, and Christian Wolff. "John Cage, Electronic Technology, and Live-Electronic Music: (2012)." In *Cybersonic Arts: Adventures in American New Music*, edited by Michelle Fillion, 166–78. University of Illinois Press, 2015. http://www.jstor.org/stable/10.5406/j.ctt17w8g01.32.

Gorgon Mumma is an American composer trained in piano and "cybersonic" performance. Mumma went to the University of Michigan in Ann Arbor before dropping out. Throughout his music career Gordon Mumma worked alongside several electronic contemporaries like David Tudor, Robert Ashley, and John Cage. In 1975 Gordon Mumma was professor of music at the University of California in Santa Cruz.

The inscriptions by Gordon Mumma are personal – having collaborated with Cage in several venues, Mumma does a fantastic job bringing together John Cage's upbringing and life influences. Mumma brings attention to *Imaginary Landscapes, No. 1*, as Cage's "first significant music using electronic technology (p.168)." From there, Gordon Mumma gives a brief synopsis of other live-electronic works by John Cage; *William Mix*, *Forbidden Planet*, *Cartridge Music*, *Atlas Eclipticalis*, *Winter Music,* and the series of *Variation* which Mumma was given the opportunity to collaborate on. Gordon Mumma describes the technological methods used by John Cage to generate an electronic sound, including magnetic tapes, cartridge transducers, phonographs, preamplifiers, equalizers, and even a custom device similar to a terpsitone which Cage uses for his 1965 premiere of *Variation V*.

The level and sophistication behind making these desired sounds and effects is what Gordon Mumma shares in his summary of John Cage's electronic music career. The creativity and imagination along with insight in sound engineering was what made Cage so successful throughout his electronic endeavors, and is reflective of the creative nature behind Luigi Rusolo's futuristic manifesto.

12. Roads, Curtis. Review of *The Art of Noises*, by Luigi Rusolo and Barclay Brown. *Computer Music Journal* 11, no. 4 (Winter, 1987): 54. https://www-jstor-org.du.idm.oclc.org/stable/3680244?searchText=The+Art+of+Noises&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3DThe%2BArt%2Bof%2BNoises&ab_segments=0%2Fbasic_search_gsv2%2Fcontrol&refreqid=fastly-default%3Ac5a16a96abce020e5f3db8854000df66#metadata_info_tab_contents.

Curtis Roads (1951-Present) is currently both the professor of Media Arts and Technology at the University of California at Santa Barbara and the Associate Director of the Center of Research in Electronic Arts Technology (CREATE) at USCB. Roads received bachelors, masters, and doctorate degrees in composition and music programming from the California Institute of Arts, the University of San Diego, and Université Paris 8. Furthering his education between 1980 to 1986, Roads was a researcher in computer music at the Massachusetts Institute of Technology and MIT Media Laboratory. From then on, Curtis Roads has taught in masterclasses all across Europe

and America, As well as confounding the International Computer Music Association in 1979, he was the Editor of Computer Music Journal for the MIT Press between 1978-1989, and Associate Editor from 1999-2000. His studies focus on microsound synthesis, pluriphonic spatialization, visualization and notation of sound, and the history and aesthetic of electronic music composition. From his intensive studies in the field, Curtis Roads has received several awards for electronic composition and published several books in computer music history and composition.

Written during a time of rapid industrialization, growing nationalism, and romantic maximalism showcased by Mahler and Wagner, there was always a lot of noise being made in Europe at the turn of the 19th century. Because of the soundscapes of large cities constantly generating random noises, Luigi Russolo (1885-1947) was determined to create all sorts of new, indistinguishable sounds. In the pursuit of elevating sound production and organization, Luigi Russolo created several experimental instruments, compositions, and ultimately his manifesto *The Art of Noises*.

This review, made by Curtis Roads, presents both the impact *Art of Noises* has in musicology, and Barclay Brown's synopsis on Russolo's life. Based on his opening remarks Roads is grateful to have a Brown's publication that includes Russolo's manifesto and several writings in the mid to late 1910's. Following his gratitude the review points out many of Russolo's stories through major historic events. Brown encapsulates the manifesto as a series of personal accounts in noise instrument performance, graphic notation, composition, and inspiration from nature, language, and war. From the early influence of urbanized soundscapes and loud machines to the post-war European climate, Brown presents Luigi Rosolo's *Art of Noises* around an even larger summary of Europe in the early 1900's.

During a time of rapid development, scientific discovery, and radical political reform, Luigi Rusolo's *Art of Music* is the inspiration behind prominent composers like John Cage, Karlheinz Stockhausen, and Pierre Schaeffer who are staples in electronic music's lineage. To someone like Curtis Roads who is advancing further the field of electronic music today, he understands the deep traditional imprints for sound exploration and the significance of Luigi Russolo's futuristic marks in embracing and organizing different sounds. With the research background of Curtis Roads, I wonder if he feels more a musician in the computer music realm, or if similar to Pierre Schaeffer's interview maybe Roads feels more like a researcher in the field of sound sculpting and engineering.