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THE EVALUATION AND ASSESSMENT OF ELECTRONICALLY-COMPOSED AND PERFORMED MUSIC



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Abstract

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Some purveyors of traditional music may see the introduction of electronics and electronic instruments as stains on the grand tapestry of music; yet there are many composers and performers who have embraced the possibilities that can emanate from technology and deftly woven those threads into this aural tapestry. A significant step toward equal footing with Western art music is to critically evaluate and assess electronically-composed and -performed music. This paper will address issues of evaluating and assessing electronically-composed and -performed music, especially as it relates to defining composition, discussing "skill," and contemplating musical literacy.

Introduction

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As one who teaches both music history and music technology I have been caused a reasonable level of consternation by the divide which has gradually formed between historic formal/concert music and popular music. As one who teaches on everything from the Grecian modes to drum 'n' bass music I stand in the midst of that divide and give credence to both sides. As one who teaches music technology I remind my students that audio recording is not just rock 'n' roll – it encompasses all genres of music.

These thoughts became increasingly present to me as I began to focus more of my compositional efforts towards technology, specifically the use of computer-generated audio, both in composition and performance. While I knew there was a short, yet rich, history of electronic music in higher education I found it difficult to rise above the “pop culture” stigma often assigned to electronic music. I realized that electronically-composed and -performed music needed to be critically evaluated and assessed in order to be closer to equal footing with Western art music.

This paper will address issues of evaluating and assessing electronically-composed and -performed music; specifically, this paper will: 1) suggest potential issues with defining an electronic composition, 2) touch on skills for composition and performance, 3) present thoughts on assessment and evaluation (from a primarily academic standpoint), and 4) postulate on electronic musical literacy. The paper will conclude with three brief closing thoughts.

Defining “Composition”

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The question as to what defines a composition is a point of contention among people in the field of music.¹ Composition is a complex, multifaceted construct.² Three categories are suggested for defining a composition: musical cohesion/coherence, complexity, and how the resulting piece of music is viewed by its creator.

Musical Cohesion/Coherence

The eighteenth-century French writer and composer Jean-Benjamin de Laborde, writing in his *Abrégé d'un Traité de Composition*, said this about composition:

Then it boils down to two things: to set certain rules in order to organize the sounds, one after the other, so that a pleasant melody results from them, and to provide the means to accompany this melody with a good harmony. That is to say, to have several different melodic lines heard at the same time, without this mixture having anything unpleasant [about it].³

¹ Indeed, the very act of defining of music can be a difficult venture. Horacio Vaggione offers a thought, along with a quote from Jacques Bouveresse on the matter: “...it can be argued here that the very idea of ‘music itself’ encounters a major difficulty: nobody can say what music is, other than by means of a normative proposition, because ‘music itself’ is in fact a non-demonstrable thing, and its practice is neither arbitrary nor based on physical or metaphysical foundations: ‘It is not because we know, in one manner or another (and without being able to say how), what music is that we also speak of atonal or concrete music as music. We use the word “music” according to certain rules, and these are neither very precise nor based on the “nature of things”, even if they cannot be considered as arbitrary.’” Horacio Vaggione, “Some Ontological Remarks about Music Composition Processes,” *Computer Music Journal* 25, no. 1, “Aesthetics in Computer Music (Spring 2001), 55. <http://www.jstor.org/stable/3681635>.

² “Music composition processes can be envisioned as complex systems involving a plurality of operating levels. Abstractions of musical ideas are manifested in myriad ways and degrees, one of which is of course their suitability for implementation as algorithms, enabling musicians to explore possibilities that would otherwise lie out of reach.” *Ibid.*, 54. Luigi Russolo, famed early twentieth-century Futurist and painter, said, “In order to excite and stir our sensibility, music has been developing toward the most complicated polyphony and toward the greatest variety of instrumental timbres and colors.” Luigi Russolo, “The Art of Noises: Futurist Manifesto,” *Audio Culture: Readings in Modern Music*, Christoph Cox and Daniel Warner, eds. (New York: Continuum International, 2004), 11.

³ Donald Craig Filar, *Jean-Benjamin de Laborde's "Abrégé d'un Traité deComposition:" The Merger of Musica Speculativa and Musica Practica with an Emerging Musica Historica* (PhD diss., Florida State University, 2005), 249. Preceding this summary, Laborde says, “What we call composition consists of only two things. The first is to line up and arrange several sounds, either similar or different, one after the other, in such a way that this series of sounds will have nothing unpleasant about it and may make pleasure for the ear; this is what the Ancients called melody and what we name song. The second consists of having two or several sounds heard together in such a way that this mixture will be pleasant. That is to say, it is to devise several different melodic lines which will be able to go together in such a way that the mixture or collection of different sounds of which they are composed will contain

If this definition were to be our model then there are copious amounts of music that would be considered “compositions” and yet there would also be a considerable amount of music that would not be designated compositions, in particular where Leborde’s definition says a composition should not have “anything unpleasant [about it].”

Aurelio de la Vega writes that there are two main considerations when delineating electronic music composition:

(1) accepting the honesty of the electronic music composer, his artistic ability, his technical skill and the validity of his creation as an organized artistic experience, is this type of artistic creation music at all? and, (2) given that the product is accepted as music of a new type or order, is not such music “inhuman”?⁴

He follows this with a brief comparison of the division between the stereotypically subjective nature of nineteenth-century music and the attempted objectivity of early twentieth-century composers.⁵ This objectivity, de la Vega says, is “epitomized in Stravinsky's description of it as ‘a form of speculation in terms of sound and time’.”⁶ For de la Vega recognition and/or appreciation of twentieth-century music is more important than a comprehension of its forms and sounds.⁷ This view of appreciation over comprehension is not new to the realm of “new music;”

nothing that shocks the ear. This is what we call harmony, and what would only be worthy of the name composition. A dual use has prevailed, however. We hear this word [composition] used equally for melody and harmony, thus, to set up a pleasant series of sounds that produce a beautiful song when they are put together from other sounds to create a harmonic whole. All of this is composition.” Ibid., 248-9.

⁴ Aurelio de la Vega, “Regarding Electronic Music,” *Tempo*, no. 75 (Winter 1965-66), 5. <http://www.jstor.org/stable/943392>.

⁵ “The ever-present popular concept of music as a direct, open, emotional expression and as a subjective form of communication from the composer, is, of course still that of the nineteenth century, when composers themselves spoke of music in those terms: e.g. ‘from the heart to the heart’ (Beethoven), ‘tone as the direct expression of feeling’ (Wagner), ‘emotional sensitivity’ (Berlioz), ‘the portrayal of soul states’ (Mahler), and ‘not needing the frame of pedantic forms’ (Busoni).” Ibid.

⁶ Ibid.

⁷ “An acceptance of this more characteristic twentieth-century view of the art of musical composition will of course immediately bring the layman closer to an understanding of, and sympathetic response to, electronic music, even if the forms, sounds and approaches it uses will still be of a foreign nature to him.” Ibid.

composers from Debussy to Stockhausen have had to defend their music against the onslaught of purists.⁸

Musical Complexity

The discussion of complexity in music is not exclusive to electronic music; many pieces and works over the centuries have been labeled “complex” by listeners and critics alike.⁹ But does a heightened degree of complexity equal a “good” composition? In an assessment rubric for the live-coding music software Sonic Pi, Pam Burnard and Louis Major describe complex as “detailed, elegant.”¹⁰ Arnold Whittall, in responding to a study on complex music, said,

I added that ‘the principal challenge for complex music is to create material as memorable and a formal context and treatment as rich and refined, as is possible (if rarely attained nowadays) with motives’.¹¹

⁸ Stockhausen participated in a “musical exchange” with a group of electronic musicians dubbed the “Technocrats” (Richard D. James/Aphex Twin, Richie Hawtin/Plastikman, Robin Rimbaud/Scanner, and Daniel Pemberton). Stockhausen was given a piece from each of the Technocrats, he listened to them, critiqued them, and recommended one of his pieces to each of the Technocrats for their musical development. The Technocrats each listened to a Stockhausen piece, gave critique to Stockhausen, and then recommended one of their works for Stockhausen’s musical development. While there was some appreciation shown most of the participants did react rather defensively of their music. This is documented in “Stockhausen vs. the Technocrats,” *Audio Culture: Readings in Modern Music*, Christoph Cox and Daniel Warner, eds. (New York: Continuum International, 2004), 381-5.

⁹ Any number of electronic and electroacoustic compositions comes to mind, including Stockhausen’s *Gesang der Jünglinge* and Varèse’s *Poème électronique*, as well as “traditional” works, such as Stravinsky’s *Rite of Spring* and Schoenberg’s *Erwartung*.

¹⁰ Sonic Pi, Pam Burnard and Louis Major, “Assessing Music Coded using Sonic Pi,” Sonic Pi: Live & Coding, <http://www.sonicpiliveandcoding.com/s/Assessing-music-coded-using-Sonic-Pi.pdf>, accessed March 6, 2015. “As a result of the research we identified that teachers were looking for some guidance on how to assess music coded using Sonic Pi, both compositions and live coded performances. In this section, we identify several approaches to assessment developed by Pam Burnard and Louis Major (Faculty of Education – University of Cambridge). These encourage practitioners (teachers/artists/technologists) and pupils to work together to develop assessment practices that take the form of joint evaluations.” Sonic Pi, “Resources,” <http://www.sonicpiliveandcoding.com/>, accessed March 16, 2015.

¹¹ Arnold Whittall, James Dillon, “Review: Riverrun,” *The Musical Times* 134, no. 1805 (July 1993), 387. Roger Marsh, commenting on Whittall’s comment, says this, “Clearly a champion of the broad aesthetic of the ‘new complexity’ composers (Femeyhough, Dillon, Barrett, etc.), these remarks reveal a certain ambivalence which requires explanation. For while the exhortation to take the next mighty step has a bravely positive ring, it is nevertheless an implicit acknowledgement that ‘complex’ music has not yet achieved a very high degree of sophistication within its own language. The material, according to Whittall, is unmemorable and its treatment and formal distribution are neither rich nor refined by comparison with other (motivic) music. Leaving aside the question of what constitutes a ‘motive’, and whether or not ‘complex’ composers use them, it has to be said that Whittall’s

Taking this idea a step further, two rubrics were compared for the assessment of musical compositions: one for elementary school-aged children and one for university students.¹² The general criteria for the elementary-aged rubric include “aesthetic appeal, creativity, and craftsmanship;”¹³ the rubric for university students considers “orchestration, presentation, compositional technique, aesthetics/creativity, literacy, and musical form.”¹⁴ Neither rubric uses the term “complex” to assess compositions; instead they focus on how well musical ideas are being communicated and developed and if the composer shows their awareness or understanding of certain elements or aesthetics of a musical form or genre.¹⁵

Based on these ideas perhaps we should not assess musical complexity based merely on its level of difficulty; perhaps we should, as Burnard and Major suggested, look at the beauty and elegance of a piece, whether the piece be more intricate or more simplistic.¹⁶

A Composition in the Eyes (or Ears) of its Composer

We have heard that beauty is in the eye of the beholder, but what about a composition in the eyes, or ears, of its composer? How do composers classify their works? This was the subject of a paper by Sandra Stauffer in 1994. Her paper involved a two-year, collaborative case study with electronic music pioneer Morton Subotnick and his then prototype composition software.

challenge is hopelessly unrealistic. If the challenge were to be met, 'complex' music would no longer be 'complex'.” Roger Marsh, “Heroic Motives: Roger Marsh Considers the Relation between Sign and Sound in 'Complex' Music,” *The Musical Times* 135, no. 1812 (Feb. 1994), 83.

¹² While the term “elementary school” is not mentioned in the article the age range is implied when the author states, “...an assignment might invite students to ‘compose a piece of music that describes your favorite stuffed animal, using whatever sounds and notes you want.’” Maud Hickey, “Assessment Rubrics for Music Composition,” *Music Educators Journal* 85, no. 4 (Jan. 1999), 27. The university rubric was devised by Dr. Aleksander Sternfeld-Dunn and Dr. Ryan Hare, Washington State University, Spring 2010. A copy was given to me by Dr. Sternfeld-Dunn.

¹³ Hickey, 29.

¹⁴ Sternfeld-Dunn and Hare, 1-2.

¹⁵ See Appendix A for the rubrics.

¹⁶ Although the ideas of beauty and elegance are rather subjective one can find both in a tone row piece or a Chopin nocturne.

Subotnick designed the program, later known as Making Music, as a “non-notational and intuitive, meaning that children would be able to compose without having to master music performance skills or read music or verbal instructions.”¹⁷ Subotnick did this by using the computer screen and mouse as to represent the typology of a well-known children’s activity: finger painting.¹⁸

Stauffer and Subotnick used three of John Sloboda’s criteria for determining creativity in music in their case study:

- (1) examination of a composer's manuscripts, sketches, and completed works;
- (2) examination of what composers say about their own compositional processes;
- (3) observation of composers during the composition process.¹⁹

¹⁷ Sandra L. Stauffer, “Composing with Computers; Meg Makes Music,” *Bulletin of the Council for Research in Music Education*, no. 150 (Fall 2001), 2. <http://www.jstor.org/stable/40319096>. Accessed August 31, 2014. A brief summary of the study is as follows: “The goals established for the first year of the study included observing children as they worked with versions of Subotnick’s composition program, testing the software, and refining research procedures and questions for subsequent study of children’s creative thinking and composition processes. At the beginning of the school year, a letter asking for volunteers to participate in an after-school computer music project was sent to the parents of all children who attended a local public elementary school. Volunteers were accepted on a first-come, first-served basis. Twenty-one children ranging in age from six to eleven years old participated in the project during the first year of study. Participants attended thirty-minute sessions once a week, with no more than three children participating during any time slot. Sessions continued throughout the academic year... After the conclusion of the first year, I reviewed and summarized data in preparation for the next phase of the study. Based on the data and our experiences, I revised procedures and developed the following questions to guide the second year of the study: How do children get started with their compositions? What does the process of composing look like among children? Do any patterns of composing develop over time? What evidence is there that student composers are thinking in sound?...The following fall, Subotnick concluded testing and I continued the study of children as composers. Parents of children who had participated in the first year of the project were contacted, and eleven participants continued in the study for the second year. If children or parents inquired about including siblings or friends, we accepted them. We also accepted one additional student who volunteered independently. Sixteen children participated in the second year of the study. Subotnick’s software, now completed and published under the title *Making Music*, was the primary composition program used by participants in second year of the project.” Ibid., 2-4.

¹⁸ “[Subotnick] described the program using the metaphor of finger painting in sound.” Ibid. “When a child plays with crayons or finger paints we don’t say, ‘Wait – before you experiment creatively, we’re going to give you drawing lessons.’ Yet, if a child has an idea for a piece of music they will have to bang at a piano or hit a drum; they will not be able to write the music at the level of finger painting. So we say, ‘Let’s give you piano lessons.’ I created Making Music to allow children to experience what it’s like to create music at the level of finger painting.” Transcribed from: Morton Subotnick, “Making Music: Home Edition,” Morton Subotnick’s Making Music, http://creatingmusic.com/demo/making_music_h.html?ref=m, accessed March 16, 2015.

¹⁹ Stauffer, 3. “We examined works participants created, talked with them about their works, and watched them as they composed.” Ibid.

Of these three criteria it is the second one (“examination of what composers say about their own compositional processes”) which concerns us at this time.

A considerable portion of Stauffer’s study focuses on one specific child, a young girl named Meg. According to Stauffer, Meg was selected because

of [her] place in the center of the age range of all participants, the completeness of the case record, and because the data provided ‘opportunity to learn’ - a ‘primary criterion’ for selecting cases and for sampling data within them when constructing the report.

Stauffer documents Meg’s journey in four sections: “Meg as Composer,” “The Composition Process” (in three stages), “Thinking in Sound,” and “Implications.”²⁰

Meg developed a total of twenty-seven pieces of music. In “Ending: Concluding a Composition” (the third stage of “The Composition Process” section), Stauffer remarks, “...listening to and revising the end of the composition only or listening to the whole and making minor adjustments to the background of a piece usually signaled the conclusion of Meg’s work on a composition.”²¹ Ultimately, Stauffer notes, “The term ‘composition’ refers only to pieces Meg chose to call ‘composition’ and save in the ‘Composition Book’ file.”²²

Vaggione says, “What a composer wants comes from the ‘singularity’ of his or her musical project – from the composer’s manner of performing a critical act with relationships.”²³

²⁰ Ibid., 5-19.

²¹ Ibid., 13.

²² Ibid., 6. Hickey suggests, “Composition should be an ongoing activity in the music classroom, providing opportunities for students to experiment freely with musical sound in order to discover how to manipulate and organize it. Students should be encouraged to compose, edit, revise, and ‘doodle’ music as often as possible, keeping their ‘sketches’ as well as final compositions in personal ‘portfolios’ such as those visual artists use to hold their work.” Hickey, 26.

²³ Vaggione, 60. “There is no musical process without representational systems at work – a plurality of representational systems, depending at which level or time scale we are operating. Algorithmic representations cover a substantial part of this plurality and are certainly pertinent, as they can match at least some of the assumptions underlying a given music production system, especially when including the condition of interaction, revealing its many simultaneous levels of articulation as well as its direct anchoring in perception. This leads us to valorize what is perhaps the most important issue for an ontology of music: the fact that situations organized around the production of music would not be pertinent if they were devoid of implications touching directly on questions of action and perception.” Ibid., 60-1.

The evidence would suggest that ultimately it is the composer who christens their compositions as such. The genre or subgenre could be historically mandated (e.g. concerto, drum 'n' bass, etc.) however the differentiation of a full-fledged composition versus a “sketch” or a “working idea” would ultimately lay with the composer.

Skills

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While the playing of a traditional instrument, such as a guitar or piano, carries with it a historical skill set and pedagogy, the playing of electronic music instruments and controllers spans a wide range, from the aforementioned historical skill set and pedagogy to a bespoke/case-by-case model.²⁴ Not only have piano keyboard-based synthesizers have been popular electronic music instruments for a number of years (as mentioned in Section II, “Extending Cognitive

²⁴ Examples of bespoke electronic music controllers would include Elena Jessop Nattinger’s VAMP, Imogen Heap’s Mi.Mu gloves, Tim Exile’s Flow Machine, and Beardyman’s Beardytron 5000 mkII. Sergi Jordà, speaking on gestural controllers, notes, “Acoustic instruments consist of an excitation source that can oscillate in different ways under the control of the performer(s), and a resonating system that couples the vibrations of the oscillator to the surrounding air. Where in most non-keyboard acoustic instruments, the separation between the control interface and the sound generating subsystems is fuzzy and unclear, digital musical instruments can always be easily divided into a gestural controller (or input device) that takes the control information from the performer(s), and a sound generator that plays the role of the excitation source. The controller component can typically be a simple computer mouse, a computer keyboard, a MIDI keyboard or a MIDI fader box, but with the use of sensors and appropriate analogue to digital convertors, any control signal coming from the outside (i.e. the performer, but also the audience or environment – as in the case of interactive installations) can be converted into control messages understandable by the digital system. Changes in motion, pressure, velocity, light, gravity, skin conductivity or muscle tension, almost anything, can now become a ‘music controller’.” Sergi Jordà, “Interactivity and live computer music,” *The Cambridge Companion to Electronic Music*, Nick Collins and Julio d’Escriván, eds. (Cambridge: Cambridge University Press, 2007), 96-7. “Where we typically think of an instrument as singular, within live electronic music, it is perhaps best to think of the individual components (eg turntables and drum machines) as the musical objects of the live rig *as instrument*. Percussionists are a close acoustic parallel to the modular musical rig of electronic performers. While there are percussion players who use a single percussive instrument for their performances, others will have a rig of component elements to use at various points throughout a set. The electronic performer inherits such a configuration from keyboardists, who typically have a rig of keyboards, each with different sounds, to be used throughout a set. Availing themselves of a palette of sounds allows keyboardists to break out of the limitations of timbre and verge toward the realm of multi-instrumentalists. For electronic performers, these limitations in timbre only exist by choice in the way the individual artists configure their rigs. From the perspective of users of traditional instruments, a multi-instrumentalist is one who goes beyond the standard of single instrument musicianship, representing a musician well versed at performing on a number of different instruments, usually of different categories. In the context of electronic performance, the definition of instrument is so changed that it is more practical to think not of multi-instrumentalists but multi-timbralists. The multi-timbralist can be understood as the standard in electronic performance. This is not to say there are not single instrument electronic performers, however it is practical to think about the live electronic musician’s instrument not as a singular musical object, but rather a group of musical objects (timbres) organized into the live rig. Because these rigs can be comprised of a nearly infinite number of musical objects, the electronic performer has the opportunity to craft a live rig that is uniquely their own. The choices they make in the configuration of their rig will define not just the sound of their performance, but the degrees of variability they can control.” Primus Luta, “Live Electronic Performance: Theory And Practice,” *Sounding Out!*, December 9, 2013, <http://soundstudiesblog.com/2013/12/09/live-electronic-performance-theory-and-practice/>, accessed March 17, 2015. Chris Brown adds, “Considering the intuitive facility that acoustic musicians develop through years of practicing physical gestures that create sounds on their instruments, what strategies should electronic musicians can take in designing their instruments for live performance?” Chris Brown, “Music 252 Seminar in Electronic Music Performance Spring 2015 Syllabus,” Mills College, 2.

Ability”) but guitar-, drum-, and wind instrument-based synthesizers/electronic instruments and controllers have enjoyed a range of popularity since the late 1970’s.²⁵ The governing logic behind these four instrument-based typologies (piano, guitar, drum, wind) is to use something familiar (fingerings, chords, embouchure, breath controller, etc.) to gain access to something foreign (i.e. synthesized sounds).²⁶

In the early days of computer-based composition and performance composer-musicians used room-sized computers littered with knobs, dials, switches, and levers to create their compositions. These gargantuan machines could contain a series of oscillators, tape machines, and filters. In these situations musical skill could be defined by the ability to turn a knob or flip a switch at a predetermined time or how well a punched card was authored or magnetic tape was spliced.²⁷

The difficulty in codifying a set of skills and pedagogy for electronic music instruments and controllers is the diversity and sheer number of options that exist and are currently under

²⁵ Jordà reinforces this: “. . . not only keyboards, but virtually all traditional instruments (such as saxophones, trumpets, guitars, violins, drums xylophones or accordions) have been reconceived as MIDI controllers.” Ibid., 97. Kickstarter reports the Expressiv MIDI Guitar was successfully funded November 25, 2014 (<https://www.kickstarter.com/projects/733246303/expressiv-midi-guitar-real-midi-real-guitar-real-c>); online music retailer Musician’s Friend stocks fifty-four different electronic drum sets as of this writing (<http://www.musiciansfriend.com/electronic-drum-sets#pageName=category-page&N=500311&Nao=0&recsPerPage=20&v=g&profileCountryCode=US&profileCurrencyCode=USD>); and digital audio company Akai Professional continues to make the flagship wind controller, the EWI (Electronic Wind Instrument, <http://www.akaipro.com/product/ewiusb>). All websites accessed March 16, 2015.

²⁶ “Music controllers can preserve traditional playing modes, permitting us to blow, strike, pluck, rub or bow our ‘computers’ . . . With the flexibility offered by MIDI, any controller can certainly be combined with any sound- and music-producing device.” Jordà, 99. While Jordà preceding encouragement, he also offers this caveat: “Still, each choice is critical. . . Any input device can become a good or a bad choice depending on the context. . . Just as the automotive engineer chooses a steering wheel over left/right incrementing buttons, ‘we should not hand a musician a butterfly net when a pitchfork is required’ . . . The challenge remains how to integrate and transform this apparatus into coherently designed, meaningful musical experiences with emotional depth.” Ibid.

²⁷ For additional reading see: Karlheinz Stockhausen, “Electronic and Instrumental Music,” in *Audio Culture: Readings in Modern Music*, Cox and Warner, eds., 370-80; Peter Manning, *Electronic and Computer Music* (Oxford: Oxford University Press, 2004); and Thom Holmes, *Electronic and Experimental Music*, 4th ed. (New York: Routledge, 2012).

development.²⁸ Sergi Jordà, based off of research by Marcelo M. Wanderley, gives us three categories of controllers: “instrument-like controllers,” “extended controllers,” and “alternative controllers.”²⁹ Instrument-like controllers refer to the kind mentioned at the beginning of this “Skills” sub-section; extended controllers “includes traditional instruments...which with the addition of extra sensors afford additional playing nuances or techniques and thus supplementary sound or music control possibilities.”³⁰ Examples of extended controllers would include Livid’s Guitar Wing (mentioned in Section II) and Tod Machover’s Hyperinstruments. Jordà’s third category is the one which is particularly of interest to this thesis.³¹

Jordà notes that the first two types of controller categories are based on historical typologies.³² The stumbling block, according to Jordà, is that the majority of these “commercially available controllers, mainly *midified* versions of traditional instruments, have remained mostly imitative and conservative.”³³ As a result, he says, “[Traditional] performance

²⁸ The music website Music Radar listed some of the highlights from the 2015 NAMM (National Association of Music Merchants) Show on their website: Ben Rogerson, “The hottest new MIDI controllers and audio interfaces of NAMM 2015,” Music Radar, January 28, 2015, <http://www.musicradar.com/us/news/tech/the-hottest-new-midi-controllers-and-audio-interfaces-of-namm-2015-615543/12#>, accessed March 17, 2015.

²⁹ Jordà, 97.

³⁰ Ibid.

³¹ Jordà points out: “Although several extended controllers have been constructed to measure (e.g. for virtuosi such as Yo-Yo Ma or Wynton Marsalis) none of them is being played on a regular basis; none of them has managed to ‘dethrone’ their original instrumental role model.” Ibid.

³² “The two aforementioned categories profit from known playing techniques and thus may address a potentially higher number of instrumentalists.” Ibid. “Throughout most of the history of electronic music, the interaction end of instrument design could be classed loosely as a branch of ergonomics. Over the last 15 years, electronic instruments became digital, and within the next decade or so, their functions will probably be totally absorbed into what general purpose computers will become. Thus, for all practical purposes, musical interface research has merged with the broader field of human-computer interface. This merger has two basic frontiers; at one end, there are interfaces for virtuoso performers, who practice and become adept at the details of manipulating subtle nuances of sound from a particular instrument. At the other end, the power of the computer can be exploited to map basic gesture into complex sound generation, allowing even non musicians to conduct, initiate and to some extent control a dense musical stream. While the former efforts will push the application of noninvasive, precision sensing technologies in very demanding real-time user interfaces, the latter relies more on pattern recognition, algorithmic composition, and artificial intelligence.” Joseph Paradiso, “Electronic Music Interfaces,” Joseph A. Paradiso, 1998, <http://web.media.mit.edu/~joep/SpectrumWeb/SpectrumX.html>, accessed March 17, 2015.

³³ Jordà, 97. Paradiso offers, “The desire for musical expression runs deeply across human cultures; although styles vary considerably, music is often thought of as a universal language. It is tempting to surmise that one of the earliest applications of human toolmaking, after hunting, shelter, defense, and general survival, was probably to create expressive sound, developing into what we know and love as music. As toolmaking evolved into technology over

techniques may not constitute the best strategy to confront the new music-making paradigms...”³⁴

As mentioned previously, the difficulty in constructing a codified skill set and pedagogy is the variety of “alternative controllers,” to use Jordà’s term.³⁵ Joseph Paradiso, in his article “Electronic Music Interfaces,” lists these forms of controllers: “keyboard, percussion interfaces, batons, guitar, strings, wind, voice, noncontact gesture sensing, wearables.”³⁶ Each of these categories, plus any subset of them, would necessitate different requirements.³⁷ Just because the process of developing pedagogical materials for specific alternative controllers is potentially difficult does not mean musicians and educators should not try, particularly if the goal is to maintain or increase the use of a specific alternative controller.³⁸

If one were to loosely define the skills needed to compose and perform using an alternative controller, a person would need a good working knowledge of which ever software

the last centuries, inventors and musicians have been driven to apply new concepts and ideas into improving musical instruments or creating entirely new means of controlling and generating musical sounds. The classic acoustic instruments, such as the strings, horns, woodwinds, and percussion of the modern orchestra (and sitars, kotos etc. of the non-western world) have been with us for centuries, thus have settled into what many think of being a near-optimal design, only slowly yielding to gradual change and improvements. For hundreds of years, the detailed construction of prized acoustic instruments, especially in the string family, has remained a mysterious art, and only recently have their structural, acoustic, and material properties been understood in enough detail for new contenders to emerge...Electronic music, in contrast, has no such legacy. The field has only existed for under a century, giving electronic instruments far less time to mature. Even more significantly, technology is developing so quickly that new sound synthesis methods and capabilities rapidly displace those of only a few years before. The design of appropriate interfaces is therefore in a continual state of revolution, always driven by new methods of sound generation that enable (and occasionally require) expression and control over new degrees of freedom.” Paradiso, <http://web.media.mit.edu/~joep/SpectrumWeb/SpectrumX.html>, accessed March 17, 2015.

³⁴ Ibid., 97-8.

³⁵ “When it comes to the third category, the jumble of alternative controllers not easily includable in any previous grouping, it is difficult to provide a taxonomy that facilitates a quick overview.” Ibid., 98.

³⁶ Paradiso, <http://web.media.mit.edu/~joep/SpectrumWeb/SpectrumX.html>, accessed March 17, 2015.

³⁷ For example, Nattinger’s VAMP and Heap’s Mi.Mu gloves are both wearables, however VAMP is a one-glove system, while Mi.Mu is a two-glove system; as a result the skill set and pedagogy would differ between the two systems.

³⁸ Consider Lev Termen’s work on the theremin. Many people over the last several decades have championed the instrument, performing with them around the world, transcribing and composing music for the theremin, and developing pedagogy. For more on this see, Theremin World, <http://www.thereminworld.com/>, accessed March 17, 2015.

program they have chosen to use (i.e. Ableton Live) and select a controller to use for a significant length of time, as to learn the capabilities and nuances of the controller.³⁹

Evaluation and Assessment⁴⁰

During the research for all the topics preceding this subsection there has been a growing awareness of people discussing assessment and evaluation of music produced with computers, electronics, and controllers, particularly from an academic standpoint. Many academic institutions that have some form of an electronic music program or degree usually have some form of an electronic music composition course in their curriculum. Additionally, many of them have some sort of electronic ensemble; some will even have courses geared toward individual performance.⁴¹ Based on this, academic evaluation and assessment seems to fall into two categories: 1) composition and 2) performance.

³⁹ “As pointed out by Joel Ryan, improvers, leading researcher in the NIME [New Interfaces for Musical Expression] field and technical director of the Dutch laboratory STEIM, ‘a horizontal slider, a rotary knob, a sensor that measures the pressure under one finger, an accelerometer which can tilt and respond to rapid movements, a sonar or an infrared system that can detect the distance between two points, each have their idiosyncratic properties’.” Jordà, 99. When you combine several of these items into one device, like an alternative controller, then you have layers of idiosyncratic properties that will respond and react to each other in an exponential number of ways. Musician and writer Primus Luta says similar things about programs like Ableton Live: “Designed with the intent of taking the DAW to the stage, Ableton Live allows artists to have an interface that facilitates the translation of electronic concepts from the studio to the stage. There are a world of things that are possible just by learning the Live basics, but there’s also a rabbit hole of advanced functions all the way to the modular Max for Live environment which lies on the frontier discovering new variables for sound manipulation. For many people, however, the software is powerful enough at the basic level of use to create effective live performances.” Luta, “Live Electronic Performance: Theory And Practice,” <http://soundstudiesblog.com/2013/12/09/live-electronic-performance-theory-and-practice/>, accessed March 17, 2015.

⁴⁰ The topics of evaluation and assessment of electronic music have been at the forefront of my academic thoughts and interests for a number of months as of this writing. Not only has it been part of my thoughts and interests for this thesis, it has also been a topic of discussion among the members of the music department of Central Christian College of Kansas, where I presently serve as Professor of Music History and Music Technology. We have been wrestling with assessment and evaluation of electronic music since the Spring 2012 semester, when we submitted a proposal for a course in Electronic Music Production (which was subsequently approved and first taught by myself during the Winter 2013 term). After teaching that course for two consecutive Winter terms, I proposed the development of an Applied Lessons course for Electronic Music, specifically for composition and performance within Ableton Live. MU-AP 207 Applied Lessons: Electronic Music has been a pilot course for the SP14, FA14, and SP15 semesters.

⁴¹ A short list would include: Brown University (MEME Ensemble, <http://brown.edu/academics/music/ensembles-and-lessons/electroacoustic-improv-ensemble>), University of Miami (Electronic Music Ensemble, http://www.miami.edu/frost/index.php/department_of_music_theory_and_composition/electronic_music/electronic_music_ensemble/), Princeton University (PLOrk, <http://plork.princeton.edu/index.php>), New York University:

Evaluating/Assessing Composition

The reason for discussing composition in this chapter is due to the fact that there exists very little in the form of oeuvres for electronic music performance, particularly with controllers. Many early electronic instrument builders would play or attempt to play pre-existing music to prove the merit of their instruments.⁴² While this may work for more standardized electronic instruments like the theremin, for people using software and MIDI controllers this becomes a more difficult concept. There is no sheet music for Ableton Live; one cannot purchase a broadside of “Me the Machine” by Imogen Heap scored for Mi.Mu gloves at my local music store to perform at home or for a chamber music concert. Most of this is owed to the above-mentioned personalized approach to combining software and MIDI controllers.⁴³ Because of this multi-faceted approach we must have a rubric or rubrics that are broad enough to allow flexibility in compositional approach, yet defined enough as to allow some sense of academic rigor.

To at least achieve a rough framework for a compositional rubric the rubrics by Hickey and Sternfeld-Dunn & Hare mentioned earlier in this section will be utilized; additionally a third

Steinhardt (Electronic Music Performance, http://steinhardt.nyu.edu/music/technology/programs/undergraduate/courses/E85_1019), Georgia Tech (Technology Ensemble, <http://www.music.gatech.edu/academics/graduate/courses>), all accessed March 17, 2015. See also Collins, Schedel, and Wilson, “Live electronic music: Ensembles and roles,” in *Electronic Music* (Cambridge: Cambridge University Press, 2013), 188-91. Courses geared toward individual performance seem to be fewer and farther between than the ensemble courses.

⁴² See the “Theremin Repertoire” page (<http://www.thereminworld.com/Theremin-Repertoire>) on Theremin World’s website for examples of this.

⁴³ Often times when a customized MIDI controller is harnessed (i.e. Nattinger’s VAMP, Heap’s Mi.Mu gloves, Exile’s Flow Machine, and Beardyman’s Beardytron 5000 mkII) there is often a customized software, or a customization made to a previously existing software, that goes hand-in-hand with it. When I teach Electronic Music Production at Central Christian College the students and I use Ableton Live for composing and performing. When I introduce them to the software I show them how I and a few other composers/controllerist arrange and customize the setup to achieve the workflow we desire. “In the sleeve notes of their 1989 CD, John Bischoff and Tim Perkins note that ‘for us, composing a piece of music is like building a new instrument, an instrument whose behaviour makes up the performance. We act at once as performer, composer, and instrument builder, in some ways working more like sculptors than traditional musicians’.” Jordà, 94-5.

rubric, in the form of program goals and a syllabus from Chris Brown at Mills College for his course “Seminar in Electronic Music Performance,” will be introduced.⁴⁴ A comparison of key words in the rubrics to those used in Bloom’s Taxonomy was used to facilitate the examination of the three rubrics; a chart containing Bloom’s Taxonomy (1956, Bloom), Bloom’s Revised Taxonomy (2001, Anderson & Krathwohl), and Bloom’s Digital Taxonomy (2008, Churches) to gain the widest perspective on the three rubrics was utilized.⁴⁵ The breakdown of the three rubrics is as follows:⁴⁶

TABLE 1
COMPARISON OF THREE MUSIC COMPOSITION RUBRICS
VIA BLOOM’S TAXONOMY

Knowledge/ Remembering	Comprehension/ Understanding	Application/ Applying	Analysis/ Analyzing	Synthesis/ Evaluating	Evaluation/ Creating
SDH, B	H, SDH, B	H, SDH, B	H, SDH, B	SDH, B	SDH, B

H = Hickey; SDH = Sternfeld-Dunn & Hare; B = Brown

⁴⁴ A Graduate-level course for the Master of Fine Arts in Electronic Music & Recording Media, Mills College, “MUS 252 Seminar in Electronic Music Performance,” http://www.mills.edu/academics/graduate/mus/courses/course_description.php?courseid=mus252, Mills College, accessed March 17, 2015. “MUS 252 Program Goals: To have a developed understanding of cultural, political, social, and intellectual issues in diverse contemporary and historical musical & sound art practices. (Introduced, Practiced - Assess and critique musical examples of contemporary electronic music performance on aesthetic as well as technical grounds. Examine and discuss issues of technological use in the arts and the socio-political implications and ramifications of such use.); To have distinctive creative ideas and the ability to realize them successfully on a professional level. (Practiced, Mastered - Compose short electronic works in response to class project criteria incorporating sound diffusion, MIDI control, electro-acoustic sources, network interaction, and real-time audio analysis. Produce and perform class projects in class and in formal concert at the end of the semester.); To be able to critically analyze & clearly identify strengths and weaknesses in her/his own work, & the work of others. (Practiced, Mastered - Explain methods employed in class projects and discuss their musical attributes. Develop listening skills and critique other student's work in class in a seminar format.); To be able to productively collaborate with others in professional contexts relating to her/his area of expertise. (Introduced, Practiced, Mastered - Build collaborative performances using unique interconnection capabilities of electronic technologies. Investigate new musical properties made possible by real-time group composition and performance.); To demonstrate a technical mastery of her/his instrument or discipline, and a comprehensive knowledge of its styles and repertoire, past and present. (Practiced, Mastered - Construct hardware and software instruments and refine them through musical performance practice. Categorize and compare historical and contemporary uses of electronic technology for sonic art and musical performance.). Ibid.

⁴⁵ Dartmouth University, “Bloom's Digital Taxonomy,” <http://www.dartmouth.edu/~jmajor/blooms/index.html>, accessed March 18, 2015.

⁴⁶ The first word is utilized by the 1956 Bloom’s; the second word is utilized by both the 2001 Revised Bloom’s and the 2008 Digital Bloom’s. Ibid.

All three rubrics deal with concepts of Comprehension/Understanding, Application/Applying, and Analysis/Analyzing. This shows that mid-level Bloom's taxonomic ideas (classifying, expressing, applying, demonstrating, implementing, comparing, structuring, experimenting, mashing) are considered essential to assessing compositions across all ages and abilities.⁴⁷ Interestingly, the rubrics utilized in higher education (Sternfeld-Dunn & Hare, Brown) deal with the entire range of taxonomic levels. This recognizes the need to meet people on all levels and abilities. What is additionally noteworthy is the upper-level taxonomic ideas dealt with in the higher education rubrics: Synthesis/Evaluating and Evaluation/Creating. This shows that upper-level taxonomic ideas (arranging, composing, constructing, experimenting, critiquing, assessing, supporting, designing, inventing, programming, mixing, remixing) are considered essential to assessing compositions by more experienced composers and those with potentially higher-level abilities.

What was previously mentioned only in passing is that the rubric by Hickey that has been used thus far is for "assessing general criteria in a composition assignment."⁴⁸ In the article from which this rubric was obtained Hickey documents four assignment-specific rubrics that, when combined with the "assessing general criteria," can constitute the whole rubric for a particular composition.⁴⁹ Brown also utilizes an assignment-specific rubric for his course.⁵⁰ This bipartite approach (a general rubric combined with an assignment-specific rubric) is one potential solution.

⁴⁷ Again, the Hickey rubric is for elementary/primary-age children, the Sternfeld-Dunn and Hare rubric is for university students; the Brown rubric is for graduate university students.

⁴⁸ Hickey, 29.

⁴⁹ These assignments include: "Assessment rubric for composition using dotted-eighth and sixteenth notes," "Assessment rubric for a composition in rondo form," "Assessment rubric for a melody with well-defined parameters," and "Assessment rubric for a melody with two musical ideas." Ibid., 30-32, 33.

⁵⁰ "Compose short electronic works in response to class project criteria..." Brown, Mills College, http://www.mills.edu/academics/graduate/mus/courses/course_description.php?courseid=mus252, accessed March 17, 2015.

A companion solution would be to see what ideas or concepts all three rubrics hold as necessary. All three rubrics mention aesthetics as playing a key role in compositional assessment; the higher education rubrics tie aesthetics to an awareness of the idioms of “contemporary electronic music.”⁵¹ Creativity is also listed as an essential in all three rubrics, whether as a stand-alone idea or combined with another idea.⁵² A third component in the three rubrics is some mention of “musical form” or “craftsmanship.”⁵³ These three components, aesthetics (historical or otherwise), creativity, and musical form/craftsmanship, could form the criteria for a general assessment rubric.

Based on this discussion I propose a two-part approach to assessing composition. The first part is a general assessment rubric, comprised of aesthetics (historical or otherwise), creativity, and musical form/craftsmanship; the second part would be an assignment-specific rubric, written to reflect the specific goals determined by the assessing instructor.⁵⁴ The

⁵¹ Hickey, “Aesthetic Appeal”, Hickey, 29. Sternfeld-Dunn and Hare (“Aesthetics/Creativity), Sternfeld-Dunn and Hare, 2. Brown (“Assess and critique...on aesthetic), http://www.mills.edu/academics/graduate/mus/courses/course_description.php?courseid=mus252, accessed March 17, 2015. “The composer’s scores show an abundance of creative ideas and the composer demonstrates an astute awareness of the aesthetics of contemporary music.” Sternfeld-Dunn and Hare, 2. “Assess and critique musical examples of contemporary electronic music performance on aesthetic as well as technical grounds... To demonstrate a technical mastery of her/his instrument or discipline, and a comprehensive knowledge of its styles and repertoire, past and present.” Brown, Mills College, http://www.mills.edu/academics/graduate/mus/courses/course_description.php?courseid=mus252, accessed March 17, 2015.

⁵² “Includes very original, unusual, or imaginative musical ideas. Explores and varies at least two musical elements.” Hickey, 29. “The composer’s scores show an abundance of creative ideas and the composer demonstrates an astute awareness of the aesthetics of contemporary music.” Sternfeld-Dunn and Hare, 2. “To have distinctive creative ideas and the ability to realize them successfully on a professional level.” Brown, http://www.mills.edu/academics/graduate/mus/courses/course_description.php?courseid=mus252, accessed March 17, 2015.

⁵³ “Presents at least one complete musical idea. Has a coherent and organized form with a clear beginning, middle, and end. Uses musical elements to organize musical ideas or the form.” Hickey, 29. “Musical language demonstrates a high degree of craft, consistency, and organization... A sophisticated knowledge of the processes that comprise form in music at basic and advanced levels is well conceived and consistently demonstrated. Demonstrates expertise beyond basic forms and can extend them in new directions.” Sternfeld-Dunn and Hare, 1-2. “To have distinctive creative ideas and the ability to realize them successfully on a professional level... Build collaborative performances using unique interconnection capabilities of electronic technologies.” Brown, http://www.mills.edu/academics/graduate/mus/courses/course_description.php?courseid=mus252, accessed March 17, 2015.

⁵⁴ As in Hickey, 30-32, 33; and Brown, http://www.mills.edu/academics/graduate/mus/courses/course_description.php?courseid=mus252, accessed March 17, 2015.

advantage of a two-fold rubric is the ability to maintain a consistent base from which to operate (first part) and the flexibility to tailor the assignment to suit the genre/type of composition (second part). An example rubric for a forty-five point assignment could look like this:⁵⁵

TABLE 2
GENERAL ASSESSMENT RUBRIC

	5 pts.	4 pts.	3 pts.	1 pt.
<i>Submitted on time</i>	Turned in before class on the due date	—	Turned in after class on the due date	Turned in any day after the due date
<i>Aesthetics</i> ⁵⁶	Pieces note an abundance of creative ideas and the composer demonstrates an astute awareness of electronic music. Knowledge and craft are consistently reformulated in to new musical ideas.	Some degree of naïveté towards salient issues of electronic music aesthetics or a base amount of derivate musical thinking.	Some basic illiteracy or lack of curiosity regarding aesthetics.	Real creativity is minimal. An awareness or curiosity of issues in electronic music aesthetics is absent.
<i>Creativity</i> ⁵⁷	Includes very original, unusual, or imaginative musical ideas. Explores at least two musical ideas.	Involves some original aspect(s) or manipulation(s) of musical idea(s). Explores at one musical idea.	Musical ideas are more often clichéd than not. ⁵⁸ There is minimal variety or exploration of musical elements (range, melody, timbre, dynamics, rhythm, melody).	Musical idea is familiar or cliché. No variety or exploration of musical elements (range, melody, timbre, dynamics, rhythm, melody).
<i>Musical Form/ Craftsmanship</i> ⁵⁹	Demonstrates an expertise in advanced and basic musical forms. Ability to extend musical forms in new directions exists.	Understanding of basic formal processes in music is clear but usually realized in an especially sophisticated way.	Use of basic forms is demonstrated but of inconsistent quality.	Struggles to successfully make use of even the most basic small forms in music.

⁵⁵ The “Submitted on time” and “Length” portions come from the rubrics for Central Christian College of Kansas Music Department, MU-MS 371 Electronic Music Production, Central Christian College of Kansas, 2014.

⁵⁶ Sternfeld-Dunn and Hare, 1. I have tweaked the language to reflect electronic music.

⁵⁷ Hickey, 29.

⁵⁸ Sternfeld-Dunn and Hare, 1.

⁵⁹ Ibid.

TABLE 2 (continued)

<i>Literacy</i> ⁶⁰	The composer demonstrates a wide and very thorough understanding and knowledge of music history and repertoire across multiple genres and musical eras. History and repertoire of a variety of 20 th and 21st century musical genres are known thoroughly.	The composer demonstrates a wide understanding and knowledge of music history and repertoire across multiple genres and musical eras, but with some minor gaps.	The composer's knowledge of music history and repertoire is limited to only a few eras or genres.	Basic ignorance or excessively narrow understanding of music history and repertoire, particularly regarding the 20th and 21st centuries.
<i>Length</i>	3-6 minutes	—	—	>3 or 10+ min.

TABLE 3

ASSIGNMENT-SPECIFIC RUBRIC: DOWNTEMPO/AMBIENT/NOISE/GLITCH/IDM⁶¹

	5 pts.	4 pts.	3 pts.	1 pt.
<i>Fulfills project requirements</i>	3 scenes, 5-6 audio clips per scene	3 scenes, 3-4 audio clips per scene	2 scenes or 3-4 audio clips per scene	2 scenes and less than 3 audio clips per scene
<i>Demonstrates understanding of genre/subgenre (tempo, form, instrumentation)</i>	Tempo, instrumentation, and form all contribute to the subgenre	—	One of the following does not contribute to the genre: tempo, instrumentation, form	More than one of the following does not contribute to the genre: tempo, instrumentation, form
<i>Software and Mixing Proficiency</i>	“Properly quantized” and mix is balanced	Quantization is slightly off unintentionally or one element of the mix is not balanced	Quantization is noticeably off or more than one element of the mix is not balanced	Quantization is significantly off and more than one element of the mix is not balanced

⁶⁰ Ibid., 2.

⁶¹ Based on an assignment from Central Christian College of Kansas Music Department, MU-MS 371 Electronic Music Production, Central Christian College of Kansas, 2014.

Evaluating/Assessing Performance

Like composition, performance can be very subjective; a quick YouTube search will yield thousands of performances of various songs.⁶² When we move from the realm of “traditional” (i.e. classical) music performance to electronic music performance this can become even more subjective, particularly as many musicians, composers, and, especially, audience members may be unfamiliar with what goes into composing and performing electronic music.⁶³ A strategy to assessing the performance of electronic, computer-based music should be multi-pronged, utilizing education and historical awareness as a basis.

When many people today hear the term “electronic music” their thoughts are likely to go towards the pounding kick drums, lumbering beats, and robotic roars of electronic dance music (EDM) or the ethereal soundscapes and oscillations of old science fiction movies.⁶⁴ There is a wide, vast space between these musical poles, yet not every audience member who walks into a performance of electronic music knows or understands this.⁶⁵ Furthermore, the audiences may be

⁶² Based on YouTube searches: “Amazing Grace,” about 1,760,000 results (https://www.youtube.com/results?search_query=amazing+grace, accessed March 18, 2015); “The Star-Spangled Banner,” about 2,930,000 results (https://www.youtube.com/results?search_query=the+star+spangled+banner, accessed March 18, 2015); “Yesterday (The Beatles),” about 3,920,000 results (https://www.youtube.com/results?search_query=yesterday, accessed March 18, 2015).

⁶³ “The use of electronic music instruments in *live performance* is a complex topic within our culture where recorded media are the dominant means by which people experience music.” Brown, 1. “Actually, most computer music performers still seem shyly reluctant to consider the computer as a *regular* musical instrument, but nonetheless, the computer is finally reaching the point of feeling as much at home on stage as a saxophone or an electric guitar.” Jordà, 89. “With electronic music however, particularly with laptop performances, audiences know that the instrument (laptop) is capable of playing music without human aid other than telling it to play. The ‘checking their email’ sentiment is a challenge to the notion that what one is seeing in a live electronic performance is indeed an ‘actual performance.’” Luta, “Toward a Practical Language for Live Electronic Performance,” *Sounding Out!*, April 29, 2013, <http://soundstudiesblog.com/2013/04/29/toward-a-practical-language-for-live-electronic-performance/>, accessed March 17, 2015.

⁶⁴ “At the time of this writing [2013], for example, Wikipedia lists over 200 genres of electronic dance music. Under the heading ‘Psychedelic trance/Goa trance’ (one of the subgenres of Trance), styles include Dark psytrance, Full on, Psyprog, Psybient, and many others.” Joseph Auner, *Music in the Twentieth and Twenty-First Centuries* (New York: W.W. Norton & Company, Inc., 2013), 2. The quintessential example of the old science fiction movie sound is Louis and Bebe Barron’s soundtrack for the classic *Forbidden Planet*.

⁶⁵ The following is an excerpt from a pre-concert address by Jacques Barzun from 1961; it could easily be read before concerts of electronic music today: “Your presence here, at a concert of electronic music, is a compliment to the composers, as well to the Universities that sponsor their work; and while I extend to you a welcome on behalf of

oblivious to the types of performance practices that have been traditionally used in electronic music. Chris Brown states it this way:

The values ingrained by our experiences of recorded music and sound are inseparable from the desire for an authenticity that we associate with live musical experiences. And still we thirst for experiences where musical communication and decision-making happens in the moment – the experience of now. Performance is about presence, and staying present in a world saturated by recordings requires designing our compositions and our instruments to clarify our experience of time while still embracing the multiplicity of frames that confuse it.⁶⁶

With this in mind two categories of electronic music performance are suggested: 1) realized/realization and 2) live electronic performance.⁶⁷

Realized electronic music performance is usually associated with early *musique concrète* and synthesizer music. Some of the compositions were so complex that they might be nearly impossible to perform as intended; thus, the only real way to achieve the composer's aural vision for the piece was to record the piece to tape in a studio and play it back via a set of loudspeakers (the "realization") for an audience.⁶⁸ This raises the question, "What is the difference between listening to a recording of this on my home stereo and listening to it on a set of speakers in a

the Universities I also wish to convey the composers' hope that you will be as gratified by hearing their works as they are by your willingness to listen. No doubt your expectations are mixed. You are ready to be surprised, to have your curiosity satisfied, and possibly even to experience snatches of enjoyment as you would at an ordinary concert. If that is your state of mind I am fairly sure you will not be disappointed. But it may be that you are here in a mood of combined trepidation and resistance: this, after all, is the Age of Anxiety...Or you may be bent on proving that electronic music is not music – doing this by the most painful test of endurance – or else you may be feeling caught because you have been brought by a friend and friendship is dearer to you than prudence. If for these or any other reasons you are ill at ease, allow me to suggest a very few considerations which should make you more serene, while leaving you your full freedom of opinion, your entire right to dislike and reject. I suggest, to begin with, that we are not here to like or approve but to understand." Jacques Barzun, "Introductory Remarks to a Program of Works Produced at the Columbia-Princeton Electronic Music Center," *Audio Culture: Readings in Modern Music*, Cox and Warner, eds., 367-8.

⁶⁶ Brown, 1.

⁶⁷ As discussed in Luta, "Musical Objects, Variability and Live Electronic Performance," *Sounding Out!*, August 12, 2013, <http://soundstudiesblog.com/2013/08/12/musical-objects-variability/>, accessed March 17, 2015.

⁶⁸ Composers associated with this practice include Pierre Boulez, John Cage, Pierre Schaeffer, Karlheinz Stockhausen, Edgard Varèse, Iannis Xenakis; compositions associated with this practice would include *Poème électronique* (Varèse), *Gesang der Jünglinge* (Stockhausen), *Williams Mix* (Cage), and *Diamorphoses* (Xenakis).

concert hall?” The answer lies in the composer/performer’s intent. There is a vast amount of pop, rock, and electronic music that can, or will, only be heard via a stereo recording.⁶⁹

But what if the composer/performer intended the work for a multi-channel, surround-sound performance? In this case the answer to the previously-posed question is, “The composer/performer intends to place you in the environment of the piece so that you experience the piece in an immersive way, not just as sound coming from in front of you.”⁷⁰ It is the difference between watching a movie about outer space on a television in your living room versus watching the same movie in an IMAX movie theatre with 7.1 surround sound.

While realization performances may fuel the “pressing play” controversy that has troubled electronic music for decades, realization is, in some cases, the only option a composer has in order to present their music to the public.⁷¹ With that in mind I will move from solely realized electronic music to live electronic performance.

⁶⁹ Brown supports this idea: “To have distinctive creative ideas and the ability to realize them successfully on a professional level.” Brown, http://www.mills.edu/academics/graduate/mus/courses/course_description.php?courseid=mus252, accessed March 17, 2015.

⁷⁰ This point of view can be seen through written accounts about *Poème électronique* (Varèse) and *Gesang der Jünglinge* (Stockhausen).

⁷¹ The “pressing play” controversy is the idea that laptop/live electronic performers, especially DJs and producers, only hit “play” on a track or set, and then hide behind a shroud of lights, visualizations, pyrotechnics, and on-stage antics. EDM artist/producer Joel Zimmerman, a.k.a. Deadmau5, set off major ripples in the EDM scene after he made statements both in his blog (Joel Zimmerman/Deadmau5, “we all hit play.,” united we fail, <http://deadmau5.tumblr.com/post/25690507284/we-all-hit-play>) and a cover story in *Rolling Stone* magazine (Josh Eells, “The Rise of Deadmau5,” *Rolling Stone*, July 5, 2012, 48.) about how all EDM artists and DJs just hit play on a song or set: “From the crowd, it's hard to tell exactly what a dance musician is doing onstage. Almost all of them use prerecorded tracks; sometimes it seems like they're getting paid to wave their arms and occasionally adjust their headphones. ‘If I wanted, I could play a...wav file and just stand there and fist-pump all night, and no one would [care],’ Zimmerman says. In fact, he says, a lot of people do just that. ‘David Guetta has two iPods and a mixer and he just plays tracks – like, ‘Here’s one with Akon, check it out!’ Even Skrillex [a friend of Zimmerman’s] isn’t doing anything too technical. He has a laptop and a MIDI recorder, and he’s just playing his [set]. People are, thank God, smartening up about who does what – but there’s still button-pushers getting paid half a million. And not to say I’m not a button-pusher. I’m just pushing a lot more buttons.” Eells, “The Rise of Deadmau5,” 48. Luta approaches Zimmerman’s thoughts from a more tame perspective: “Unfortunately, quite often it is impossible to know exactly what range of tools are being utilized within a laptop strictly by looking at an artist on stage. This is what leads to probably the biggest misnomer about the performing laptop musician. As common as the musical object may look on the stage, housed inside of it can be the most unique and intricate configurations music (yes all of music) has ever seen. The reductionist thought that laptop performers aren’t ‘doing anything but checking email’ is directly tied to the acousmatic nature of the objects as instruments. We can hear the sounds, but determining the sources and

Primus Luta, in the second article of a three-part series of articles designed to “develop a ‘usable aesthetic language’ to describe live electronic performance,” lists “four basic distinctions for live electronic performance”:⁷²

- 1) The electro/mechanical manipulation of fixed sonic performances
- 2) The physical manipulation of electronic instruments
- 3) The mechanized manipulation of electronic instruments
- 4) A hybrid of physical and mechanized manipulation of electronic instruments.

In the third article Luta urges his reader, “To put live electronic performances into the proper musical context, one must determine what type of performance is being observed.”⁷³ The idea of educating audiences, even with an intentional pre-concert lecture, may be one of the best options live electronic music performers have in getting audiences to understand and appreciate their music; moreover, it can be useful in assessing live electronic performance in academic settings.⁷⁴

understanding the processes required to produce them is often shrouded in mystery. Technology has arrived at the point where what one performs live can precisely replicate what one hears in recorded form, making it easy to leap to the conclusion that all laptop musicians do is press play.” Luta, “Live Electronic Performance: Theory And Practice,” *Sounding Out!*, December 9, 2013, <http://soundstudiesblog.com/2013/12/09/live-electronic-performance-theory-and-practice/>, accessed March 17, 2015.

⁷² Robin James, “Aesthetics and Live Electronic Music Performance,” *The Society Pages*, December 13, 2013, <http://thesocietypages.org/cyborgology/2013/12/13/aesthetics-and-live-electronic-music-performance/>, accessed March 17, 2015. Primus Luta, “Musical Objects, Variability and Live Electronic Performance,” *Sounding Out!*, August 12, 2013, <http://soundstudiesblog.com/2013/08/12/musical-objects-variability/>, accessed March 17, 2015.

⁷³ Primus Luta, “Live Electronic Performance: Theory And Practice,” *Sounding Out!*, December 9, 2013, <http://soundstudiesblog.com/2013/12/09/live-electronic-performance-theory-and-practice/>, accessed March 17, 2015. Luta continues, “For example, an artist who performs a set using solely vinyl with nothing but two turntables and a manual crossfading mixer, falls in the first distinction between live electronic music performances. Technically, the turntables and manual crossfading mixer are machines, but they are being controlled manually rather than performing on their own as machines. If the artist includes a drum machine in the set, however, it becomes a hybrid (the fourth distinction), depending on whether the drum machine is being triggered by the performer (physical manipulation) or playing sequences (machine manipulation) or both. Furthermore, if the drum machine triggers samples, it becomes machine manipulation (third distinction) of fixed pre-recorded sounds (first distinction) If the drum machine is used to playback sequences while the artist performs a turntablist routine, the turntable becomes the performance instrument while the drum machine holds as a fixed source. All of these relationships can be realized by a single performer over the course of a single performance, making the whole set of the hybrid variety. While in practice the hybrid set is perhaps the most common, it’s important to understand the other three distinctions as each of them comes with their own set of limitations which define their potential variability.” *Ibid.*

⁷⁴ Again, refer to the pre-concert address by Jacques Barzun: Jacques Barzun, “Introductory Remarks to a Program of Works Produced at the Columbia-Princeton Electronic Music Center,” *Audio Culture: Readings in Modern Music*, Cox and Warner, eds., 367-9.

The issue Luta brings to the forefront is the “performance’s variability”⁷⁵: can a live electronic music performer improvise within their set, akin to a jazz musician?⁷⁵ With this idea Luta basically says there are two parts of a live electronic performance: 1) the performer in front of an audience and 2) the ability of the performer to have control over, in some way, shape, or form, at will or whim, the music issuing from their instrument. While Luta admits this performative framework can be tricky to sort out, it is still the factor that can bring electronic music onto the same playing field as rock, jazz, and even classical music.⁷⁶

Based on the information presented above it would appear the ideas of realized/realization and live electronic performance each require a different assessment. Realized/realization could use the abovementioned assessment rubrics for electronic music composition. One thing that could be added to the rubric is how the realized piece is presented; it could be presented with a multi-channel speaker system or with visualizations and lights, à la

⁷⁵ Luta, “Live Electronic Performance: Theory And Practice,” *Sounding Out!*, December 9, 2013, <http://soundstudiesblog.com/2013/12/09/live-electronic-performance-theory-and-practice/>, accessed March 17, 2015. “Critical listening to a live performance includes identifying when these shifts happen and how they change the variability of the set. Through the combination their individual limitations can be overcome increasing the overall variability of the performance. One can see a performer playing the drum machine with pads and correlate that physicality of it with the sound produced and then see them shift to playing the turntable and know that the drum machine has shifted to a machine performance. In this example the visual cues would be clear indicators, but if one is familiar with the distinctions the shifts can be noticed just from the audio.” Ibid. This is actually the way Luta begins the first article of this series: “Amongst friends I’ve been known to say, ‘electronic music is the new jazz.’ They are friends, so they smile, scoff at the notion and then indulge me in the Socratic exercise I am begging for. They usually win. The onus after all is on me to prove electronic music worthy of such an accolade. I definitely hold my own; often getting them to acknowledge that there is potential, but it usually takes a die hard electronic fan to accept my claim. Admittedly the weakest link in my argument has been live performance. I can talk about redefinitions of structure, freedom of forms and timbral infinity for days, but measuring a laptop performance up to a Miles Davis set (even one of the ones where his back remained to the crowd) is a seemingly impossible hurdle.” Primus Luta, “Toward a Practical Language for Live Electronic Performance,” *Sounding Out!*, April 29, 2013, <http://soundstudiesblog.com/2013/04/29/toward-a-practical-language-for-live-electronic-performance/>, accessed March 17, 2015.

⁷⁶ “Essential to all categories of live electronic music performance, however, is the performance’s variability, without which music—and its concomitant listening practices—transforms from a ‘live’ event to a fixed musical object. The trick to any analysis of such performance however, is to remember that, while these distinctions are easy to maintain in theory, in performance they quickly blur one into the other, and often the intensity and pleasure of live electronic music performance comes from their complex combinations.” Luta, “Live Electronic Performance: Theory And Practice,” *Sounding Out!*, December 9, 2013, <http://soundstudiesblog.com/2013/12/09/live-electronic-performance-theory-and-practice/>, accessed March 17, 2015.

Poème électronique by Edgard Varèse. A professor could easily add a line to their rubric to look something like this (shaded in grey):⁷⁷

TABLE 4

ASSIGNMENT-SPECIFIC RUBRIC: MUSIQUE CONCRÈTE

	5 pts.	4 pts.	3 pts.	1 pt.
<i>Fulfills project requirements</i>	3 scenes, 5-6 clips per scene, screenshot	3 scenes, 3-4 clips per scene, or no screenshot	2 scenes or 3-4 clips per scene or no screenshot	2 scenes and less than 3 clips per scene and no screenshot
<i>Demonstrates understanding of genre/subgenre (tempo, form, instrumentation)</i>	Tempo, instrumentation, and form all contribute to the subgenre	—	One of the following does not contribute to the genre: tempo, instrumentation, form	More than one of the following does not contribute to the genre: tempo, instrumentation, form
<i>Ableton and Mixing Proficiency</i>	“Properly quantized” and mix is balanced	Quantization is slightly off unintentionally or one element of the mix is not balanced	Quantization is noticeably off or more than one element of the mix is not balanced	Quantization is significantly off and more than one element of the mix is not balanced
<i>Presentation</i>	Piece is presented in a creative, historically-informed manner with obvious thought given to aesthetics.	Piece is presented in an above-average manner with thought given to aesthetics	Piece is presented in an average manner, one that shows some thought given to aesthetics	Piece is presented in a below-average manner, one that shows little to no thought given to aesthetics

The live performance rubric would be the harder one. In developing a rubric for a pilot course in Applied Lessons with the instrument being “Electronic Music,” the Music Department of Central Christian College of Kansas utilized the following for the performance/recital portion:⁷⁸

⁷⁷ Based on an assignment from Central Christian College of Kansas Music Department, MU-MS 371 Electronic Music Production, Central Christian College of Kansas, 2014.

⁷⁸ Taken from Central Christian College of Kansas Music Department, MU-AP 107, 207, 407 Applied Lessons – Electronic Music, Central Christian College of Kansas, 2014.

TABLE 5

RECITAL/CONCERT EVALUATION FORM

Recital/Concert Evaluation Form	
Student:	Semester:
Date:	
Choice of material suitable for performer? _____/10	
Material well-prepared? _____/10	
Technique? _____/10	
Control, balance, rhythm? _____/10	
Musicality - interpretation, phrasing, dynamics? _____/10	
Communication with other participants? _____/10	
Communication with the audience? _____/10	
Performance successful? _____/10	
Professionalism and timeliness? _____/10	
Student evaluation completion _____/10	Total: _____/100
Rank by	
0= none 1-5 = failed attempt 6 = below average 7 = average 8 = very good 10= outstanding	Instructor Signature: _____ Student Signature: _____

TABLE 5 (continued)

Student Recital/Concert Personal Evaluation Form	
Student: _____	Semester: _____ Date: _____
Please comment on the following:	
Preparation:	
Control, Balance, and Rhythm:	
Musical Interpretation:	
Performance Success:	

While this is a department-wide performance rubric, it gives a starting point for the development of an instrument-specific performance rubric. Brown utilizes the following rubric for his

“Seminar in Electronic Music Performance” course at Mills College:

To demonstrate a technical mastery of her/his instrument or discipline, and a comprehensive knowledge of its styles and repertoire, past and present. (Practiced, Mastered): Construct hardware and software instruments and refine them through musical performance practice. Categorize and compare historical and contemporary uses of electronic technology for sonic art and musical performance.⁷⁹

Clearly there is the potential for a wide range of possibilities when it comes to the construction of rubrics for electronic music performance. I would derive mine from the rubric put forth by the Music Department of Central Christian College of Kansas because they are seeking to put electronic music performance on the same level as historic performance practices.

⁷⁹ Brown, Mills College, http://www.mills.edu/academics/graduate/mus/courses/course_description.php?courseid=mus252, accessed March 17, 2015.

After much discussion of composition, the next phase of our journey is to give space to a discussion of musical literacy and its place in technology's influence on music composition and performance.

Musical Literacy

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When introducing people to the performance of rock, jazz, and classical music it is important that they be introduced to the oeuvres specific to the genres. The same can be said for electronic music. To return to the composition rubrics discussed above, both of the higher education composition rubrics have a history/literacy component to them.⁸⁰ This is why in many books on electronic and computer music have chapters on the development and history of the music, often contain some kind of discography or suggested listening, and/or may contain CDs of music.⁸¹

This idea of a musical literacy can be a linguistic idea as well as knowledge of key works. It is necessary to have a shared literacy of electronic music; to speak and fashion a common language would behoove the electronic music idiom as it would place it on a footing akin to traditional music composition and performance. The problem comes in agreeing upon what that literacy should entail or include; which works and pieces are necessary to achieve a certain degree of electronic music literacy? The brief answer is the language may still be developing and we may still be too close chronologically to many of these electronic works to achieve definitive

⁸⁰ “The composer’s scores show an abundance of creative ideas and the composer demonstrates an astute awareness of the aesthetics of contemporary music... The composer demonstrates a wide and very thorough understanding and knowledge of music history and repertoire across multiple genres and musical eras. History and repertoire of a variety of 20th and 21st century musical genres are known thoroughly.” Sternfeld-Dunn and Hare, 2. “To have a developed understanding of cultural, political, social, and intellectual issues in diverse contemporary and historical musical & sound art practices. (Assess and critique musical examples of contemporary electronic music performance on aesthetic as well as technical grounds. Examine and discuss issues of technological use in the arts and the socio-political implications and ramifications of such use.)... To demonstrate a technical mastery of her/his instrument or discipline, and a comprehensive knowledge of its styles and repertoire, past and present... Categorize and compare historical and contemporary uses of electronic technology for sonic art and musical performance.” Brown, http://www.mills.edu/academics/graduate/mus/courses/course_description.php?courseid=mus252, accessed March 17, 2015.

⁸¹ For examples, see *Audio Culture: Readings in Modern Music*, Christoph Cox and Daniel Warner, eds. (New York: Continuum International, 2004); Peter Manning, *Electronic and Computer Music* (Oxford: Oxford University Press, 2004); and Thom Holmes, *Electronic and Experimental Music*, 4th ed. (New York: Routledge, 2012); V.J. Manzo and Will Kuhn, *Interactive Composition* (Oxford: Oxford University Press, 2015).

musicological lists such as we have for the Baroque, Classical, and Romantic eras. There are many works of electronic music from the past ninety years that will probably become the electrified equivalents to des Prez's motets, Gabrieli's concerti, J.S. Bach's cantatas, Mozart's operas, and Chopin's nocturnes.⁸² Accomplishing this would require performers, educators, and musicologists to examine what has been done and used in the past and set a typology. It could be rather fluid until at such time it seems to be settling (not unlike gelatin).

A "canon" of compositions, again, would give gravitas to electronic music. It seems the more "historic" pieces might be easier to agree upon as a set canon, however there would need to be some agreed upon parameters to help a group filter the works to a set number or at least to a set of historical guidelines/parameters (e.g. historic epochs, etc.). A few record labels and music historians have tried to offer some form of introductory set of pieces, most notably the record labels Chrome Dreams, who have released two double-disc albums under the titles *Forbidden Planets: Music From The Pioneers Of Electronic Sound* and *Forbidden Planets 2: More Music From The Pioneers Of Electronic Sound* (both of which focus on the historic or pioneering works of electronic music, e.g. the Barrons, Varèse, Stockhausen, Xenakis), and Sub Rosa, whose seven-volume *Anthology of Noise & Electronic Music* series covers from 1921-2012 and is set in an a-chronological manner.⁸³

⁸² As a place to start for "historic" electronic music I would recommend the double-disc album *Forbidden Planets: Music From The Pioneers Of Electronic Sound* (Chrome Dreams, 2009).

⁸³ Various, *Forbidden Planets: Music From The Pioneers Of Electronic Sound*, Chrome Dreams, CDCD5033, 2009, compact disc. Various, *Forbidden Planets 2: More Music From The Pioneers Of Electronic Sound*, Chrome Dreams, CDCD5067, 2011, compact disc. Sub Rosa, "Anthologies," Sub Rosa, <http://www.subrosa.net/en/catalogue/anthologies.html>, accessed April 1, 2015. "Devoted to experimental, noise, and electronic music: This collection explores in depth the historical bases of electronic music and analyzes the slow emergence of noise, from the 1910s to now. A series of 2-CD/3-LP sets culling material from the most celebrated composers down to the most obscure artists." Sub Rosa, "Catalogue," Sub Rosa, <http://www.subrosa.net/en/catalogue.html>, accessed April 2, 2015. Indeed, a significant portion of Sub Rosa's catalogue focuses on experimental and avant-garde electronic music from 1920-2012.

Two likely issues present themselves in creating a canon of electronic music. First is the divide between “formal” or “academic” electronic music (e.g. *musique concrète*, tape music, electroacoustic) and popular electronic music (i.e. EDM). A divide has existed for centuries between formal music and popular music; this can be most clearly seen in western cultures of the 20th century with the advents of jazz and rock ‘n’ roll.⁸⁴ That being said, popular music studies have become an academically accepted discipline within the field of musicology, so the gap may be smaller than imagined.⁸⁵ Again, it will take performers, educators, and musicologists weighing and deliberating on the elements and merits of both academic and popular electronic music.

The second issue is the splintering of popular electronic music. It seems more subgenres of popular electronic music have developed in its first forty years than almost any other genre in music history.⁸⁶ In my experience musicians working in popular electronic music seem to fall into one of three categories: 1) Copy: they pattern their music after their favorite musicians(s), thereby continuing the tradition of a subgenre; 2) Create: they want to create their own new, unique sound or subgenre, thereby developing any number of sub- or sub-subgenres; or 3) “Care

⁸⁴ For more on this see: Simon Emmerson and Denis Smalley, “Electro-acoustic music,” in *Grove Music Online* (Oxford University Press, 2001-), accessed April 3, 2015, <http://www.oxfordmusiconline.com.proxy.wichita.edu/subscriber/article/grove/music/08695>.

⁸⁵ American universities offering graduate degrees with popular music studies (sometimes as a subset of ethnomusicological studies) as an emphasis include UNC-Chapel Hill, Columbia University, Mills College, and UCLA.

⁸⁶ For examples, see “Ishkur's Guide to Electronic Music,” <http://techno.org/electronic-music-guide/>, accessed March 18, 2015; Androids, “An Idiot’s Guide to EDM Genres,” Complex, March 28, 2013, <http://www.complex.com/music/2013/03/an-idiots-guide-to-edm-genres/>, accessed March 18, 2015; Wikipedia, “List of electronic music genres,” Wikipedia, http://en.wikipedia.org/wiki/List_of_electronic_music_genres, accessed March 18, 2015; Stoney Roads, “SOMEONE MADE A 'SUB-GENRES OF EDM' CHART. HOW DOES IT STACK UP?,” November 27, 2013, <http://stoneyroads.com/2013/11/someone-made-a-sub-genres-of-edm-chart-how-does-it-stack-up>, accessed March 18, 2015. In the afterword of his book *Playing with Something That Runs: Technology, Improvisation, and Composition in DJ and Laptop Performance*, Mark Butler notes, “In the introduction to this book I framed electronic dance music as a case study, one that foregrounds the interplay of recording and performance in particularly vivid ways. As one of the first popular styles to make recordings central to the creative practices of performance, club music was at the forefront of a trend that has only increased in recent decades.” Mark J. Butler, *Playing with Something That Runs: Technology, Improvisation, and Composition in DJ and Laptop Performance* (Oxford: Oxford University Press, 2014), 232.

Less”: they compose the music they like and enjoy, regardless of who it may sound like or what the influences are, thereby caring more about artistic expression than classifications or pigeonholing. An academic solution to this issue would have to include musicologists and performers, professors and fans compiling an adequate list of main subgenres, composers, etc.; even that might require a little more time for the collective consciousness to marinate with the music in order to come to an informed decision.

The splintering effect could be tamed somewhat by placing popular electronic music subgenres under a few choice meta-subgenre headings. Possible terms could include EDM, electronica, and synthpop. EDM would include the more “dancing” or “club-style” music; this could include house, techno, trance, progressive, American dubstep, dance pop, and drum ‘n’ bass. Electronica has been defined as “electronic dance music that is geared for listening instead of strictly for dancing.”⁸⁷ This definition opens a fairly wide door to a number of subgenres; these could include ambient, downtempo, chillwave, and trip-hop.⁸⁸ Synthpop would encompass genres like disco, new wave, synthpop, and other genres that prominently feature synthesizers.

Figure 1 shows an oversimplified way to categorize all electronic music:⁸⁹

⁸⁷ Tony Verderosa, *The Techno Primer: The Essential Reference for Loop-Based Music Styles* (Milwaukee: Hal Leonard Corporation, 2002), 28.

⁸⁸ A large number of electronic music artists would fit in the “electronica” category because trying to fit them neatly into a category often proves difficult. Spotify has a few playlists (including “Heady Beats | Smooth Electronic,” “ESM | Electronic Study Music,” and “Indie Electronica”) that feature such electronica musicians.

⁸⁹ Fabian Holt addresses the idea of genre division in his book *Genre in Popular Music*. He lists nine potential genres of American popular music: “Blues, Jazz, Country music, Rock, Soul/R&B, Salsa, Heavy metal, Dance, and Hip-hop.” Fabian Holt, *Genre in Popular Music* (Chicago: The University of Chicago Press, 2007), 15-6. Holt goes on to state, “Such a list can only be tentative. It serves a rudimentary purpose and should not limit the agenda for our thinking about genre. . . . To understand the complex work of genre we need more than a systematic account of individual dimensions. We need explanations of fundamental connections and moments in the trajectory of a genre. The nine genres on my list above have evolved differently, but they have all gone through two basic processes: They have been *founded* (and *codified*) in what I call ‘center collectives,’ and they have changed through *further negotiations*. It is reasonable to distinguish between formative and subsequent stages in a genre’s history.” *Ibid.*, 16, 20.

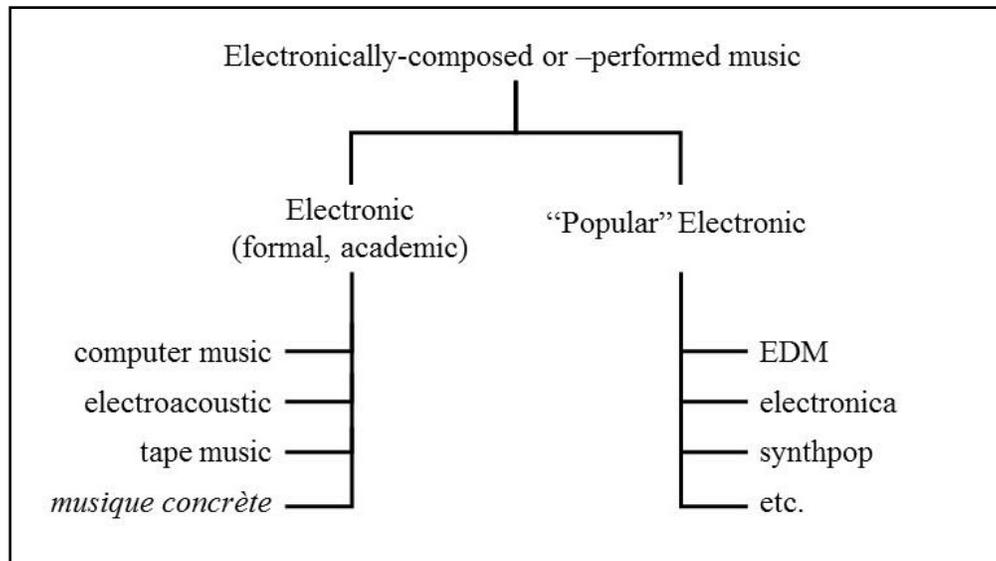


Figure 1. Proposed Categorization of Electronic Music

While this takes a very broad view of electronic music it could continue to move conversation toward both musically literacy and a canon of electronic music forward.

This type of music should be included in the tomes of musicology and music history. The trials and difficulty of assessing and evaluating electronic music is what makes it beautiful and wonderful: its diversity. As presented in this section there are people (myself included) who are attempting not a pigeonhole classification of this music but rather who are attempting to give banks to the river of electronic music.⁹⁰ Scholars, teachers, and performers will have to come to some consensus on the base elements of assessment and evaluation of this music in order for it to properly sit alongside music of previous centuries; then Karlheinz Stockhausen, Frankie Knuckles, Imogen Heap, and Flying Lotus can sit next to Monteverdi, Corelli, Beethoven, and Debussy.

⁹⁰ In 2002, Verderosa cautioned, “The term ‘Electronica’ is a term of convenience for label executives and record-store chains, and ultimately does not provide listeners with a true picture of the many individual styles found in most urban centers. Getting past the term ‘Electronica’ and learning the details of specific styles is your first important step in understanding Techno music and DJ culture.” Verderosa, 28.

This paper can be boiled down to a few salient points. First, by defining what constitutes a “composition” electronically-composed/-performed music can sit alongside Western art music of other eras. Second, the skills required to compose and perform electronic music can vary widely based on the performer/composer and the means (e.g. software, controllers) utilized by the performer/composer. Third, a taxonomic approach can assist in the development of rubrics for electronically-composed/-performed music in order to compensate for the inherent variability. Finally, a corpus of electronically-composed/-performed music for literacy would give electronically-composed/-performed music gravitas; this requires consensus from a host of people, including musicologists, composers, performers, fans, etc. Furthermore, the multitude of subgenres could be a detriment to this cause.

Closing Remarks

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Three thoughts have accompanied me throughout this paper. First is an idea I formulated while in graduate school: there seem to be two poles in electronic music – formal/academic and EDM – but there exists a vast land between them that we have yet to fully explore. There is so much room to experiment, play, explore, discover, etc. that we should be brave, push out into it, and see/hear what becomes of it.

Second is a line from the song “State of the Art” by the Australian musician Gotye. The song focuses on the home electronic organ culture that was popular in the 1950’s and 1960’s; the lyrics, and the accompanying music video, describe how a family becomes obsessed with the organ and the organ takes over their lives. A particularly thought-provoking verse section says, “Enjoy the state of the art / The Magic Swing Piano really is astounding / Now we can't tell them apart / But these amazing simulations end up sounding even better than the real thing.”⁹¹ Technology keeps advancing and there are times, whether in audio or visual arts, that distinguishing reality from synthetic sounds can be difficult. Perhaps the lesson to be learned is the music can be beautiful, of high quality, expertly rendered, etc., regardless of the sound source (e.g. acoustic vs. electronic).

The final thought comes from American composer/musician Dan Deacon. Deacon’s music is known for its variety of electronic sounds, use of acoustic instruments (including an orchestra), and sonic impact. When he was interviewed by NPR about his 2012 album *America*

⁹¹ Gotye, “State of the Art,” AZ Lyrics, accessed April 3, 2015, <http://www.azlyrics.com/lyrics/gotye/stateoftheart.html>.

Deacon was asked, “What do you say to people who are dismissive of electronic music? Do you ever feel that kind of criticism?”⁹² Deacon responded

I don't really feel the criticism, but I think I just feel like it's insane that people still call electronic music, electronic music. It's just - it's like calling music guitar music, or vocal music or something. And I don't know. It just doesn't make any sense. Like, you know, and people talk about how it's permeating the mainstream, but it's been in the mainstream forever, forever. But I feel like it'd be kind of like, people saying: I can't believe they're allowing trombones in the church... That's sort of like the mentality that I feel when people are like: Electronic music. Do you think it's going to last? Do you think - so...⁹³

Perhaps we will continue to call it electronic music; maybe we will get enough distance within this century where genre, not means of sound generation, will dominate.⁹⁴ Whichever way music goes in the future I will certainly be there—participating, composing, watching, listening—and, as I have endeavored to do in this paper, drawing attention to the vast possibilities that do and can exist when humanity converges its musical creativity with technology.

⁹² NPR Staff, “Dan Deacon On Computers, College And 'Electronic Music,’” NPR, August 28, 2012, <http://www.npr.org/templates/transcript/transcript.php?storyId=160169376>, accessed April 3, 2015.

⁹³ Ibid.

⁹⁴ During the writing of this paper I was introduced to the band Too Many Zooz, a three-piece band consisting of trumpet, baritone saxophone, and a drummer/percussionist that plays house and drum ‘n’ bass music. For more see <http://toomanyzooz.com/>.

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APPENDIX A: HICKEY, STERNFELD-DUNN & HARE, AND BROWN RUBRICS

Hickey: "Rubric for assessing general criteria in a composition assignment"⁹⁵

Components	Quality Line			
	Needs Work			Terrific!
Aesthetic Appeal	Does not present an effective general impression. Musical ideas do not hold the listener's interest.	Includes at least one interesting musical idea. Yet, the overall impression is not effective.	Includes some interesting musical ideas. The general impression is pleasant and moderately effective.	Strong aesthetic appeal and general impression. Would be enjoyed by many listeners. Keeps the listener interested.
Creativity	Musical idea is familiar or a cliché. No variety or exploration of musical elements (range, timbre, dynamics, tempo, rhythm, melody).	Musical idea is neither familiar nor a cliché. However, there is no development, variety, or exploration of musical elements.	Involves some original aspect(s) or manipulation(s) of musical idea(s). Explores and varies at least one musical element.	Includes very original, unusual, or imaginative musical ideas. Explores and varies at least two musical elements.
Craftsmanship	Gives no sense of a completed musical idea. Exhibits no clear beginning, middle, or end section. Form appears random rather than organized. Musical elements (range, dynamics, timbre, tempo, texture, rhythm, melody) do not connect well or are not used to organize musical ideas or the form.	Presents one complete musical idea. However, composition lacks overall completeness. Fails to use musical elements to organize musical ideas or form.	Ending feels final. Uses at least one musical element to organize the musical ideas and overall form.	Presents at least one complete musical idea. Has a coherent and organized form with a clear beginning, middle, and end. Uses musical elements to organize musical ideas or the form.

⁹⁵ Hickey, 29.

Hickey: “Assessment rubric for composition using dotted-eighth and sixteenth notes”⁹⁶

Components	Quality Line			
	Needs Work Terrific!			
Includes at least four dotted-eighth and sixteenth note rhythms	Contains no dotted-eighth and sixteenth note rhythms.	Contains one or two dotted-eighth and sixteenth note rhythms.	Contains three dotted-eighth and sixteenth note rhythms.	Contains four or more dotted-eighth and sixteenth note rhythms.
Includes dynamic markings and is eight measures long	Contains no dynamic markings and is less than eight measures long.	Is at least eight measures long or uses dynamic markings.	Is at least eight measures long and uses dynamic markings.	Is at least eight measures long and uses dynamic markings effectively for expression.
Melody	Does not feel complete or coherent.	Seems complete and coherent but lacks imagination.	Seems complete and coherent and contains some imaginative aspects.	Is convincingly complete, coherent, and imaginative.

⁹⁶ Ibid., 30.

Hickey: "Assessment rubric for a composition in rondo form"⁹⁷

Components	Quality Line			
	Needs Work			Terrific!
Rondo form	Has no formal structure.	Has a clear two-measure theme and one other theme but is not in rondo form.	Is in rondo form but with only two other themes—ABACA.	Is clearly in rondo form, with three other themes—ABACADA.
Suits the instrument (if applicable)	Is outside the practical range of the instrument and is beyond the technical grasp of players of this level.	Is within the practical range of the instrument but has too many difficult passages for players of this level.	Is within the practical range of the instrument and has only one or two passages that are technically awkward for players of this level.	Falls within the proper range of the instrument and is playable by performers at this level of proficiency.
Melody	Does not feel complete or coherent.	Seems complete but lacks imagination.	Feels musically complete and contains some imaginative aspects.	Feels complete and coherent and makes musical sense. It is imaginative and aesthetically effective.
Rhythm	Is erratic. It does not make musical sense for the piece overall.	Is stable but does not have any variety or does not make musical sense for the piece as a whole.	Makes musical sense for the overall form of the composition.	Is coherent and makes musical sense. It adds to the aesthetic effectiveness of the composition.

⁹⁷ Ibid., 31.

Hickey: "Assessment rubric for a melody with well-defined parameters"⁹⁸

Components	Quality Line			
	Needs Work			Terrific!
Begins on <i>do</i> and ends on <i>ti-do</i>	Does not begin or end with the correct notes (<i>do</i> , <i>ti-do</i>).	Begins or ends with the correct notes but does not do both.	Begins and ends with <i>do</i> but does not include <i>ti</i> .	Begins and ends with the correct notes as specified by the assignment.
Uses only notes from chord tones on template	Less than 50% of the remaining notes match the corresponding chord tones.	Between 50% and 75% of the remaining notes match the corresponding chord tones.	Between 75% and 90% of the remaining notes match the corresponding chord tones.	All other notes match the corresponding chord tones.
Suits the instrument (if applicable)	Is outside the practical range of the instrument and is beyond the technical grasp of players of this level.	Is within the practical range of the instrument but includes too many difficult passages for players of this level.	Is within the practical range of the instrument and has only one or two passages that are technically awkward for players of this level.	The composition falls within the proper range of the instrument and is playable by performers at this level of proficiency.

⁹⁸ Ibid., 32.

Hickey: "Assessment rubric for a melody with two musical ideas"⁹⁹

Quality Line

Components	Quality Line			
	Needs Work			Terrific!
Has at least two complete musical ideas that complement each other	Has no apparent complete musical ideas.	Has only one complete musical idea or at least two musical ideas, but they do not work together to create a sense of completeness in the song as a whole. The transitions between musical ideas are not smooth.	Has at least two complete musical ideas that complement each other within the structure of the song. However, the transitions between musical ideas are not smooth.	Has at least two complete musical ideas that complement each other, creating a feeling of completeness in the song. The transitions between the musical ideas are smooth.
Suits the instrument (if applicable)	Is outside the practical range of the instrument and is beyond the technical grasp of players of this level player.	Is within the practical range of the instrument but has too many difficult passages for players of this level.	Is within the practical range of the instrument and has only one or two passages that are technically awkward for players of this level.	Falls within the proper range of the instrument and is playable by performers of this level of proficiency.
Melody	Does not feel complete or coherent.	Seems complete but lacks imagination.	Feels musically complete and contains some imaginative aspects.	Feels complete and coherent and makes musical sense. It is imaginative and aesthetically effective.
Rhythm	Is erratic. Does not make musical sense for the piece overall.	Is stable but does not have any variety or does not make musical sense for the piece as a whole.	Makes musical sense for the overall form of the composition.	Is coherent and makes musical sense. It adds to the aesthetic effectiveness of the composition.
Aesthetic Appeal	Does not present an effective general impression. Musical ideas do not hold the listener's interest.	Includes at least one interesting musical idea. Yet, the overall impression is not aesthetically effective.	Includes some interesting musical ideas. The general impression is pleasant and moderately effective.	Makes strong general impression and has great appeal. Would be enjoyed by many listeners. Keeps the listener interested.

⁹⁹ Ibid., 33.

Sternfeld-Dunn & Hare: “Composition Rubric”¹⁰⁰

Composition Rubric	Superior 6	Excellent 5	Above Average 4	Average 3	Fair 2	Poor 1
Orchestration	Demonstrates an advanced understanding and creativity in idiomatically writing for and combining instruments, voices, or electronics. Mature knowledge of fundamental and extended techniques.	Demonstrates an advanced understanding but is lacking the final mature creativity in writing for and combining instruments, voices, or electronics. Largely complete knowledge of fundamental and extended techniques, but some elements missing.	Knowledge and creativity slightly unsophisticated in some manner regarding instruments, voices, or electronics. Knowledge of fundamental and extended techniques mostly but not entirely complete.	Basic but not sophisticated understanding of instruments, voices, or electronics. Fundamental knowledge is mostly there but understanding of extended techniques is lacking. Writing is not always idiomatic.	Fundamental knowledge of writing for and combining instruments, voices, or electronics exists but is essentially unsophisticated or unimaginative. Writing is often not especially idiomatic.	Knowledge of writing for and combining instruments, voices, or electronics is crude, non-idiomatic, and frequently includes errors.
Presentation	Quality of notation and presentation of materials gives the impression of professionalism and an astute attention to detail.	Quality of notation and presentation of materials generally very good. Attention to detail is not perfect but what few errors or inconsistencies exist are easily corrected.	Attention to detail is generally good, but there are frequent minor errors or inconsistencies. There are no or very few large problems.	Attention to detail is generally good, but there are frequent minor errors or inconsistencies, and occasional large problems. Professionalism not obvious.	Numerous small and large errors or inconsistencies in presentation. Details are there, but not sufficient for a professional product.	Presentation is crude, messy, unsophisticated, or very inconsistent.
Compositional Technique	Musical language demonstrates a high degree of originality, consistency, and organization.	Musical language demonstrates a high degree of consistency, but is not as original, thoroughly organized, or polished.	Original musical craft is clear, but there are some minor inconsistencies or fundamental weaknesses in organization.	Musical language shows basic knowledge or craft, but is generally unpolished. Musical language is inconsistent, or the whole is not particularly well organized.	Basic organizational skills are lacking. Musical language is essentially inconsistent.	Crude, thoughtless, disorganized.

¹⁰⁰ Sternfeld-Dunn & Hare, 1-2.

Aesthetics/ Creativity	The composer's scores show an abundance of creative ideas and the composer demonstrates an astute awareness of the aesthetics of contemporary music. Knowledge and craft are consistently reformulated into new musical ideas.	Some small degree of naïveté towards salient issues of contemporary music aesthetics or a very slight amount of derivate musical thinking exists.	Basic naïveté but with apparent interest and curiosity to learn more. Occasional, conspicuously derivate musical thinking.	Musical ideas are more often clichéd than not. Some basic ignorance or lack of curiosity regarding aesthetics.	Musical ideas are primarily clichéd or obviously derivative. Little to no understanding or interest in contemporary musical aesthetics.	Real creativity is minimal. An awareness or curiosity of issues in contemporary music aesthetics is absent.
Literacy	The composer demonstrates a wide and very thorough understanding and knowledge of music history and repertoire across multiple genres and musical eras. History and repertoire of a variety of 20 th and 21 st century musical genres are known thoroughly.	The composer demonstrates a wide understanding and knowledge of music history and repertoire across multiple genres and musical eras, but with some minor gaps.	The composer demonstrates a wide understanding and knowledge of music history and repertoire across multiple genres and musical eras, but with some significant gaps.	The composer's knowledge of music history and repertoire is limited to only a few eras or genres.	Basic ignorance or excessively narrow understanding of music history and repertoire, particularly regarding the 20 th and 21 st centuries.	Knowledge of music history and repertoire is essentially absent or extremely narrow (e.g. confined mainly to recent popular music.)
Musical form	A sophisticated knowledge of the processes that comprise form in music at basic and advanced levels is well conceived and consistently demonstrated. Demonstrates expertise beyond basic forms and can extend them in new directions.	Demonstrates an expertise in advanced and basic musical forms, but not always in the most sophisticated way. Ability to extend musical forms in new directions exists but is of inconsistent quality.	Understanding of basic formal processes in music is clear but not usually realized in an especially sophisticated way.	Use of basic forms is demonstrated but of inconsistent quality.	Struggles to successfully make use of even the most basic small forms in music.	No knowledge of musical form is apparent.

Brown: “Mills College MUS 252 Seminar in Electronic Music Performance”¹⁰¹

- Music Elec & Rec Media
 - To have a developed understanding of cultural, political, social, and intellectual issues in diverse contemporary and historical musical & sound art practices. (Introduced, Practiced)
 - Assess and critique musical examples of contemporary electronic music performance on aesthetic as well as technical grounds.
 - Examine and discuss issues of technological use in the arts and the socio-political implications and ramifications of such use.
 - To have distinctive creative ideas and the ability to realize them successfully on a professional level. (Practiced, Mastered)
 - Compose short electronic works in response to class project criteria incorporating sound diffusion, MIDI control, electro-acoustic sources, network interaction, and real-time audio analysis.
 - Produce and perform class projects in class and in formal concert at the end of the semester.
 - To be able to critically analyze & clearly identify strengths and weaknesses in her/his own work, & the work of others. (Practiced, Mastered)
 - Explain methods employed in class projects and discuss their musical attributes.
 - Develop listening skills and critique other student's work in class in a seminar format.
 - To be able to productively collaborate with others in professional contexts relating to her/his area of expertise. (Introduced, Practiced, Mastered)
 - Build collaborative performances using unique interconnection capabilities of electronic technologies.
 - Investigate new musical properties made possible by real-time group composition and performance.
 - To demonstrate a technical mastery of her/his instrument or discipline, and a comprehensive knowledge of its styles and repertoire, past and present. (Practiced, Mastered)
 - Construct hardware and software instruments and refine them through musical performance practice.
 - Categorize and compare historical and contemporary uses of electronic technology for sonic art and musical performance.

¹⁰¹ Brown, Mills College, http://www.mills.edu/academics/graduate/mus/courses/course_description.php?courseid=mus252, accessed March 17, 2015.