A MIXED ANALYTICAL APPROACH FOR EXAMINING CORT LIPPE'S LIVE-ELECTROACOUSTIC WORKS FOR INDEFINITE PITCHED PERCUSSION

by

QUINTIN R. MALLETTE

(Under the Direction of Timothy K. Adams, Jr.)

ABSTRACT

The study of analytical techniques in Live Electroacoustic works demands the recognition of issues and obstacles that inhibit musical interaction and synthesis of performer role within a given piece. This dissertation introduces an analytical approach to outline how the performer can identify and understand musically significant interactions between traditional and computer instruments, and how this understanding may influence the authority of the performer in Live Electroacoustic music (LEM). In LEM, there are several obstacles and challenges that the performer must overcome and meet. Some obstacles are easy to predict, such as an increased demand for sound equipment or other technologies; however, additional problematic areas are faced when the performer has a lack of means with which to understand or analyze the work. This issue arises from the fact that works utilizing live electronics tend to avoid notation of the computer's output, despite comprehensively notating the intended output from the performer. The lack of balance in notation, and lack of a written record of the computer's intended output, render traditional methods of analysis ineffective. Without an understanding of a particular work's organization, or the performance practice within a specific genre or style, the foundations of musical preparation, necessary for a consistently high level of performance, cannot be

established. This document proposes a "mixed" analytical approach to LEM that is influenced by the accepted analytical techniques from the fields of Spectromorphology and Performance Studies, as well as the incorporation of less formalized analytical techniques colloquially applied in practice by the performer. This approach will allow for an interdisciplinary perspective towards music analysis similar to current trends in musicology.[1] Subsequently, the "mixed" approach will then be applied to the indefinite-pitched percussion works of composer Cort Lippe as a vehicle for furthering the understanding of interaction between the "traditional instrument" as played by the human performer and "non-traditional" instrument, whether the computer or sound technician, in LEM, as well as to provide insights on the analytical techniques of performers.

INDEX WORDS: Cort Lippe, Duo for Cajon and Computer, Music for Hi-hat and Computer, Music for Snare Drum and Computer, Electroacoustic Music, Percussion, Performance and Analysis, Live/Electroacoustic Music, Typomorphology, Spectromorphology, Interactivity, Performance Practice, Mixed Electroacoustic Works

[1] Daphne Leong, "Analysis and Performance, or wissen, können, kennen," *Music Theory Online* 22, no. 2 (2016).

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DEDICATION

To Jacquelyn

I still believe that together our lives intertwine in counterpoint so perfectly that it must have been written by the pen of God.

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CHAPTER 1

INTRODUCTION

Live electroacoustic music (LEM) developed during the third quarter of the twentieth century as a result of a continued exploration of sound sources and an incorporation of the computer into stage compositions.[2] Throughout this exploration, composers have created several different programs and means for combining materials from electronic music and acoustic music. This combination resulted in the development of several different software applications, including MAX/MSP, Pure Data, and Supercollider.[3] Due to the ease with which they support an exploration of computer processes and transformations by the computer, these programs allow the composer to maximize their sonic palette. Similarly, percussion instruments throughout the twentieth century have emerged as a solo voice that also allows the composer to explore an extensive tonal palette through the incorporation of Eastern and Western percussion instruments outside of those typically written for within the canon of Western art music.[4] While it would seem that the maximizing of sonic capabilities for both the electronic and acoustic sound source would provide the composer with great potential for creativity, in turn, flooding electroacoustic music with works for percussion, such an effect does not seem to have taken place. This observation is underlined by the presence of only 305 works for the discipline noted in the Siwe Guide to Solo and Ensemble Literature, a number dwarfed by the number of acoustic works

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[2] Sergi Jordá, "Interactivity and Live Computer Music," in *The Cambridge Companion to Electronic Music*, eds. Nick Collins and Julio d'Escriván (New York: Cambridge University Press, 2007), 89.
[3] Ibid.
[4] Samuel Z. Solomon, *How to Write for Percussion: A Comprehensive Guide to Percussion Composition*, 2nd ed. (New York: Oxford University Press, 2016), 1, 5-7.

written for the marimba alone during that same period.[5] Through the increased study of electroacoustic works and the scholarship of performers such as Elizabeth McNutt, as well as that of composers such as Simon Emmerson and Leigh Landy and the group OREMA (Online Repository for Electroacoustic Music Analysis), there has been a growing exposure of electroacoustic music to a wider audience, allowing for the demystification of the genre. Although there has been a growing exposure to these works, there is still a great deal of indeterminacy on how to approach their analyses. The foundation of the OREMA has helped to codify the various tactics for approaching electroacoustic music. Of the eleven examples cited in OREMA, the majority of literature within this field devoted to this topic addresses the concepts derived from the theories of Pierre Schaeffer in his proposition of Typo-Morphology and the adaptation later proposed by Denis Smalley as Spectromorphology.[6] Typo-morphology was a "breakthrough" for the "codification of [electroacoustic] sounds into a grand, unified diagram…[it has] remained without much practical consequence," with some musicologists, similarly to Lasse Thoresen, opting to rethink it, and others largely abandoning it in favor of a more Spectromorphological approach, but both parties citing the essence of its "term" [Spectromorphology] as the "most adequate…[for designating] the vast field of research opened by Pierre Schaeffer."[7]

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[5] Additionally, the Siwe Guide makes no distinction for works that have "fixed" as opposed to "live" electronic accompaniment, which further underscores their lack of incorporation within the repertoire. As accessed on May 10, 2017. Thomas Siwe, "Siwe Guide to Solo and Ensemble Literature," Percussive Arts Society, http://www.pas.org/resources/research/ResearchCompos.aspx (accessed May 30, 2017).
[6]Insight taken from the synthesis of several writings, but the context is taken from David Hirst. David Hirst, "Analysis of Denis Smalley's Wind Chimes: A Summary," in David Hirst, *The Development of a Cognitive Framework for the Analysis of Acousmatic Music* (PhD diss., University of Melbourne, 2006), http://orema.dmu.ac.uk/sites/default/files/Hirst_Wind_Chimes_Anal.pdf.
[7] Lasse Thoreson and Andreas Hedman,"Spectromorphological Analysis of Sound Objects: An Adaptation of Pierre Schaeffer's Typomorphology," *Organised Sound* 12, no. 2 (2007): 129-141.

Spectromorphology was designed not as a form of analysis, but as a tool for unfolding the listening process.[8] With this ideology, Spectromorphology is an ideal perspective with which to categorize sounds and hence understand their organization. However, much like Typo-morphology, Spectromorphology is an in-depth process that requires time and dedication over time to make analytical insights on par with those derived from the traditional score-based analysis.[9] The "approximation" of a written score for the computer as instrument-sometimes with no notation of the electronic component- can be seen in this context as a disadvantage for the performer seeking to interact with his/her partner. Few scholars in the field of EA analysis have approached the analytical needs of the performer, an issue that should be addressed. As the number of performers receiving degrees in performance continues to grow, so does the need for diverse areas of training, such as a familiarity with LEM.[10] Additionally, performers are frequently called upon to make interpretive decisions in music due to the obscurity that arises from the written score. As LEM combines a notated version of the traditional score and, in most cases, no visual representation, i.e., score, for the computer instrument, it exacerbates the problem of interpretation for the performer.

In contrast, within the field of Performance Studies, there has been a significant amount of research written within the past 40 years discussing "performance and analysis," and more specifically within the last 20 years there has been a discussion on "performance as analysis," an area of study led by scholars John Rink and Nicholas Cook. Their scholarship has led to the presentation of notable concepts such as "informed intuition," a method that, according to Rink,

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[8] Denis Smalley, "Spectromorphology in 2010," *Polychrome Portraits No. 15* (Paris: Groupe de Recherches Musicales, 2010), 92.
[9] Bruno Bossis, "The Analysis of Electroacoustic Music: From Sources to Invariants," *Organised Sound* 11, no. 2 (2006): 101-102.
[10] Jamie Bullock et al., "Live Electronics in Practice: Approaches to Training Professional Performers," *Organised Sound* 18, no. 2 (2013): 170.

is employed as a form of analysis throughout learning a work.[11] If performers are empowered through the knowledge that their observations through "informed intuition" can provide meaningful readings of the work from an "analytical perspective," then they will be more likely to involve themselves in the dialogue about LEM and seek to understand the pieces and their software on a deeper level.

The Composer Cort Lippe (b. 1953) has been a consistent voice in the field of interactive computer music, having worked extensively at the Institut de Recherche et Coordination Acoustique/Musique (IRCAM) in Paris.[12] His work as a part of the team that developed the interactive software Max revolutionized interactive music. Over the course of his career, Lippe has received international acclaim as a composer and within the field of interactive music, establishing himself with thirty-five peer-reviewed publications and compositions that have appeared on over thirty CD recordings.

As live-electronic works become more prevalent and accessible for the performer, there is an increased need for dialogue on this topic that addresses the specific analytical needs of performers. There is a large field of published works studying interactivity from the perspective of the composer or music theorist; however, there are far fewer discussing it from the viewpoint of the performer.[13] Within the field of percussion, a few performers have continued to carry the baton of scholarship as it relates to the study of percussion performance in electroacoustic music.[14] Such scholarship is necessary for the field of percussion as electronic music is prevalent

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[11] John Rink, "Analysis and (or?) Performance," in *Musical Performance: A Guide to Understanding* (Cambridge: Cambridge University Press, 2002), 39.
[12] Cort Lippe, "Biography," University of Buffalo, accessed May 30, 2017, http://www.music.buffalo.edu/faculty/lippe/compositions#nav.
[13] Elizabeth McNutt, "Performing Electroacoustic Music: A Wider View of Interactivity," *Organised Sound* 8, no. 3 (2003): 297-304.
[14] As noted by the dissertations written by Bradley Meyer, Von Hansen, and Fernando de Oliveira Rocha.

throughout its solo percussion repertoire, a repertoire that is small in comparison to other instruments whose solo repertoire has been augmented over several centuries. In turn, this scholarship creates exposure and evokes a curiosity that encourages performers to explore new works through the uncovering and clarification of complexities that may intimidate performers. From this perspective, this document will seek to continue the area of research through analyzing the indefinite-pitched percussion duos of Cort Lippe.

The indefinite-pitched percussion duos, namely Music for Hi-Hat and Snare Drum, Music for Snare Drum and Computer, and Duo for Cajon and Computer, will be explored with the intent of uncovering their interactive elements. Through the incorporation of adjacent perspectives of analysis, Performance and Analysis Studies and Spectromorphology, a new "mixed" analytical process will be presented from the viewpoint of "performer's analysis." This process will serve as a vehicle for furthering the understanding of the interaction between the "traditional instrument" as played by the human performer and "non-traditional" instrument, whether the computer or sound technician, in LEM, as well as to provide insights on the analytical techniques of performers. The intent of this project is to further the scholarship within both the fields of percussion performance and performance practice in LEM.

CHAPTER 2

THE EPISTEMOLOGICAL PERSPECTIVE OF PERFORMER'S ANALYSIS

A Brief History

In writing about performance and analysis studies, this paper intends to present a reflection of the field through its own "morphology," so to speak. Unlike a more theoretical discussion on analysis, the study of performance speaks to interdisciplinary interaction. An undertaking that involves the cross-relationship between musicologists, composers, and performers must consider variables that are not discussed concretely. Perhaps this is fitting for a field that is still young and relatively narrow in its reach, with enough growth to receive resistance yet without the stronghold of more prevalent musicologies such as Schenkerian analysis or performance practice.[15] While these two forms of study have a great deal to do with the discussion of performance, they do not constitute its actual study as they lack an inclusive dialogue on the performer as subject and instead focus on style and the written score, respectively. Thus, it is the intent of Performance and Analysis Studies, hereafter mentioned simply as Performance Studies, to centralize the discussion on performance and its cross-relationship with analysis.[16] According to Dunsby, this is centralized from the perspective that "performers need a frame of reference for how they think about music in general, and for how

[15] Derived from a general theme as noted in the writings of John Rink and Jonathan Dunsby, who discuss the lack of "academic literature" serving this readership; John Rink, "Analysis and (or?) Performance"; Jonathan Dunsby, "Musical Performance Studies as a Discipline," in *Performing Music: Shared Concerns* (Oxford: Clarendon Press, 1995).

[16] Shortening of Performance and Analysis Studies drawn from the writings of Dunsby; Dunsby, "Musical Performance Studies as a Discipline," 18.

they go about their training and their job or pastime."[17] While this particular perspective may be problematic for the more modern view of Performance Studies, in which the merits of performance and the implied framework of their analysis are argued for, it is a foundational theme through which this field is perceived.

Several issues that arise from how musicologists discuss their analysis are the performers themselves, the centrality of analysis to performance and the viability of intuition as a form of analytical insight. It must be admitted that the field of "Performance Studies" has only recently begun taking shape as a true discipline. Its early roots begin in the discussion of issues more related to "performance practice" as opposed to "performance as analysis," a distinction that is necessary for understanding that the study of performance is neither an exploration of "authenticity" nor a path toward exploring a modern "taste."[18,19] Even as late as the mid-1990s, the field of performance studies was discussed not as a true field but more a "random scattering of performance studies, sometimes lurking in written endeavors aimed at quite different ends."[20] These "different ends," previously alluded to by Dunsby, often stemmed from the discussion of "performance practice."

While the discipline of "performance practice" may not be an actual presentation of "authenticity to the work" in its initial inception, it is a testament to "modern authenticity" and how the past is reflected upon today.[21] This reflection is meaningful in its own right but very

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[17] Ibid.
[18] Term as coined by Nicholas Cook. Nicholas Cook, "Between Process and Product: Music and/as Performance," *Music Theory Online* 7, no. 2 (2001): 1-31.
[19] Drawn from the criticism of Richard Taruskin on "Early Music" in which he writes, " If all Early Music was taste, why then, we [can] take it or leave it." Richard Taruskin, *Text and Act: essays on Music and Performance* (New York: Oxford University press, 1995),4.
[20] Jonathan Dunsby, *Performing Music: Shared Concerns* (Oxford: Clarendon Press, 1996), 27.
[21] Richard Taruskin, *Text and Act: Essays on Music and Performance* (New York: Oxford University Press, 1995), 9.

different from performance studies, as with performance practice the score or "oracle" is central to the conversation, whereas in performance studies the score is understood along with the concept of "performance."[22] When reflecting on the state of performance and musicology, Taruskin said the following:

> When thinking of the relationship between the musicologist and the performer we usually assume that the former teaches and the latter learns. But good performers can teach receptive scholars a great deal, and communication both ways is needed if a real symbiosis of musicology and performance is to occur.[23]

While the previous affirmation was presented over thirty years ago, it is very much a reflection of the direction in which performance studies is continually endeavoring to proceed. Thus, there is puzzlement as to what is impeding this seemingly innocent call to action. This fundamental question is central to the argument for performer's analysis. To understand this "call" and why it remains a pursuit for Performance Studies, it is necessary to venture back to the beginnings of the performance studies movement.

According to McClelland's bibliography on the field, performance and analysis studies stem from the work of early twentieth-century music scholars Hugo Riemann and Heinrich Schenker, who as a part of their writings would make performance recommendations. As the field of music theory emerged, this practice began to disappear as the theoretical discussion and a discussion of the finite within a written work began to take precedent.[24] It was not until the 1968 text *Musical Form and Musical Performance*, written by Edward T. Cone, that a resurgence in the discussion of performance and analysis began. The resistance impeding Taruskin's "call to action" purportedly originated from the supporters of this text. In his book, Cone intently

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[22] Taruskin, *Text and Act*, 55.
[23]Taruskin, *Text and Act*, 63.
[24] Ryan McClelland, "Performance and Analysis Studies: An Overview and Bibliography," *Indiana Theory Review* 24 (2003): 97.

discussed the principal nature of analysis and differentiated performance as a means for transmitting analysis to the audience. This belief is echoed by the writings of Wallace Berry, who in the 1989 text *Musical Structure and Performance* dismisses the intuitions of the performer and echoes the hegemony of analysis. Berry's viewpoint can be cited as reinvigorating the field of performance studies as it elicited a great deal of discussion amongst musicologists and led to many reviews in response to his claims. As can be noted by the reviews of John Rink and Eric Clarke, as well as those of Larson and Folio, Berry's argument for the hegemony of analysis and triviality of intuition, as opposed to the more apt dichotomy of rationalism and intuition, is dismissive of the intuitive aspects of music analysis.[25] *Musical Structure and Performance* has been considered the "most ambitious study" into the cross-section of analysis and performance, the impact of which "will likely be measured by the negative reactions it provoked, some of which accelerated the offshoot of entirely new branches within the discipline."[26]

These offshoots have explored many different aspects of performance, ranging from studies that are mostly analytical in nature, such as Edward T. Cone's and Harald Krebs's discussion continuing the conceptualization of hypermeter, to those whose focus was to bask in the cross-section and discuss both equally, notably, in Janet Schmalfeldt's paper, "On the

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[25] John Rink, review of *Musical Structure and Performance*, by Wallace Berry, *Music Analysis* 9, no. 3 (October 1990): 319-339; Eric Clarke, review of *Musical Structure and Performance,* by Wallace Berry, *Music and Letters* 72, no.1 (Feb. 1991): 86-88; Steve Larson and Cynthia Folio, review of *Musical Structure and Performance*, by Wallace Berry, *Journal of Music Theory* 35, no. ½ (Spring-Autumn 1991): 298-309.

[26] Edward D. Latham, "Analysis and Performance Studies: A Summary of Current Research," *Jahrbuch vom Zeitschrift der Gesellschaft für Musiktheorie* 2/2–3 (2005): 157–62. http://www.gmth.de/zeitschrift/artikel/521.aspx

Relation of Analysis to Performance: Beethoven's Bagatelles Op. 126, Nos. 2 and 5."[27, 28] Other ventures, such as those evidenced by the writings of David Epstein, began to expand the field by incorporating psychology and cognitive science into the discussion, with significant research devoted to the understanding of "the neurobiological basis of musical timing.[29, 30] However, it is the detailed exploration of "performance as analysis" with which this chapter is most concerned. This area is currently led by the writings of Jonathan Dunsby, Nicholas Cook, and John Rink, who are leading the discussion on the centrality of analysis and the extent to which intuition can provide meaningful insights on music from the analytical perspective.

Performance and Analysis

In exploring the connections between many of the preeminent scholars in performance and analysis, much of the analysis is, notably, based upon established analytical techniques, especially those drawn from the writings of Heinrich Schenker, although many incorporate several different analytical approaches.[31] However, articles that are polarized in focus on either "performance" or "analysis" will not typically take such an inclusive approach and instead focus their insight from a singular vantage point. John Rink, while incorporating Schenkerian analysis as a basis for several of his analytical writings on the performance of the music of Chopin, has recently taken to developing analytical techniques more suited to drawing parallels between

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[27] Edward T. Cone, *Musical Form and Musical Performance* (New York: W.W. Norton & Company Inc. 1968), 32-56; Harald Krebs, "Hypermeter and Hypermetric Irregularity in the Songs of Josephine Lang," in *Engaging Music: Essays in Music Analysis*, ed. Deborah Stein (New York: Oxford University Press, 2005), 13-29.

[28] Janet Schmalfeldt, "On the Relation of Analysis to Performance: Beethoven's Bagatelles Op. 126, Nos. 2 and 5," *Journal of Music Theory* 29, no. 1 (1985): 1-31.

[29] David Epstein, "'Shaping Time: Music, the Brain, and Performance', a Response to William Rothstein," *Journal of Music Theory* 43, no. 1 (1999): 165-90, accessed May 17, 2017. http://www.jstor.org/stable/3090693.

[30] For a more thorough biography of Performance and Analysis studies, see Latham, "Analysis and Performance Studies," 157–62.

[31] McClelland, "Performance and Analysis Studies," 97.

performance and analysis.[32] Insights such as those presented by Rink allow for a dismantling of the hegemony of musicology over the analysis of music through encouraging observations that are derived from disciplines outside of theory, a pursuit which this paper aims to further through applying performer's analysis to Live Electroacoustic Music (LEM). This pursuit has not received much attention from the Performance Studies discipline and offers a new area of application in which to examine the viability of performer's analysis. This discussion is therefore directed towards establishing the legitimacy of performer's analysis as a viable means of analysis with musically significant observations that are unique to the discipline of performance, a pursuit that will pave the way for the application of performer's analysis to LEM.

Cross-Relationship Between Performance and Analysis

Performance as a discipline is independent and unique from theory. It is an art form that relies on the projecting of interpretation, a process that John Sloboda has noted as "[i]n its broadest sense" exploring "the whole range of overt musical behavior;" however, once the scope of perspective is narrowed, it can be defined as "a musical performing…in which a performer, or group of performers, self-consciously enacts music for an audience."[33] Such simplicity carries with it all kinds of weight yet strikes at the very difference between the reading projected by a performance and one unfolded through written analysis, such that performance as an entity does not function independently of its performance due to the unavoidable presence of the audience and the "social responsibility" that it prescribes is a sentiment that does not apply to the analyst.[34] Cook discusses the difference between performance and theorists' analysis, dealing with the concepts

[32] McClelland, "Performance and Analysis Studies," 99.
[33] John Sloboda, *The Musical Mind: The Cognitive Psychology of Music* (Oxford: Clarendon Press, 1985), 67.
[34] Anthony Gritten, "Alibis, and Why Performers Don't Have Them," *Musicae Scientiae* 9, no. 1 (2005): 137-140.

of time and flux of analytical choice. Where theorists can afford to present multiple readings at their leisure, the performer must be decisive and committed to their interpretation in real-time performance.[35] Such differences in temporality help to illustrate the difference between the fields.

Additionally, the pursuit of performance through the constant adjustment of interpretation ex-post-facto highlights the performer's focus on continual growth, development, and exploration, as opposed to the search for "truth" or "correctness" in their interpretations. According to Doğantan-Dack, "a particular performer's perspective…will involve many different kinds of assumptions, information, images and associations, which will contribute in unique ways to the formation of her performance interpretations, and performance signature."[36] Such widespread interests and assimilation of influences place the readings of the performer on a very different plane than those of the analyst, as this compilation of influences is not based on any given theory but a litany of various theories, commonalities and dissonances notwithstanding. For, as they relate to the performer, "the different kinds and modes of knowledge…do not necessarily form a hierarchy of importance."[37]

At times, the performer may purposefully choose to present a reading of a work from a stance with which they do not agree simply for the "renewed inspiration" that it presents.[38] In contrast, other performances may be void of predetermined interpretation from their outset, much like the organic process alluded to by Glenn Gould, in which "the ideal way to go about making

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[35] Joel Lester, review of "Musical Structure and Performance," by Wallace Berry, *Music Theory Spectrum* 14, no.1 (Spring 1992): 76-77.
[36] Mine Doğantan-Dack, "Recording the Performer's Voice," in *Recorded Music: Philosophical and Critical Reflections,* ed. Mine Doğantan-Dack (London: Middlesex University Press, 2008), 303.
[37] Doğantan-Dack, "Recording the Performer's Voice," 303.
[38] Lester, review of "Musical Structure and Performance," 77-78.

a performance…is to assume that when you begin, you don't quite know what it is about[,] you only come to know as you proceed."[39]

These various thoughts on performances reveal a unifying force that is as much about projecting a reading of a work to the audience as it is about the egoistic nature of the performer. Such egoism is present when the performer chooses not to duplicate the "revered" performances preceding it but instead wants to follow his/her personal intuition, a journey that may lead to new discoveries or perhaps more honest interpretations of which the audience may be appreciative or disapproving. Performance is not about the pursuit of what is "definitive" but instead about the journey for more knowledge and insight into the inner workings of a piece, which is the same type of exploration that we associate with analysis itself.[40] The key difference, of course, is the notion that theorists are not concerned with "musical realization" and incessantly seek a "definitive answer" to questions that arise from the score.[41]

Following the writings of Cook, if performance and analysis are to be observed as directly linked, both perspectives should be pursued "simultaneously and interactively."[42] This approach makes analysis a "tool" for the performer and vice versa, providing support for the further questioning of a work and not necessarily the source of answers within a work. Instead of analyzing a work to understand how to play it, this difference can be understood as analyzing the work to explore what interpretations carry which musical meanings. Howell takes this position when discussing "the role of analysis…[as] one of raising possibilities rather than providing

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[39] Glenn Gould and Tim Page, *The Glenn Gould Reader*, (New York: Vintage Books, 1990), quoted in Dunsby, *Performing Music*, 39.
[40] Lester, review of "Musical Structure and Performance," 75-81.
[41] Lester, review of "Musical Structure and Performance," 75-81.
[42] Nicholas Cook, "Analysing Performance and Performing Analysis," *Rethinking Music* (Oxford: Oxford University Press, 1999), 248.

solutions," as does Judith Butler's statement that "'Structure' is performativity constituted by the very 'expressions' that are said to be its result."[43] The difficulty with codifying this relationship lies with how to determine the influence of performance on analysis. To understand the effect of analysis on performance, we can adopt the perspective of Fisher and Lochhead and see how "the performer encountering an analysis by someone else…may provide the basis for an inner hearing as the performer comes to own the analysis."[44] This statement is similarly echoed by Howell as he speaks of the "process of recreation in experience" and how this experience "involves making somebody else's analysis your own."[45] These ideas share a common thread in that they speak to the extent to which as a performer one may easily adopt the ideas of others through the clear path from analysis to performance. Fisher and Lochhead express that this process "takes into account the primary task of the performer—[that] the creation and projection of an inner hearing can make a significant contribution to convincing performances."[46]

To understand the opposing process, Fisher and Lochhead's previous sentiment can be rephrased to say that "the primary task of the performer is the creation and projection of a *reading*." This shift in emphasis from "hearing" to "reading" shifts the focus from the performer as one who is subservient to "the readings of others" to one who is in charge of his/her "own" readings. This shift in focus is further elucidated in the arguments of Cook, who wrote that "if as the listener or musical audience we are introduced to a musical work through its translations or

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[43] Anthony Howell, *The Analysis of Performance Art: A Guide to its Theory and Practice* (London: Routledge, 2013), 702; Judith Butler, *Gender Trouble: Feminism and the Subversion of Identity* (New York: Routledge, 1990), 25.
[44] George Fisher and Judy Lochhead, "Analysis, Hearing, and Performance," *Indiana Theory Review* (1993): 36.
[45] Howell, *Performance Art,* 702.
[46] Fisher and Lochhead, "Analysis, Hearing, and Performance," 36.

performance, then the performances become our source for musical meaning."[47,48,49] In this passage, Cook is framing "performance" as a way of translating notation. This reframing allows for the observer, or "listener," to reflect upon the performance itself as an analyst, even if the performer may not experience the same perspective due to his/her active role in the music-making.[50] This unique perspective on the function of performance presents it clearly as a form of analysis. Cook elucidates this point even further when he writes that

> performance should be seen as a source of signification in its own right. It does not simply "express," "project," or "bring out" originary meaning, meaning which, in Rosenwald's words, we cannot know in se. If we come to know the original "precisely by means of reflecting on its translations," then it follows that performance is a source of musical meaning.[51]

Such a process can be understood as a "performative approach" to analysis as it illustrates the original discovery present in its performance. Such originality exists implicitly through the act of performance, since for the audience the performer's reading of a work is their primary source of knowing in that moment.[52] This perspective raises several questions: What are the "real" implications of this "originary meaning"? What, if any, are the effects of pre-existing knowledge of a work by the observer? Cook's line of thought presents a clear case for performance as its own form of analysis. However, as understandable as this argument may be, it still leaves the issue of performance as analysis as a problematic one, leaving many questions unanswered, the pursuit of which is beyond the scope of this essay. Instead, with the understanding of performance as analysis determined, it is necessary to explore how a model for understanding

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[47] Cook, "Analysing Performance," 246-247.
[48] Cook, "Analysing Performance," 256.
[49] Cook, "Analysing Performance," 259.
[50] Nicholas Cook, "Performer's Analysis," in *Beyond the Score* (New York: Oxford University Press, 2013), 45.
[51] Cook, "Analysing Performance," 249.
[52] Cook, "Analysing Performance," 249.

performance as analysis can be framed such that the framework can lay the foundation for applying performance as analysis to the understanding of other disciplines, namely LEM. In order to achieve this, it is necessary to pursue an answer to what role the performer assumes in "their" analysis.

Performers as Analysts

One line of logic is to surmise that if performance must be viewed as analysis, then the analysis must come from an analyst. Since the performance originates from the "performer," the performer must therefore function as an analyst. The difficulties with this logical argument are the "illocutionary force" behind the word analysis or analyst.[53] These words and their resulting categorization infer an assumption of the "scientific" nature of scholarly writing and musical insight through which only an informed elite can make and perceive arguments. The weight of those terms and their imposed meaning is very different from what we associate with the performer, who in turn conjures the assumption of the "artistic," with their ebb and flow, their beauty and flawlessness, their mythical search for Euterpe.[54] Richard Schechner presents his views on performance as in line with those of Aristotle and his Poetics, where the act of performance is "more truthful," more "real" than "ordinary experience." While Schechner's framing of performance refers to theatrical performance, it does provide insight into the notion that the terminology that is employed when discussing the "performer as analyst" is socially dichotomous and a linguistic obstacle that contradicts what is traditionally understood as performance.[55] Performance as a field draws definition from the abstract, whereas analysis draws

[53] "Illucutionary force" is used here to discuss the inherent sense of 'authority' implied through the words that the speaker uses.
[54] Euterpe is a muse from Greek Mythology, daughter of Mnemosyne and Zeus, considered to be the muse of music.
[55] Richard Schechner, "Introduction, The Fan and the Web," in *Performance Theory* (London: Routledge, 2003), XIX.

definition from the concrete or discernable. Perhaps Cook presents this value most strikingly, by drawing on the performer's hyper-focus in regards to the "raw" "reductive material," in contrast to the more holistic theorist's analysis, as the relevance and singularity of the "performer as analyst."[56] With this insight, the perception of the performer must be reframed to realize the concept of "the performer" as "analyst" and, further, "performance as analysis."

If performance is to be reframed from "aesthetic" to "esthesic," or to be approached as a discipline that makes relevant inferences based on the written score—beyond that of presenting originary meaning to the audience—it must additionally, as Cook has charged it as doing, offer insights on the material within a work. But how may this be done?

While an argument as to whether performers interpret written scores would be trivial, there is a substantial argument presented when discussing the intentionality of this interpretation. Rink has ventured to explore this area through presenting concepts aimed at "translating" between performance and structure with his ideas on "informed intuition" and "performer's analysis." Although both Rink and Cook have been wary and critical of those drawing too direct a connection between the work of the musicologist and that of the performer, in their analysis, this idea of "translation" is seemingly intended to spark the intentionality of how and why the performer thinks and understands written material. As Cook notes, allows the presentation of "translation" put forth by Lawrence Rosenwald, in his theory of "translation," as the appropriate perspective through which to view the connection between scores and performance.[57] He states that "we do not know the original, do not and cannot know it in se, and …come to know it precisely by means of reflecting on its translations." Perhaps this is why Rink targets the goal of the performer's analysis as the intention "to discover the music's 'shape,' as opposed to [its]

[56] Cook, "Performer's Analysis," 43-46.
[57] Cook, "Page and Stage", 48.

structure."[58] Through these thoughts, Rink is alluding to the structure of a work as defined by observations of its written score. However, according to Rosenwald's theory, the written score itself is a translation of the composer's original conceptualization of the "piece." To the composer, this process would most assuredly align with "art" and not "theory," as the composer is not limiting himself/herself to a set of rules but instead creating music.[59] As Milton Babbit writes about his own music, "If you looked at any of [my] pieces (or if you were told by somebody [about them]), you'd find that they were all twelve-tone, twelve-pitch-class—whatever words you want to use—compositions, but I think that would tell you very little about my music or probably anybody else's music."[60] As alluded to by Babbit, the intention behind translating the composers' ideas for the "piece" into written notation is an act of artistry, even if it is simultaneously derived from "theory," allowing for the performer's act of translating or "interpreting" the written notation to be both "art" and "theory." Is it possible then for the work of the performer to be that of the analyst even without the explicit determination of such intentions? This is a loaded question, but if the argument for the performer as analysis is to be broached in a meaningful way it is necessary to explore why the performer's analysis is problematic. Such a discussion would be incomplete without discussing the scholarship behind why musicologist analysis is adopted by performers as valid, and performer's analysis is not as easily adopted by the broader field of musicology.

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[58] John Rink, "Analysis and (or?) Performance," in *Musical Performance: A Guide to Understanding* (Cambridge: Cambridge University Press, 2002), 39.
[59] Lawrence Rosenwald, "Theory, Text-Setting, and Performance," *The Journal of Musicology* 11, no. 1 (1993): 53-54.
[60] Stephen Dembski and Joseph Strauss, eds., *Milton Babbitt: Words About Music*, *The Madison Lectures* (Madison: The University of Wisconsin Press, 1987), 4.

The Hegemony of Analysis

A way forward in determining the merit and existence of the performer as analyst is to briefly discuss the merits and meaning of the musicologist as analyst. While a detailed discussion of the musicologist as scholar is beyond the scope of this essay, it is necessary to discuss the significance of their contributions to performance studies and why musicologists and their theories of musical understanding are considered absolute truths for performance. Rosenwald, as a translation theorist, discusses translation as an ongoing process with the aim of continuous exploration of the original through the offering of paraphrases that may, to use Cook's word, either come as a "surprise" or perhaps evoke thoughts on the paraphrases that have been "surprised" by the translation.[61] In simpler terms, this means that the translation of a work, whether through composition, interpretation, or analysis, is inherently biased. This bias will tend toward that mastery over a discipline that the individual possesses, not to mention their personal views on the subject. However, even when acknowledging this bias, there has been little consideration for the bias of the audience or even whether we perceive the medium as a translation itself. For example, many may not recognize a composer as translating their "own" ideas. This oversight could result because we assume that since the idea has not left the composer, they are simply transcribing their own ideas into notation, and since the ideas belong to them, the illocutionary force that they exhibit provides us, as the observer, with no need to question their "original," notated composition with the true "original," as Maus points out in his review of Rosenwald, existing within the mind of its creator.[62]

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[61] Rosenwald, "Theory, Text-Setting, and Performance," 62.
[62]Fred Everett Maus, "Response to Lawrence Rosenwald," *The Journal of Musicology* 11, no. 1 (1993): 71.

This sentiment leads us to discuss the authority of the musicologist as it relates to analysis. Musicologists use linguistics to display "illocutionary force" through their applications of theory in analysis. Such power and external support for their arguments are influential in coaxing the observer to accept their writings or analyses as "truths," as opposed to a singular "reading" of a text that performers and analysts alike are aware may have many different readings.[63] Linguistics, as used by musicologists, is not limited to the vocabulary that analysts employ for discussing everything from musical structure to observable interactions; it is also aimed at how analysts describe the authority of their observations.[64] Such illocutionary force can be observed in Dunsby's discussion of the opening to Berg's Sonata Op. 1:

> the second G…must be heard as: an upbeat to the following note; the subsidiary rhythmic member of a dotted-note figure; the filling-in of an unattacked first beat after a busy two-beat anacrusis; and as having many further functions. It is a note overburdened with meanings, most of which can be resolved in performance by the convenient introduction of an unscripted pause on the third beat of the first incomplete bar, thus destroying the larger establishment of a perception of metrical order in the first phrase.[65]

This display of linguistic mastery and persuasiveness guides the reader to trust and accept the words of this analysis as the "true reading." However, what if in place of this presentation of linguistic mastery, a separate "imaginary" analyst asked for a reading of this work to simply "allow a moment of repose on the third beat, to allow the piece to 'breathe'"? Would their insights be any less convincing, simply due to their lack of "illocutionary force"? They are arguing the same things, in all likelihood for the same reason, because intuitively there was something in this passage that was "problematic." Rink discusses the previous passage by

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[63] J.L. Austin, J.O. Urmson and Marina Sbisa, *How to Do Things With Words* (Cambridge, Mass: Harvard University Press, 1975), 99-101 as quoted in Rosenwald, "Theory, Text-Setting, and Performance," 63.
[64] Rink, review of *Musical Structure and Performance*, 319.
[65] Jonathan Dunsby, "Guest Editorial: Performance and Analysis of Music," *Music Analysis* 8, no. 1-2 (1989): 14.

Dunsby as "of inestimable value to performers…[due] to the consideration of the contextual functions inherent in a given pitch or passage, and how to convey them in one's playing."[66] Simultaneously, Rink questions why Dunsby approaches his previous inquiry from this resigned stance: "The opening of Berg's Sonata, fine though it is, is… something to be dealt with pragmatically." It seems clear that the two issues are one in the same. Dunsby expresses concerns with the written readings of music, alluding to their inability to express or elaborate on a passage using their linguistic arsenal as a "problematic" ineptitude for the field that is frequently encountered in "theoretical analysis."[67]

Such ineptitudes are not encountered by the imaginary analyst, who advised that a passage should "breathe," as their analytical process dealt less with structure and more with shape. While a discussion of "shape" does not detail the "why" in a piece, it can detail the "how," which in turn alludes to the "why." This element is why Rink proposes that the goal of the performer's analysis is "to discover the music's 'shape,' as opposed to [its] structure." It is also why Cook similarly alludes to alludes to the performer as analyst benefitting the field through his/her exploration of musical works as "scripts in response to which social relationships are enacted [with] the object of analysis…present…in the interactions between performers, and in the acoustic trace that they leave."[68] This material is of minor consequence to the structure of a work but is of consequence to its "shape," or how the piece is read in regard to its abstractions. The performer as analyst is likely to present arguments for interpretation much like the one submitted by the "imaginary" analyst. It may be assumed that such analysis is the work of a "novice," and by the musicologist's standards of analysis seeking an understanding of structure,

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[66] Rink, "Review of Musical Structure", 319
[67] Dunsby, "Performance Studies as a Discipline," 11, 19-21.
[68] Cook, "Music and/as Performance",9.

it likely would be. However, for the performer seeking to understand the work's "shape" and how to manipulate it, readings exclusively concerning structure are less relevant and of the same usefulness as those of the "imaginary" analyst for the musicologist, raising the question: What validity is there to the hegemony of musicology?

To answer this, we must therefore return to the ideas of Rosenwald, where "translation" is an ongoing process of continually developing insight. However, the question is now raised regarding the extent to which the concretized "work," in its written score, is the "original work," as opposed to the closest approximation of the "true" composition, which, as we have determined, exists in its most authentic "self" within the composer's mind. Once we consider that the written "score" is simply the closest approximation or "translation" of the work attainable, we can see both the musicologist and performer as analysts who explore readings of a work with the same deficiencies. The musicologist is using the "written score" as a means to determine the composer's ideas on structure, and the performer is using the "written score" to determine the composer's ideas on "shape." The difference here being the performer's reliance on qualitative modes of analysis. Both are simply attempting to present their closest attainable interpretation of the work based upon their hermeneutic circle, with this circle of imperfections leading them toward a "truer" state of discovery. It is not unusual to hear a composer mention that a work is unfinished upon its completion, but instead, comes to fruition through its performance. This process of realization or "translation" of the score by the performer is of value to the compositional process, as it is not likely that a replication of the composer's original vision is ever reached, nor that such a realization is ever the intention. The "true" intention behind a work is, arguably, that of continued "discovery" and "translation." On a broader scale, perhaps the benefit of "translation" is that it provides support for the ongoing hegemony of the symphony

orchestra and that of "Western" concert music within music schools. Presumably, it is this ongoing "discovery" that allows for a deeper understanding of music and the musical process of "translation." This discovery is noted through the paradigms of creation (composer), ideas and understanding (musicology and theory) and realization (performance), which make the current model of music education beneficial for the study and comprehension of trends and processes with which this newfound awareness can be applied to other musics cross-culturally. This amalgamation of ideas across musical disciplines provides a framework for approach how all levels of music scholarship are interconnected, allowing for performer insights to be deemed as having merit. While the viability of performer's analysis has now been established, it is equally important to explore the uniqueness of the performer's observations. In other words, is performer's analysis unique to performance, or are they simply another mode of filtering the theorists analytical insights. This leads to the question: How critical is theoretical analysis to performer's analysis?

Centrality of Analysis to Performance

Analysis, as it has been discussed throughout this paper, is a broad topic. Primarily, this discussion has revolved around the analyses of performers and of musicologists, with rhetorical differences being the primary distinction. As pointed out by Bethany Lowe, the nature of this debate is due to the lack of explicit models, where "attacks on other writers for their point of view have been based on criticizing the ideological outcome of that writer's understanding of the relationship, rather than on identifying his or her formulation of the relationship itself."[69] Such distinction between "explicit" and the resultantly derived "implicit" projections of a model to express the relationship between performance and analysis is an interesting one. The explicit

[69] Bethany Lowe, "On the Relationship Between Analysis and Performance: The Mediatory Role of the Interpretation," *Indiana Theory Review* 24 (2003): 47.

proposal of a model is a concept heavily used in the sciences, but not typically proposed in the humanities, but we should ask: Why not? Is it possible that the theoretical nature of musicology means that developing concrete or "explicit" models would inhibit the malleable character of written arguments, thus revoking the empowering nature of linguistics and their perceived "illocutionary force"? In turn, this change could be understood as decreasing the musicologist's hegemony within the epistemological study of music. In other words, if musicologists are forced to clarify their intentions through an explicit model, would this decrease their stronghold on the study of music analysis? It is not the intention of the author to imply that the illocutionary force of musicology is negative, nor need it be an issue of concern for performance studies. In fact, analysis from the perspective of musicology is necessary for performers to have a complete understanding of music. As can be noted within the recent developments of musicology, despite the influence of early field leaders Hanslick and Schenker, theorists have become increasingly more interested in the expressive and emotional aspects of music, resulting in their reintroduction and inclusion in their analyses, though still from the paradigm of a type of "superstructure" or extra-musical aspect of the music.[70] This manner of receptivity for other modes of musical analysis are not exclusive to musicologists; similarly, performers incorporate "structural" aspects into their analysis, ranging from traditional modes of analysis like those put forth by their counterparts in musicology to new means of analysis such as the tempo graphs proposed extensively by Rink.[71] With this appreciation for the benefits and drawbacks of both performers' and musicologists' analysis, we must ask: What is the centrality of analysis to performance?

[70] Nicholas Cook, "Page and Stage" in *Beyond the Score* (Oxford: Oxford University Press, 2013), 33.
[71] John Rink, "Analysis and (or?) Performance" in *Musical Performance: A Guide to Understanding* (Cambridge: Cambridge University Press, 2002), 37-39.

This issue, despite its simplicity, is a difficult one to solve. As Dunsby claims, "young musicians are no longer taught that academic study of music should be, or can be, divorced from practical concerns."[72] If this sentiment holds true for musicians, how then do they develop interpretations? Is it explicitly through "traditional" musicological analytical techniques, or do they explore music in a different way? As revealed earlier, performers approach analyzing music with a preference toward understanding its shape as opposed to its structure, so is it fruitful for them to explore in-depth analytical techniques with a structural focus? Is it possible that over-emphasis on the structural aspects of the music will offer a performance that is pedantic and boring, one in which the audience is spoon-fed the structure without having to search for it? In the words of William Rothstein, the performer must be cautious with written analysis, "because, [by] knowing what a piece of music contains in terms of structure, the performer can proceed to 'bring it out,'" which in turn presents "a dangerous half-truth," because it is one thing to be convinced that something is true analytically "[and]…quite another to decide how—or even whether—to disclose such information to one's listeners in a performance."[73, 74] The question of how to properly disclose analysis in performance, or whether such practice is useful, is an ongoing one, which in effect gets at the very center of how performance and analysis studies are beneficial. Perhaps this mutual benefit is most clear in the words of Schmalfeldt: "the Analyst fails to clarify that many of her analytic views had in fact been inspired by the performer. Nor does the performer grasp the opportunity to demonstrate that performances can, and usually do,

[72] Dunsby, "Performance Studies as a Discipline", 19.
[73]William Rothstein, "Analysis and the Act of Performance," in *The Practice of Performance: Studies in Musical Interpretation* (Cambridge: Cambridge University Press, 1995), 218, 238.
[74] As quoted by Nicholas Cook in Cook, "Page and Stage," 38.

influence and even determine analytic interpretations, just as much as analyses can, and often do, inform performances."[75]

With this perspective, it is understandable that while performers may have their methods of analyzing a work based on the exploration of shape, they must simultaneously be concerned with the structural implications within a work. As Dunsby admits, there are writings on performance where "the performer is invited to take the time to contemplate something that [is] …ultimately vacuous, however well-intended." This does not contradict the need for a "frame of reference for how [to] think about music in general."[76] Performance as analysis does not equal musicology as analysis, but they do both lead toward interpretation from a neutral perspective with which all may be influenced.[77]

Additional Perspectives

Performance as analysis is not a unilaterally accepted concept. Arguments regarding its validity vary from a discussion on its efficacy as analysis to its choice of linguistics for terminology. Perhaps one of the most overwhelming dismissals of "performance as analysis" comes from Bethany Lowe, who writes that

> A related terminology and set of problems comes along with the concept of "performer's analysis," which indicates a type of analytical discourse that is either digestible by performers or can be spontaneously generated by them. Elaine Goodman has worked extensively on the conversations held between cellists and pianists while rehearsing a duo piece in order to identify the types of discourse within lessons and rehearsals. Although these performers' comments move freely between different kinds of discussion, each of them falls nonetheless into one of the three modes of Interpretation, Performance, and Analysis. For instance, the simple comments "keep it to the same dynamic" and "I prefer it slower" are suggestions for literal Performative realization, while more metaphorical comments like "it's sad," a comparison to frustrated screaming, or a series of arches drawn in the air, fall under the heading of Interpretative statements.[78]

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[75] Schmalfeldt, *In the Process of Becoming: Analytic and Philosophical Perspectives on Form in Early Nineteenth-Century Music* (Oxford University Press on Demand, 2011), 114.
[76] Dunsby, "Musical Performance Studies as a Discipline," 18.
[77] Lowe, "On the Relationship Between Analysis and Performance," 47-94.
[78] Lowe, "On the Relationship Between Analysis and Performance," 86.

It is clear that, as Lowe notes, "the concept of 'performer's analysis'"[79] is not uncovering the same kinds of discoveries sought after by musicologists.[80] Its merits, however, do elucidate interpretations of music for the listener.[81] While Lowe's arguments regarding the shortcomings of the performer's analysis as "[falling] nonetheless into one of the three modes of Interpretation, Performance, and Analysis" is evident, it is also biased.[82] Interpretation, Performance, and Analysis, as found within Lowe's writings, are simply imagined constructs whose existence was actively being defended within the same essay. Such arguments hardly speak to the ineptness of performer's analysis. If, as in this instance, musicologists are to create boundaries for the sake of keeping performers out, then an argument for the importance of performer's analysis can never be made. The merit of including performance and "performance as analysis" within the field of performance and analysis studies is that it seeks an understanding of the cross-relationship between the performance and analysis of music, an objective that is not achieved by excluding the measures put in place by performers.

Contrary to common arguments, the term analysis, as it relates to music, does not belong exclusively to the constituent fields in musicology as much as it belongs to the overarching discussion of the constituent fields in music. Some scholars disagree, stating that

> It is counter-productive however, to give this activity a name drawn from another field, since this might diminish the freedom of access to it that performers feel they have, as well as beg the question of its identity. Furthermore, putting the term analysis in quotation marks, like other measures of redefinition intended to soften or broaden the meaning, threatens at best to dilute the term into a vague synonym for "observation(s)," "selective attention," "musical awareness," or whatever—functions that cannot be assumed to invoke any analytical thought as this term is usually understood within musicology.[83]

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[79] Ibid.
[80] Ibid.
[81] Cook, "Analysing Performance and Performing Analysis," 241, 246.
[82] Lowe, "On the Relationship Between Analysis and Performance," 85.
[83] Lowe, "On the Relationship Between Analysis and Performance," 85.

Arguments like this one use their illocutionary force as a scare tactic against the earnest consideration of alien forms of analysis. Such an argument is simply gentrifying the term analysis and subsequently redefining it in order to exclude the minority perspective, a point that David Rumelhart elucidates: "According to the schema theory of comprehension…the task for the comprehender is to find a schema within which [the] utterance is coherent…thus, the interpretation that the speaker is asserting…suggests that the characteristic properties of the predicate concept are to be applied to the subject concept."[84] In other words, Rumelhart, in distinguishing between metaphorical and literal meaning, is arguing that when applying metaphorical meaning to something, it only needs to translate to its new meaning in a "coherent" and not a literal manner. This distinction between coherence and literal meaning allows for "performer's analysis," or any other discipline-specific analytical technique, to borrow the term analysis so that the "observer" is aware of the context of the subsequent discourse. Lowe alludes to this concept when she says that "the use of a familiar word such as analysis to cover a new idea is perfectly understandable and a normal part of our linguistic resourcefulness and creativity."[85] As such, there is no detriment to the performer, musicologist, or observer in perceiving performer's analysis as a unique form of analysis from the stance of linguistics.

Additionally, there are concerns within the field of musicology with the way musicologists formulate their audience for papers. Dunsby cites one such concern over the discussion of performers' concerns without writing with them in mind. In confronting this problem, Dunsby has presented a call to the field so that "musicologists might turn their exceptional intelligence to helping performers to understand better their activity, with its ideals

[84] David Rumelhart, "Some Problems with the Notion of Literal Meanings," in *Metaphor and Thought*, ed. Andrew Ortony (Cambridge: Cambridge University Press, 1979), 80.
[85] Lowe, "On the Relationship Between Analysis and Performance," 85.

and its fears as well as its practicalities."[86] This sentiment does not preclude the analyst from academic writing or musicological exercises that stretch the boundaries of musical understanding, but instead urges them to develop a form of middle ground in which the musicologist may take a more involved role in the development of performance. Howell suggests that such a sentiment is seemingly welcomed by musicologists, noting that the "performer's art" composes a "crucial part of their own [art]." While the previous statement, which is echoed in Lowe's writings, is presented concurrently with the notion that performers "tend to view analysis either with considerable suspicion or as a complete irrelevance," it does signify an intent for inclusivity.[87] However, it should be noted that Howell's assertion about the performer's perspective on written analysis is baseless. His writing offers no citations to substantiate such beliefs; in fact, the opposite view can easily be argued, that musicologists do not consider the influence of the "performer's art" either. In Schmalfeldt's earlier writings, she speaks condescendingly of the merits of performers' analyses, writing that "whereas the analyst can speak and write about a work without having to perform it, the performer's presentation will, for better or worse, reflect his 'analysis.'"[88] Is such dialogue indicative of inclusivity regarding the input of performers? Additionally, how much of the field has heeded the following influential statement?

> [For] any present-day researcher who wishes to prescribe performance decisions by relying on the authority of analytical findings based on the score, there is no excuse for not demonstrating through a recorded performance of her own how exactly such analytical knowledge is translated into a sounding performance of the piece.[89]

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[86] Dunsby, "Musical Performance Studies as a Discipline," 5.
[87] Tim Howell, "Analysis and Performance: The Search for a Middle Ground," *Companion to Contemporary Musical Thought* (1992), 2:693.
[88] Schmalfeldt, "On the Relation of Analysis to Performance," 1.
[89] Doğantan-Dack, "Recording the Performer's Voice," 302.

While similar analyses may be noted in the field of "performance analysis," or in the reference of recordings by Schmalfeldt in her analysis of Schubert, they hardly substantiate the entire field of musicology nor the field's general opinion of itself.[90] Perhaps the truth behind the cross-relationship and, moreover, the centrality of analysis to performance lies in a belief that performance as art and musicology as art are both self-reflecting. Only peripherally do they take into account outside influences. This self-reflexivity is understandable, as there is a great deal of sentiment that the writings and ideas of those outside the field of musicology are not substantive enough to expand the body of knowledge, an idea to which Lowe alludes through citing the "over-inflated claims [that are] made for disciplinary analysis, making it seem more indispensable and more uniquely the source of interpretative wisdom than could reasonably be claimed."[91] Lowe is right in this assessment, as there is no shortage of "over-inflated" claims spouting the influence of performance on analysis. However, it must be said for performance that the over-inflated claims are each but a singular narrative that has been chosen to legitimize performance as analysis. Much like the music that it aims to discuss, performance as analysis can have many readings and many interpretations of those readings. As this field continues to explore its boundaries and implications there will be, as Dunsby wisely points out, arguments and discussion covering a broad nature of "types," including those that will be observed as "overstatement, understatement, [and] post-statement—for which we should be on guard in the search for stimulus and development in performance studies."[92] Perhaps the reason why those who conflate the importance of performance with its function as an analytical technique is much the same as the novice writer who conflates his/her ability to use dense academic language with

[90] Schmalfeldt, *In the Process of Becoming*, 56, 120-121, 155.
[91] Lowe, "On the Relationship Between Analysis and Performance," 84.
[92] Dunsby, "Musical Performance Studies as a Discipline," 27.

"scholarship." Conceivably, the "over-inflated claims" are used as a means of joining the larger conversation. As in the arguments of Lowe, the merits of the claim were being attacked because its argument was not strong, not because the claim itself is unfounded. Progress, in the case for performance as analysis, should be directed at discovering the appropriate means with which to involve performers in the discussion. This inclusion is vital if the field of performance and analysis studies is to avoid a hierarchical bias.

Again, to echo the words of Doğantan-Dack, "performance studies will thrive to the extent that it successfully represents the musical activities and experiences of not only those who listen to and theorize about 'live' and recorded performances but also of those who ultimately make musical experiences possible, namely performers."[93] Conceivably, such incorporation would not have to include performers as writers but might be inclusive through including their recorded performance as analysis or "reading." Such a solution would likely be accepted by the performance community, as Susan Bradshaw states: "even though we as a group [performers] 'do not tend to be interested in what is written' about music, it all depends on who does the writing," with the archetype of written analyses being those scholars who "succeed in focusing our minds on the concerns of the music itself, at whatever level the reader chooses to understand them, rather than merely on what they have to say about it."[94] Bradshaw implies that performers do have an interest in written analysis, but are perhaps excluded due to the linguistics they employ. Additionally, Lester echoes this path toward equality as one that allows "performers [to] enter [the] analytical dialogue as *performers*—as artistic/intellectual equals, not as intellectual

[93] Doğantan-Dack, "Recording the Performer's Voice," 308.
[94] Susan Bradshaw, review of *Performing Music: Shared Concerns*, by Jonathan Dunsby, *The Musical Times* 136, no. 1832 (Oct. 1995): 546.

inferiors."[95] Lester insinuates that performers and musicologists are interested in taking part in the discussion together, even if his words do not quite intimate a relationship of "equals." As Cook wisely points out, such an approach is not infallible as "[this] dialogue loses much of its force when someone else is speaking for you."[96] This is a one-sided conversation results in which the performer is held voiceless, with "no opportunity to reply."[97] While Lester's query stops short of the equality he is advocating, it does allow us to see that the field of musicology is growing beyond its tripartite structure of musicology, ethnomusicology, and theory as its contributive branches of musical insights through analysis. To echo the words of Nicholas Cook, if within the blossoming field of musicology, they,

> are content to let a thousand theoretical flowers bloom, then the only epistemological basis for this must be a conviction that each approach creates its own truth, through instigating its own perceptions, bringing into being a dimension of experience that will coexist with any number of others.[98]

Perhaps the best way forward is not to simply include recorded artifacts from the performer's profession, but additionally to cultivate an environment in which performers can partake in the analytical discussion. Then, like Cook has written, we would have "[reversed] the usual direction" of the firmly held "page to stage" approach and will be able to "explore the value and limitations of performance for analysis."[99] Such examples may include not simply the inclusion of performers through recordings, but additionally the inclusion of interdisciplinary papers with performers and musicologists as coauthors, such as the articles put forward by Daphne Leong

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[95] Joel Lester as quoted in Nicholas Cook, Cook, "Analysing Performance and Performing Analysis," 245.
[96] Nicholas Cook, "Theorist's Analysis," in *Beyond the Score* (New York: Oxford University Press, 2013), 40.
[97] Cook, "Theorist's Analysis," 40.
[98] Cook, "Analysing Performance and Performing Analysis," 261.
[99]Cook, "Theorist's Analysis," 42.

with flutist Elizabeth McNutt and with pianist David Korevaar.[100] Regardless of how it is done, the inclusion of performers within the discussion of performance and analysis, whether through recorded or written media, creates a discipline in which performers and musicologists can commingle without seeking dominance, but instead provide unique readings aimed at satisfying different aesthetics.

This "call for change" is notably idealistic; however, if the insights of the performer are to be seen as viable it is necessary for intra-disciplinary scholarship throughout music to account for the insights of all. If Performance Studies is to grow, it is necessary for multifaceted scholarship to be explored further within the field—scholarship like the ideas proposed in this project, where performer's analysis is used as a means for understanding the problems associated with analyzing LEM. Due to the complexity of LEM, and impossibility of accurate representing acousmatic material in a universal way, this discussion will have to include a "mixed" approach to analysis that is able to deal with the complexities of both the topics of analysis and electronics. As this chapter has explored and discussed the topic of analysis, specifically establishing that the performer's insights are a viable form of analysis that are unique and significant to performance, it is now critical to explore the area of analysis within electronics.

[100] Daphne Leong and Elizabeth McNutt, "Virtuosity in Babbitt's Lonely Flute," *Music Theory Online* 11, no. 1 (2005); Daphne Leong and David Korevaar, "Repetition as Musical Motion in Ravel's Piano Writing," in *Unmasking Ravel: New Perspectives on the Music* (Rochester, NY: University of Rochester Press, 2011).

CHAPTER 3

INTRODUCTION TO SPECTROMORPHOLOGY

When asked what it means to analyze a work, Marco Stroppa writes that "through the tearing apart and reassembling of parts the analyzer reveals themselves their education, culture and the time in which they live."[101] To draft the narrative of electroacoustic music (EAM), several challenges must be overcome within the broader context of music history. With the continued progress of computer technology, these problems deal less with typology and morphology than with the lack of standardization of analytical techniques.[102] Traditional acoustic works can be universally observed through the standard historiographical modes of research because of the existence of stylistic invariants such as the organization of the sound-worlds that they employ. More simply, because acoustic works deal with known instruments whose source of sound is easily traceable, the observer of these sounds is able to analyze the music using standard analytical techniques. While this standardization is not readily observable between distant stylistic applications of compositional processes, such as the music of Leonin as compared to that of Stravinsky, the common thread is noticeable in that the sounds that they evoke are derived and disseminated by an identifiable "sound-world" based on the hegemony of pitch. This point of similarity is important as the human sound-world is limited to naturally occurring or acoustically produced sounds and identifiable modes of composing works.[103]

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[101] Marco Stroppa, "The Analysis of Electronic Music," *Contemporary Music Review* 1 no.1 (1984): 175-180.
[102] Bruno Bossis, "The Analysis of Electroacoustic Music: From Sources to Invariants," *Organised Sound* 11, no. 02 (2006): 101.
[103] Ibid., 101-102.

Outside of this, in the electronic sound-world, such commonalities are not so easily observed.[104]

In live electronic works, the aforementioned approach to understanding invariants—i.e., commonalities across works—is made more difficult due to a lack of standardization in their development.[105] As such, Electroacoustic music (EAM) provides many challenges for analytical study. Among those challenges is its seemingly "foreign" nature to the unindoctrinated. This ignorance concerning the structure or inner workings of this music has led musicologists such as Bruno Bossis to call for an increase in the documentation of the surviving founders of EAM, as well as that of the compositional processes employed by the composers.[106] This undertaking would allow for a revelation of trends and a recognition of invariants critical for providing context for the music. Such context in acoustic music, due to the invariance of pitch, allows the performer insights into the music that reveal observations about its underlying "shape." For performers, a lack of familiarity with the technology presented in software such as "M," "Pure Data," "Max/MSP" or "Supercollider," or the coding that is done within the patches, requires them to familiarize themselves with its epistemology, a process that can viewed as problematic when learning a new piece.[107] These time constraints are exacerbated, since typically the performers' familiarization with this genre is minimal as their formal academic training tends to focus on the more "traditional" modes of analysis.[108] This significant investment of time and resources presents an additional barrier for the performer when attempting to offer a reading of

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[104] Electronic is used here in reference to music that consists of electronic sounds, in which the user is not able to readily identify the cause or source of the sound.
[105] Ibid., 101.
[106] Ibid.
[107] Elizabeth McNutt, "Performing Electroacoustic Music: A Wider View of Interactivity," *Organised Sound* 8, no.3 (Dec. 2003): 297.
[108] Cort Lippe, "Musings on the Status of Electronic Music Today," in *International Computer Music Conference and Sound and Music Computing Conference Proceedings*, Athens (2014): 40.

these works with the same authority present in acoustic works.[109] Additionally, as much of the research concerning analysis is written with the expectation of familiarity with the technology, performers do not benefit much from exposure to its scholarship.[110]

This truth about analysis speaks to the need for an inclusive and interdisciplinary culture in electroacoustic analysis. Because the field of electroacoustic music is "still quite young," there is a unique opportunity to explore the usefulness of performer's analysis as an analytical technique outside the realm of purely acoustic music.[111] Amongst the primary obstacles to making observations about EAM is the contrast with how the technology is incorporated into the music. Due to these contrasts, there is not a "Schenker equivalent" with which observations about the field can easily be made.[112] According to Bossis, "the establishment of a universal and unique analytic method for electroacoustics is not immediately feasible, nor necessarily desirable."[113]

Bossis's pointed statement implies that a lack of "universal" analysis techniques is "not necessarily desirable" and raises the question as to why this is the case. Perhaps this question is best answered through acknowledging the problems faced in EAM due to the lack of "invariants" between styles, with Bossis admitting that styles "struggle with [how to account for the] rapid technological progress made over the last half-century."[114] As "each [of these genres make] unique demands on the analytical method," Simon Emmerson and Leigh Landy have proposed

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[109] McNutt, "Performing Electroacoustic Music," 298-303.
[110] Mark Ballora, "Expanding Frames of Reference: Teaching the History of Electro-Acoustic Music," in *College Music Symposium*, vol. 46, (2006): 13; Jamie Bullock, Lamberto Coccioli, James Dooley, and Tychonas Michailidis, "Live Electronics in Practice: Approaches to Training Professional Performers," *Organised Sound* 18, no. 02 (2013): 170.
[111] Simon Emmerson and Leigh Landy, *Expanding the Horizon of Electroacoustic Music Analysis* (Cambridge: Cambridge University Press, 2016), 6.
[112] Ibid.
[113] Bossis, "The Analysis of Electroacoustic Music," 106.
[114] Ibid., 101.

that the best means with which to frame analytical explorations would be through the creation of a "toolbox" of techniques with which the analyst may apply what is useful.[115] Such malleable parameters present an opportunity for the incorporation of cross-disciplinary techniques into the "toolbox," a collaborative process that Emmerson and Landy promote through their call for an "integration [of electroacoustic analysis] with analytical tools used for different purposes in note-based music."[116] While a discussion of the specific problems that face each of these styles is beyond the scope of this project, this chapter will explore the current challenges associated with the genre of Live Electroacoustic Music (LEM). Through the identification of analytical problems, a case will be made for the benefit that performer's analysis, through its added insights on interactivity and structure, will provide to LEM analytical techniques. The problematic issues associated with analyzing LEM can be noted as those that are derived from the lack of performer training on LEM, the partial notation of the score, and the orientation of "traditional" and "non-traditional" instruments with its resultant interaction of electronic and acoustic sounds.

Problems with Analyzing LEM

One of the primary obstacles to making observations about LEM is its "foreign" nature to those who come to it as outsiders. According to the writings of Richard Taruskin, the "authenticity" of a performance is not derived from an adherence to a particular performance practice, but rather is more closely related to the authenticity of the performance itself.[117] This ignorance of the inner workings of these pieces and their construction have led musicologists such as Bruno Bossis to call for an increase in the documentation on the surviving founders of EAM, as well as that of

[115] Emmerson and Landy, *Expanding the Horizon of Electroacoustic Music Analysis*, 5.
[116] Ibid., 6.
[117] Richard Taruskin, *Text and act: Essays on Music and Performance* (Oxford University Press, 1995): 67-81.

the compositional processes employed by the composers. This undertaking would allow for a revelation of trends and a recognition of invariants critical for providing context for the music. In adopting this outlook by Taruskin, the performer is able to make insights into the music that reveal observations about its underlying "shape" without the verification of "research."[118] This statement is not made to imply that research is not beneficial for developing a performer's schema, but moreover that the authenticity that is revealed through this schema is genuine to the performer's intent and, therefore, to their authenticity.[119,120]

Another issue presented in analyzing LEM, as opposed to previous genres and styles of music, is the lack of a written record, which renders the more traditional methods of analysis ineffective for LEM.[121] This raises the question of what a successful analysis will look like, a response to which might be found in the proposal by Camillieri and Smalley, who explain that such an analysis will "attempt to reconcile and relate the internal world of the work with the outside world of sonic and non-sonic experience."[122] In other words, they feel like there needs to a cross-relationship between the theoretical mechanics of the work and the perceived existence of the work as observed by the listener. In discussing their proposal, they

> regard the analytical search for pertinences as aiming to achieve four goals: firstly, to uncover pertinences acting within the individual musical work; secondly, to uncover types of pertinence which might apply across a number of works; thirdly, to highlight pertinences which, separately or acting together, are idiomatic or specific to electroacoustic music (compared with other musics) or which are given a new guise or twist by the electroacoustic medium; and fourth, to seek out core pertinences, common among music genres, which transcend medium and style. One finds examples of all of these among the analyses in this collection.[123]

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[118] Richard Taruskin, *Text and act: Essays on Music and Performance, 73-75.*
[119]. Ibid. The use of "shape: and "structure" as analytical foci references the discussion in Chapter 2 regarding the differences between observations put forward by the performer and the musicologist.
[120] Schema is used here to refer to the performers intrinsic thoughts and behaviors.
[121] Bossis, "The Analysis of Electroacoustic Music,"103-104.
[122] Leilio Camilleri and Denis Smalley, "The Analysis of Electroacoustic Music: Introduction," *Journal of New Music Research* 27, no. 1-2 (1998): 3-12.
[123] Ibid., 7.

While this approach is comprehensive, its realization is difficult due to the amount of variation in compositional strategies, as outlined by musicologist Bruno Bossis, who states that

> A phenomenon reducing the musicologist's constraints is the fact that every piece from the repertoire of contemporary music is often unique with respect to its generative process. In a literal sense, every musical work, no matter what its style or to which corpus it belongs, is systemic: it forms an ensemble of symbols and/or acoustic phenomena that is rendered coherent by an organising principle.[124]

As a result, each approach will uncover different strengths and expose the weaknesses of the other systems, as noted in Stephane Roy's belief that a syntactic role cannot be assigned purely because the morphological criteria say it is there.[125] This outlook calls into question how to assess the insights of the listener. Furthermore, François Delalande proposes that listeners apply an "empathic approach" to listening and hear the piece as "instant" as opposed to a synthesis of how it unfolds over time.[126] With this perspective, listener insights appear to be problematic and difficult to cite as a source of meaningful information. However, despite their problematic nature, due to the lack of notated "translations" of the work such as the notated score, the "translations" of the listener offer a primary perspective on the insights of the work.

Despite the ambiguity present regarding the necessary focal point of analysis, there are some commonalities in approach that can be noted. One of these is the understanding that LEM will need to account for the relationship between the mixed instrumentation and the contrasting treatment of the acoustic and the electronic, or in other words, between the traditional instrument and the computer, electro-acoustic, instrument.[127] As analyzing LEM is clearly problematic, the question is broached for what insights performance as analysis can offer to LEM. The previously

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[124] Bossis, "The Analysis of Electroacoustic Music," 102.
[125] Camilleri and Smalley, "The Analysis of Electroacoustic Music: Introduction," 7.
[126] Insights drawn from the observations of Camilleri and Smalley on the perspectives of Delelande and Roy. Camilleri and Smalley, "The Analysis of Electroacoustic Music: Introduction," 7 3-12.
[127] Ibid.

posed problems with LEM analysis speak to the need for an inclusive and interdisciplinary culture for electroacoustic analysis.

A Cross-Disciplinary Solution

The problems that are posed through attempting to analyze LEM, such as the orientation of "traditional" and "computer" instruments, the interaction of electronic and acoustic sounds, and the partial notation of the score, are addressed through musicological solutions. One such solution has been found through the conception of Spectromorphology, proposed by Denis Smalley. Spectromorphology is derived from the earlier listening techniques put forward by Pierre Schaeffer known collectively as Typomorphology. Typomorphology is limited in its adaptability to LEM, as its "fixed-listening" approach requires the listener to focus exclusively on the music and to create an amalgamation of the sounds from both the computer and the traditional instrument while taking into account extra-musical interactions.[128] As LEM is highly variable, a "fixed" perspective will not address the "real-time" processing of input by the computer or the transformation of sounds from the performer. This shortcoming, according to the writing of Lasse Thorensen, renders Typomorphology unusable for observing LEM, with "one of the major achievements of Schaeffer's work, his codification of all sound categories into a grand, unified diagram, [remaining] without much practical consequence."[129]

In contrast, Spectromorphology has been widely incorporated and adapted due to its malleability, with Smalley referring to it "not as a form of analysis, but as a tool for unfolding

[128] John Dack, "Strategies in the Analysis of Karlheinz Stockhausen's *Kontakte für Elektronische Klänge, Klävier und Schlagzeug*," *Journal of New Music Research* 27, no. 1-2 (1998): 84-119.
[129] Lasse Thoresen and Andreas Hedman, "Spectromorphological Analysis of Sound Objects: An Adaptation of Pierre Schaeffer's Typomorphology," *Organised Sound* 12, no. 2 (2007): 129.

the listening process."[130] This means of analysis, unlike that of typomorphology proposed by Schaeffer, takes into account gesture and cultural implications derived from listening.[131] The term Spectromorphology was derived from the terms spectra- and -morphology. Each of these terms represents unique "frameworks" for observing music, with "the two parts of the term [referring] to the interaction between sound spectra (spectro-) and the ways they change and are shaped through time (-morphology)."[132] Together, these "frameworks" are aimed at "describing and analyzing the listening experience" so that the observer can "discuss [their] musical experiences… describe the features [they] hear and explain how they work in the context of the music."[133] The terminology associated with the frameworks within Spectromorphology is "intended to account for types of electroacoustic music which are more concerned with spectral qualities than actual notes," a quality that does not make them wholly appropriate for observing LEM.[134] As a result, the listener's observations will assimilate the soundscape to an entirely electronic one, regardless of the origin of the sound. Since LEM incorporates soundscapes that are both acoustic and electronic, there is a need to account for all of the sounds. Therefore, the assimilation of the acoustic into the electronic, while reflective of the listener's perception, does not account for the fact that the sound sources are unique and variable, an omission that disregards an essential structural component of the work. Another problematic area of Spectromorphology is its intention to be used by specialists, as opposed to those who lack

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[130] Andrew Hugill, "On Style in Electroacoustic Music," *Organised Sound* 21, no. 01 (2016): 5, 11; Denis Smalley, "Spectromorphology in 2010," *Polychrome Portraits No. 15* (Paris: Groupe de Recherches Musicales, 2010), 92.
[131] Denis Smalley, "Spectromorphology: Explaining Sound-Shapes," *Organised Sound* 2, no. 2 (1997): 96.
[132] Ibid.,107.
[133] Ibid.
[134] Ibid.

experience in EAM.[135] These combined factors make Spectromorphology on its own ineffectual for use by performers as a means of analysis for LEM. However, as alluded to by Emmerson and Landy's earlier call for the "integration of electroacoustic analytical techniques with other disciplines of analysis," since Spectromorphology is a tool, it can be hybridized to empower use by those who may be less familiar with LEM. This sentiment is backed by Smalley, as he acknowledges that others can "supplement his basic listening with their own analogies."[136] It is, therefore, in line with the ideology for Spectromorphology to be combined with other frameworks of analysis, which in this case will be "performer's analysis."

Cross-Section of Performer's Analysis and Spectromorphology

Combining two different forms of analysis opens up the possibilities of problematic conflicts that go against the ideological framework of one or the other types of analysis. For example, combining Spectromorphology with Shenkerian analysis would present a conflict, as Shenkerian analysis is heavily steeped in visual observations from notation, wherein Spectromorphology is framed around aural observations from focused listening. Combining these two forms of analysis would go against the very nature of each. However, when looking at the principles of performer's analysis and that of Spectromorphology, several similarities should be noted. One such similarity is their perceptions on the notated score. When discussing performer's analysis, John Rink writes that "the score is not 'the music'; 'the music' is not confined to the score."[137] This sentiment reflects that in performer's analysis, the score, while potentially useful, is not the predominant form of observation. Likewise, when discussing Spectromorphology, Smalley

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[135] Denis Smalley, "Spectromorphology in 2010," in *Denis Smalley: Polychrome Portraits*, ed. Évelyne Gayou (Paris: Institut National de L'Audiovisuel, 2010), 94.
[136] Ibid., 91.
[137] John Rink, "Analysis and (or?) Performance," in *Musical Performance: A Guide to Understanding* (Cambridge: Cambridge University Press, 2002), 39.

writes, “Is a score an obligatory aid to spectromorphological description and analysis? Certainly for the analyst some kind of representation is necessary but what this should be is determined by the purpose of the analysis.”[138] Smalley again addresses the usefulness of the score for spectromorphological analysis by proposing that even in situations where the “music is represented and achieved through musical writing [in traditional notation], the score itself is a very inadequate representation of perceptual qualities.”[139] These statements, when taken together, paint a picture for two different analytical techniques with similar outlooks on the centrality of the score for analysis.

Additionally, they offer many different ways of representing sounds that provide insights on the way the music sounds. In Spectromorphology, Smalley discusses score types at length. Specifically, when referencing notations of electronic sounds, he writes that the “transcription of acousmatic material,” usually accounted for through graphs, is “concerned with spectromorphological information” that is observed through “events and textures that are given shapes [wherein the] vertical dimension represents spectral space, while the horizontal plane shows change over time.”[140] In other words, he is presenting a way of regarding graphs of information, taking into account resulting shapes as opposed to underlying structure. Similarly, in “performer’s analysis,” Rink writes that “temporality lies at the heart of performance and is, therefore, fundamental to ‘performer’s analysis,’” whose “primary goal is to discover the music’s

[138] Smalley, “Spectromorphology: Explaining Sound-Shapes,” 109.
[139] Ibid.
[140] Ibid., 108; Acousmatic material, is referenced here due to its implications on the overall perception of electronic sounds. While the term acousmatic specifically implies a specific perceived electronic sound component associated with purely electronic music without a “human performer”, the sounds as they are perceived by the listener, not the spectator, share a common sound-world. As there has been more literature devoted to understanding the acousmatic, these observations are useful for understanding the shared electronic sound-world of human and computer initiated electronic sounds.

'shape', as opposed to structure, as well as the means of projecting it."[141] These outlooks once more underline the complementarity of these two analytical frameworks.

Lastly, these two types of analysis are similar in how they disregard epistemological understanding of how the sound is made as non-essential towards their intention. Smalley writes that "[i]n spectromorphological thinking we must try to ignore the electroacoustic and computer technology used in the music's making…surrendering the natural desire to uncover the mysteries of electroacoustic sound making...[where] a sound-texture or event…is rarely the result of a single, quasi-instrumental, real-time, physical gesture." To further this point, he cautions that, "when a listener 'perceives' the technology or technique behind the music rather than the music itself...[to an extent, the] true musical meaning is blocked."[142] To the same point, Rink writes that "any analytical element that impinges on performance will ideally be incorporated within a larger synthesis influenced by considerations of style (broadly defined), genre, performance tradition, technique, instrument and so on, as well as the performer's individual artistic prerogatives. In other words, analytically determined decisions should not be systematically prioritized."[143] Once again, these frameworks are aligned in their ideologies.

Lastly, a central aspect of each framework is the role of intuition. Rink explicitly elucidates the centrality of intuition in writing that "'informed intuition' guides, or at least influences, the process of 'performer's analysis.'" As such, "informed intuition" is central to performer's analysis. Likewise, in Spectromorphology, Smalley introduces the term "behaviour" to describe the study of how the spectromorphologies interact, writing, "I believe that listeners can intuitively diagnose behavioural relationships (or a lack of them) in electroacoustic music

[141] Rink, "Analysis and (or?) Performance," 39.
[142] Smalley, "Spectromorphology: Explaining Sound-Shapes," 109.
[143] Rink, "Analysis and (or?) Performance," 39.

contexts and that this diagnosis affects the listener's interpretation of and reactions to the music."[144]

The mention of several commonalities between Spectromorphology and "performer's analysis" is not intended to assume that through combining these two approaches, nothing of either analytical framework will be lost. Inevitably, through combining differing ideologies, the resultant framework will present a paradigmatic shift. Within this shift, some idiosyncracies of one analysis may be lost, but the resultant framework that evolves will allow for new insights into the performer as listener/observer in LEM.

Traditionally, Spectromorphology was put forward as an analytical tool to aid the composer/listener in understanding electroacoustics in a more insightful way. The impact of this new perspective will be the ability to include insights from the performer/listener that may lead to an acknowledgment of perceived performer interactions that result sonically from the performer/machine interaction present in LEM, an interaction that is not traditionally accounted for in Spectromorphology. Additionally, these insights allow for performer's analysis to be applied to a new genre of music in which the hegemony of the score is not apparent. This application of listener observations, as expectant within electroacoustic music, will allow for an unbiased look into the viability of performer's analysis as "analytical framework."

[144] Denis Smalley, "explaining Sound Shapes," 117-118.

CHAPTER 4

LIPPE AND INTERACTIVITY

> The invaluable documentary resources provided by the creators of electroacoustic music must be gathered, inventoried, and distributed without delay...this work... will feed the work of musicologists in the coming years, particularly the work of analysts interested in compositions that combine music and machines.—Bruno Bossis[145]

As technology has developed, it has become increasingly more involved in analyzing Electroacoustic Music (EAM). This phenomenon is not derived from how we perceive the various morphologies, but rather from our lack of a "deep understanding of the mechanisms of electroacoustic composition."[146] Therefore, when the opportunity presents itself to discuss the "mechanisms" of a composition, an inventory of the composer's thoughts on their music is a worthwhile venture.

It should be stated that it is not the intention of this chapter to present a biography of Lippe; instead, the objective is to provide several tenets of Lippe's philosophy concerning his music.[147] While Lippe has written works that are not entirely notated, the outlook on composition that we will discuss regards how to facilitate interaction between the human and the computer in his live-

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[145] Bruno Bossis, "The Analysis of Electroacoustic Music: From Sources to Invariants," *Organised Sound* 11, no. 02 (2006): 101.
[146] Ibid.
[147] For a biographical sketch of Lippe and his many contributions to the field, please visit http://www.music.buffalo.edu/faculty/lippe#nav. While such a sketch will not be pursued in this paper, it should be noted that Lippe was involved with the creation of Max, the software conceived by Miller Pucket, now known as Max/MSP that was used to develop the works to analyzed in Chapter 7.

electroacoustic works. From this viewpoint, it is worth noting that in a global sense, Lippe views form as a "delineation of texture" with the larger umbrella of "texture, pacing and timbre" as organizing principles of his pieces. This outlook is worth exploring because it sets up a "percussive" approach to music, one that, while not inherently precluding harmony and pitch, is ideologically different from Heinrich Schenker and his touting of the Urlinie—the "fundamental descent" that he believed to be structural in all (tonal) music—as structurally significant. Such a distinction may be noted as simply the dichotomous nature of tonal as compared to post-tonal music, or perhaps as a paradigmatic shift from foreground to background. Regardless of the attribution of these differences, they allude to the fact that "analysis is supremely important to electroacoustic music."[148]

While Lippe stops short of prescribing specific modes of analysis for his works, he does write that his music "can be 'understood' on a musical level by trying different interpretations, just as a musician or group of musicians might try to approach a piece differently from an interpretive point of view."[149] This perception of "understanding" through practice is highly reminiscent of Rink's thoughts on performer's analysis, where he writes that "'performer's analysis' primarily takes place as an interpretation[, it] is being formulated and subsequently re-evaluated—that is, while one is practising rather than performing."[150] Such a predilection for discovery through practice, or observation, is fitting with electroacoustic music in a broader context, as the two primary morphologies of LEM analysis involve "focused listening." While the "focused listening" alluded to by Schaeffer and Smalley requires more constraints than the "informed intuition" alluded to in performer's analysis by Rink, there is a clear link that can be drawn between these

[148] Bossis, "The Analysis of Electroacoustic Music: From Sources to Invariants," 102.
[149] Cort Lippe, e-mail message to author, March 14, 2017.
[150] John Rink, "Analysis and (or?) Performance," in *Musical Performance: A Guide to Understanding* (Cambridge: Cambridge University Press, 2002), 39.

two analytical approaches and to the "understanding" alluded to by Lippe.

If performers are to understand Lippe's works without prior experience in LEM, some problematic areas will warrant discussion, as they are not present in traditional (acoustic) instrumental works. One such problem is the lack of a score for the computer part. According to Bossis, "Notation…allows the musical contents [of a work] to be transmitted as precisely as possible to the performer,"[151] which for the performer is essential for interacting with the music on a deep level. Lippe, while understanding the performer's needs, does not promote the "studying [of] the patch," which he attributes to the occasional lack of a "neat and easily readable [patch] with proper comments."[152] The omission of notation of the computer parts from these pieces is seemingly born out of a conscious decision to keep "the technology… as transparent as possible for the musicians in order to avoid 'bothering' or distracting the performers during concerts."[153] While Lippe developed this outlook in the 1980s and 90s, it is an evolving stance that evolves based upon performer needs. This evolution is noted in the increased Human Computer Interaction (HCI) observable in the *Duo for Cajon and Hi-Hat*, in which the performers can trigger the patches themselves without the need for a sound engineer. While the sentiment of "necessity," regarding one's use of a sound engineer, is not a dispensable one, according to Lippe's ideology, it does show a willingness to empower performers and increase interactivity between performer and machine in his works.

When discussing the interaction—"interactivity"—within LEM, the discussion revolves around the interactions between the performer and the computer/machine. In Lippe's music, the HCI between performer and computer is considered "highly interactive."[154] This interaction is

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[151] Bossis, "The Analysis of Electroacoustic Music: From Sources to Invariants," 104.
[152] Cort Lippe, e-mail message to author, March 14, 2017.
[153] Cort Lippe, e-mail message to author, March 1, 2017.
[154] Von Hansen, "An Introduction to Interactive Music for Percussion and Computers" (DMA diss.,

noted through the "[formation] of an interactive loop from performer to computer back to performer."[155] While such an interactive loop creates an interactive element to his work, Lippe believes that it is not "fully interactive." He elucidates this point in writing:

> Another important issue: improvisation vs. explicit written score directions. The level of and type of interaction that can take place in an improvisational context is much different than with a specific score. This is an obvious statement, but when people like me talk about interactive music, we can only be talking about a type of interaction that is rather restricted. Often I have ideas that would require improvisation to truly exploit them and one of the difficulties is fitting a square peg (an idea that is actually better served in an improv context) into the round hole of a notated score. [Thus,] wanting to explore interactivity in all its dimensions can sometimes be frustrating when the performer score is fixed.[156]

This outlook on interactivity is necessary for setting the scope for interactivity in his works and how this interactivity is likely to be perceived by the performer. While the needs of the performer are observable at the forefront of Lippe's thought process when composing, another essential entity to the work, alluded to before, is the sound engineer. Lippe views the role of the sound engineer

> in the same way that a conductor balances the orchestra (one of his/her jobs, maybe to some people less important than controlling timing/phrasing, but in my mind, equally as important), whoever mixes the final result in the [concert] hall has a very important role in shaping the final product.[157]

According to Lippe, this makes the sound engineer "a very significant player in the whole process that should never be left out."[158] This insight into the significance of the sound engineer in realizing his work makes a case for the sound engineer as moderator for HCI. This moderation can be understood through the logical argument that the better the performer can perceive the

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University of Kansas, 2014), 46.
[155] Ibid.
[156] Cort Lippe, e-mail message to author, March 14, 2017.
[157] Cort Lippe, e-mail message to author, March 1, 2017.
[158] Ibid.

computer, and the better the computer can receive the input from the performer, the more synchronicity and interactivity, or a sort of "ensemble performance," will be observable.[159]

This statement reveals a dichotomous relationship within "ensemble performance." While scholars such as Goodman point to this difference as a "tight" versus "sloppy" ensemble, this relationship can additionally be viewed with respect to the presence of the skills associated with "ensemble performance" and their converse, the absence of the skills related to "ensemble performance."[160] The concept of "ensemble performance," as outlined by Goodman, reveals four tenets: coordination, communication, the role of the individual, and social factors. It is with the first two tenets that interactivity within LEM is most concerned.[161] These two factors allow for the observation of a "tight" interaction between the ensemble—computer and performer—or a "sloppy" one. When discussing these factors, Goodman writes, "The anticipation of each beat and the reaction to the production of each beat are virtually defined by the nature of interaction manifest between the performers."[162] In other words, for a performance to be coordinated, it is required that the performers anticipate and react to each other. Additionally, Goodman writes that "[e]nsemble performers watch and listen to each other not merely to coordinate actions, but also to communicate ideas about the expression or interpretation of the music. However, aural communication (being able to hear each other) is more important than visual communication (being able to see each other)," a point that is elucidated through the fact "that we hear music—we don't see it."[163]

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[159] Elaine Goodman, "Ensemble Performance," in *Musical Performance: A Guide to Understanding*, ed. John Rink, (Cambridge: Cambridge University Press, 2002), 153.
[160] Ibid.
[161] Ibid.
[162] Goodman, "Ensemble Performance," 154.
[19] Ibid., 156.

In LEM, it is essential that for interactivity to take place, the performers must be able to hear each other. The "hearing" relationship, much like that previously discussed with "ensemble performance," is dichotomous. It represents a continuum in which the more clarity, or ease, with which the performers can hear each other, the more "tight" the performance will be. This is because the performer—either the performer or computer—is continuously evaluating the input that s/he receives from his/her fellow ensemble members, wherein "the individual's concentration is divided between monitoring the sound produced from his or her own part and attending to the sound produced from the rest of the group."[164]

With this reliance on "aural communication," the sound engineer, aligned with the perspective of Lippe, is truly indispensable in the performance of LEM. The sound engineer will control the balance of the work in the concert hall, which in effect determines how well the "ensemble," both performer and computer, can aurally communicate. As such, the interactivity present in LEM will be moderated by the use and effectiveness of the sound engineer. In more specific terms, the incorporation of the sound engineer into the performance of LEM will allow for more interactivity between the performer and the computer. With this reasoning, the assistance of a sound engineer is a "significant" part of interactivity in LEM.

Concluding Thoughts

With this knowledge of Lippe as a composer and how his ideologies on LEM are reflected within our study, we can craft a methodology that incorporates all of these ideas in a way that will allow for more insightful "readings" of his work. While he has not ventured to prescribe formal modes of analysis towards understanding his works, it can be assumed that he would find merit in the "shape"-oriented insights derived from "performer's analysis" because of his belief that his

[20] Ibid.

pieces "can be 'understood' on a musical level by trying different interpretations," not that of "studying the patch, which might be too "tall [an] order" to be carried out in a musically rewarding way."[165] Accordingly, Lippe's insights on the sound engineer as "significant" to a performance are enlightened and allow context for the interactive relationship between "performer and machine" to be realized.[166]

[165] Cort Lippe, e-mail message to author, March 2, 2017.
[21] Cort Lippe, "A Look at Performer/Machine Interaction Using Real-Time Systems," in *Proceedings of the International Computer Music Conference* (International Computer Music Association, 1996): 117.

CHAPTER 5

METHODOLOGY AND PRESENTATION OF "MIXED" ANALYTICAL MODEL

As this document is adopting the "performer's analysis" model for exploring Live Electroacoustic Music (LEM), it is necessary to define what this entails. The concept of "performer's analysis" is taken from the scholarly perspective of John Rink and is used to determine analytical tools that incorporate observations that are temporally based and non-systematic in nature, as opposed to the more "fixed" analytical skills derived from the score.[167,168] This paradigm of liberation from the score is in line with the principles of Spectromorphology, as well as those of the composer Cort Lippe. Autonomy from notation and prescribed translations of the "work" into notation is essential for observing LEM, as its scores are distorted in their revelations. They present a bias toward traditional—human performer—instruments as compared with non-traditional—machine performer—instruments.[169]

Spectromorphology as a tool was intended to be incorporated with other techniques to create analytical insight, making its marriage with other analytical perspectives a practice that is aligned with its conception.[170] As such, a new "mixed" analytical perspective will be shaped around uncovering the function of musical interaction by juxtaposing non-formalized with more formalized analytical techniques, such as exploring the outline of gestures and comparing it with

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[167] Nicholas Cook, *Beyond the Score: Music as Performance* (Oxford: Oxford University Press, 2014), 43-49.
[168] Daphne Leong, "Analysis and Performance, or Wissen, Können, Kennen," *Music Theory Online* 22, no. 2 (2016), accessed March 18, 2017, http://mtosmt.org/issues/mto.16.22.2/mto.16.22.2.leong.html.
[169] Denis Smalley, "Spectro-morphology and Structuring Processes," in *The Language of Electroacoustic Music* (London: Palgrave Macmillan UK, 1986), 61-93.
[170] Denis Smalley, "Spectromorphology in 2010," in *Polychrome Portraits No. 15* (Paris: Groupe de Recherches Musicales, 2010), 92.

that of form; observing changes in surface activity and comparing with those of pace and energy within a phrase; and discussing shifts in timbre and texture alongside the concept of personality or character within the work. This approach will allow for a presentation of material that can be understood within the evolving paradigm of performance and analysis studies, where performers and analysts (musicology, theory, psychology) utilize an interdisciplinary approach concerning the benefits they each provide for understanding a work.[171] This paradigm of mutual respect will allow the information to be exposed to scholars within either discipline and subsequently allow for the process to evolve with the benefit of a variety of perspectives.

The subsequent analyses will propose a "mixed" analytical approach that will consist of a more formalized evaluation of the score alongside an examination of the perceived spectromorphologies within the recorded works from the perspective of the performer as "listener."[172] The pieces that will be analyzed are *Music for Hi-Hat and Computer*, *Music for Snare Drum and Computer*, and *Duo for Cajon and Computer*. Throughout the analysis of these works, there will be three analytical categories of observation employed: "Organization," or the juxtaposition of gesture and form; "Movement," or the juxtaposition of both surface activity and timbre with pace and energy; and "Quality," or the juxtaposition of texture with personality or character. These categories of observation are an attempt to present a neutral, unified perspective in terminology that summarizes the intent of the previously mentioned juxtaposition of analytical and performance-based vocabulary. Within each category are a measurable technique and a more obscure technique, which will serve to quantify more abstract observations while simultaneously providing the more concrete observations with more conceptual characteristics. Such contrasts

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[171] Daniel Barolsky and Edward Klorman,"Performance and Analysis Today: New Horizons," *Music Theory Online* 22, no. 2 (2016).

[172] Spectromorphology in this context is used to refer to the perceived electronic material, and not the tool for analysis.

will be used to strengthen each analytical perspective for both performer and analyst and allow for increased parallels to be drawn the between the two communities. As the intent behind the terminology "performer's analysis" and the perspective of the analysis have been presented, it is necessary to introduce a plan for this study.

While each of the following will be noticed throughout the analyses of each work, and not separately as a segment of each analysis, it is beneficial to define them individually. The analysis of the "Organization" within the piece will observe form through the standard approach of tracking the motivic use of musical elements, which, due to the nature of indefinite-pitched percussion, will be noted through motivic usage of timbre, texture and rhythmic material from the mixed perspective of referencing both the recording and the written score. The analysis of "Movement" within the piece will observe and track changes in playing implements, dynamics, and surface activity throughout the traditional instrumentation, with predominant reference being given to the written score. Subsequently, the "Quality" of the piece will be observed through a mixed perspective, similar to that of "Organization." The key difference will be noted through a focus on the various interactions found throughout the works, as defined by shifts in texture coupled with observable interactions found either within the performer's instrument, within the computer as instrument, or between the performer and the computer. Upon tracking these observations, there will be an observation of the various functions or "roles" that the performer and the computer play throughout the piece and how these "roles" are influenced by the previous categories of perspective.

The resultant "mixed" analytical model, presented as a performer's analysis, will be used to analyze the works in this dissertation. The performer's analysis of LEM can be noted through the processes of "focused listening," "score study," and "practice." The focused listening

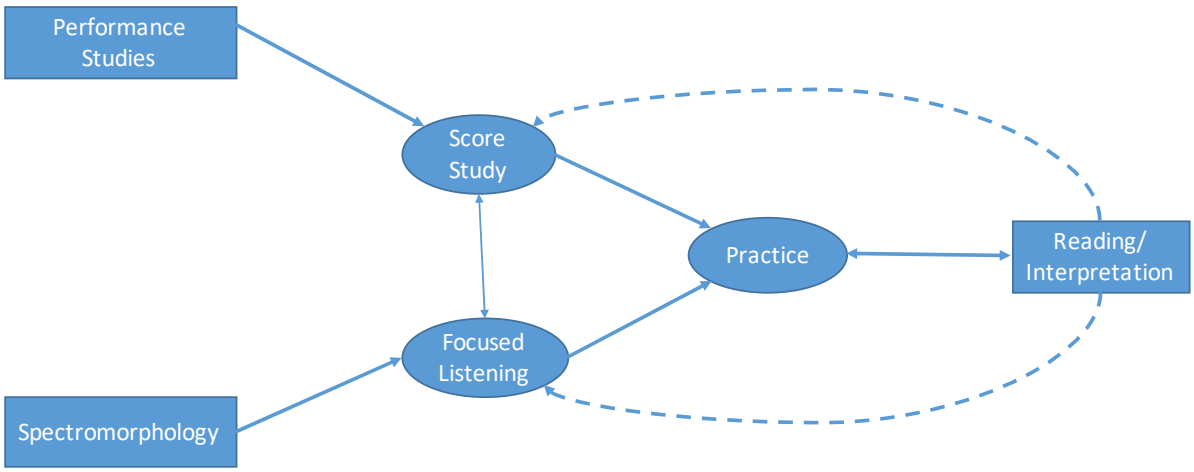

Fig. 1 “Mixed” Analytical Model.

segment of the analysis of this work adopts the language and approach of Spectromorphology to discuss electronic textures. It distinguishes between the hi-hat and the computer as separate textures, which are not an electronic “whole,” presenting a fundamental difference from the “focused listening” usually attributed to Spectromorphology. The next segment of analysis, score study, is very similar to that noticed in the performer’s analysis proposed by Rink, with the exception that the computer part is not notated, a key distinction from the authority present in the score study of traditional acoustic works. Lastly, the segment of analysis attributable to “practice” is much more like that typically associated with chamber music of any kind, as the performers may interact, and the performer becomes increasingly more aware of the potential of its partner the computer. Together, these three segments comprise the “performer’s analysis” of the work and allow for the unique “shape”-oriented perspective that the performer provides. Each of the subsequent analyses will incorporate aspects of the works’ organization, movement, and quality, all structural aspects of the work noted in the methodology. To illustrate the partial nature of each mode of analysis on its own, the subsequent analyses will each focus on a separate

work. Through doing this, the reader will be able to observe the gaps in knowledge between each of the analytical insights, which in turn provides support for the use of each technique as a segment within the performer's analytical process.

CHAPTER 6

MIXED ANALYSIS APPROACH ANALYSIS OF CORT LIPPE'S INDEFINITE PITCHED PERCUSSION WORKS

Introduction

With the aforementioned discussion and methodology, a basis for what the following analysis will provide may be simultaneously both lucid and convoluted. The lucidity stems from the fact that the subsequent analysis will most certainly discuss the works of Lippe from the standpoint of the performer, and additionally that this analysis will provide insights into the works' "shape" and interactivity. What is not as immediately clear is the voice with which this will be done. As may be assumed, the performer could take the first-person approach through an explanation of the piece; however, as alluded to by Dunsby, this manner of explanation would be more suited for a "how-to" book or perhaps a performance practice guide.[173] In contrast, the following analyses could take the opposite approach by discussing the work and uncovering substantial amounts of detail imperceptible to the observer of these works. It is with this stance that the subsequent analyses align with writings of Simon Emmerson:

> While few composers really want their audience to "follow a score," analyses of works such as this [Live-Electroacoustic] have traditionally been anchored on the score as representation of "the music." But many more people will have heard the work than have seen the score, so we should begin with the listener and work back to those aspects of the score which illuminate this experience.[174]

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[173] Jonathan Dunsby, "Performance Studies as a 'Discipline,'" in *Performing Music: Shared Concerns*, (Oxford: Clarendon Press, 1995), 27.

[174] Simon Emmerson, "The Analysis of Live and Interactive Electroacoustic Music: Hans Tutschku-*Sellen-Linien* (2007)," in *Expanding the Horizon of Electroacoustic Music Analysis*, eds. Simon Emmerson and Leigh Landy (Cambridge: Cambridge University Press, 2016), 333.

In enacting this approach, the following works will be discussed from the perspective of the performer as the listener, with a subsequent discussion about the works as laid out in the methodology.

General Concepts Surrounding the Performer and Computer Sound-World

Playing Implements

In discussing the three indefinite-pitched percussion works by Cort Lippe, the observer first must be able to distinguish between the sounds indigenous to the various instruments and those developed by the computer.[175] From the perspective of the performer, expertise in the sound-world of the hi-hat, snare drum, and Cajon can be assumed. The instruments in these works are manipulated through the use of various playing implements.[176] Each of these implements will affect the sound of their native instrument *in se*, with additional influences on these sounds based upon two distinct factors: the "size" (i.e., relative weight, length and maneuverability) of the implement and the "texture (i.e., various materials from which they are made) of the implement. These factors function on a series of continuums, with each statement existing simultaneously with its opposite/negation:[177]

- The harder the implement, the more quickly the sound is perceived by the listener.
- The narrower the playing surface of the implement the more distinct the attack is perceived.
- The heavier the implement, the darker the sound and more fundamental of pitch is perceived.
- The more textured the surface—i.e., the more disruptions in the surface—the more the sound will be perceived as grainy in nature.
- The faster the implement moves toward a surface, the louder the perceived sonic event.
- The faster the implement moves away from a surface, the shorter the event is perceived.

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[175] Cort Lippe, "Real-time Interaction Among Composers, Performers, and Computer Systems," *Information Processing Society of Japan SIG Notes*, no. 123 (2002): 1-6.
[176] See Tables 1-4.
[177] These continuums are common assumptions within the percussion community, to which the author contributes knowledge both from personal experience and the apprenticeship of percussionist and mentor Mr. Timothy K. Adams Jr. Timothy K. Adams Jr., "Cymbals and Bass Drum" (Percussion Masterclass, University of Georgia, Athens, GA, November, 2016).

With this knowledge assumed, the performer can make a series of choices about how to manipulate the various implements prescribed within the pieces.

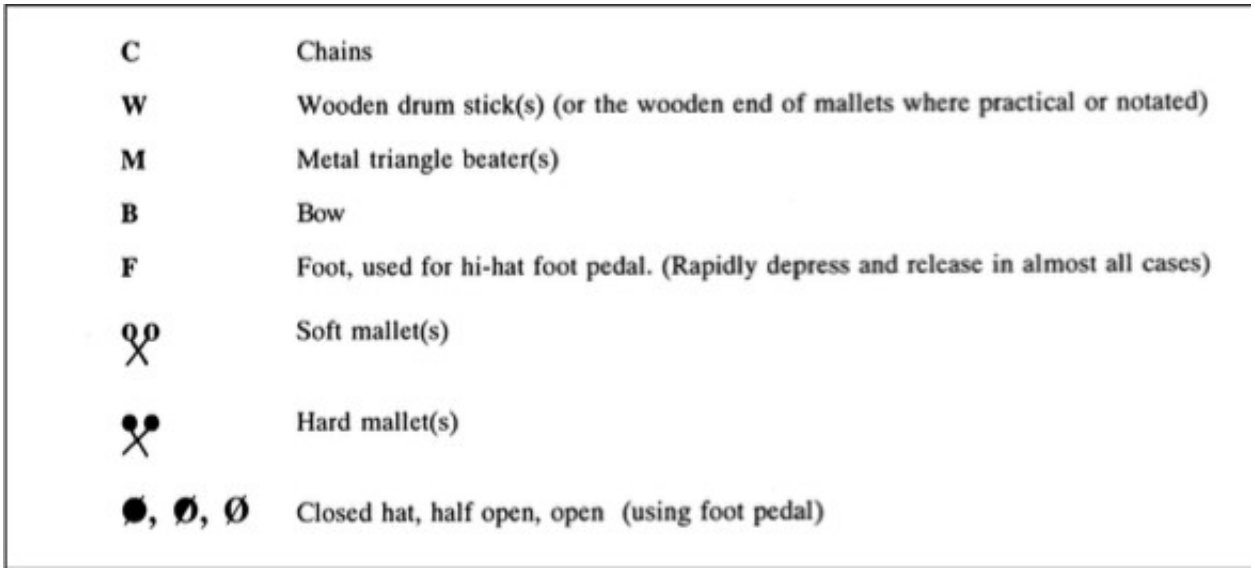

Fig. 2 Playing implements prescribed for *Music for Hi-hat and Computer*.

The score only calls for normal drumsticks and brushes, but other sticks/mallets may be used with the performer's discretion.

Fig. 3 Description of playing implements for *Music for Snare Drum & Computer*.

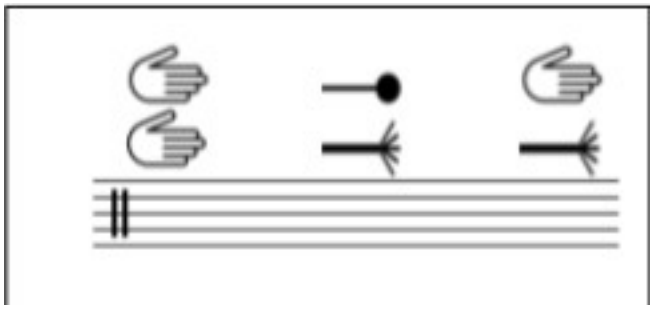

Fig. 4 Symbols denoting playing implements for *Duo for Cajon & Computer*.

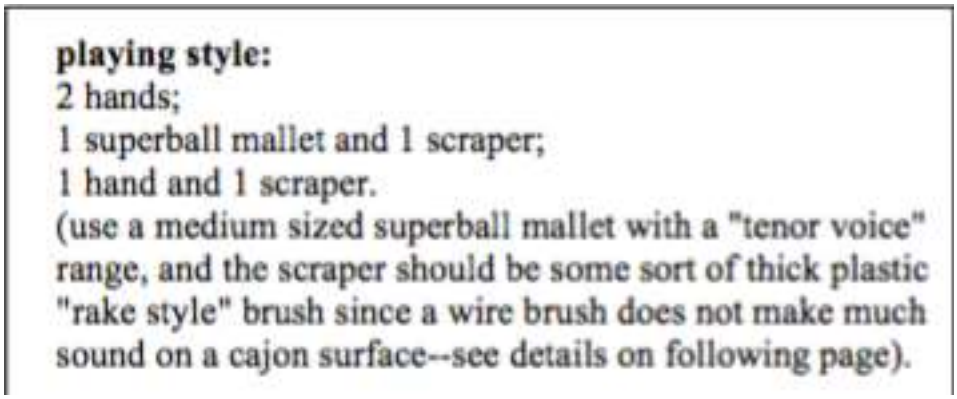

Fig. 5 Description of playing implements for *Duo for Cajon and Computer*.

Instrument Choices

As noted with playing implements, there are substantial options for the performer of these works regarding instrument choice. While mention of various instrument choices is unnecessary, it may be useful to once again discuss the different manipulations to the sound-world of these instruments that may be accounted for acoustically. As was the case for the implements, the instruments are subject to a series of continuums that govern the perceptions of their sound-world, once again each with their subsequent opposite/negation:[178]

- The deeper the instrument, the darker its tone color-timbre.
- Metal instruments tend to be brighter than wooden instruments.
- The wider the instrument's playing surface, the greater the potential for perceptible timbral differentiation.
- The more tension that is placed on the playing surface, the more perceivable the differentiation in articulation.
- The more visible the instrument, the more easily its subsequent sound diffusion is perceived by the observer.

[178] This is not intended to be an exhaustive listing of all possible continuums that govern percussion instruments. It is simply an acknowledgment of several pertinent continuums that affect performer choice in these works.

Implications of Instruments and Implications on the Resulting Sound-World

The aforementioned governing continuums of the percussionist's sound-world represent the amount of performer control on interpretation when dealing specifically with indefinite-pitched instruments-whose differentiation is perceived exclusively by timbre and texture, as they have no distinct pitch. With this mention of timbral and textural possibilities controllable by the performer, it can be understood that none of the continuums function in exclusivity. Rather, they each function concurrently, allowing for the further obscurity of the sound-world within indefinite-pitched percussion. However, it is with mention of this knowledge that the performer and the resulting sound-world of the traditional-acoustic instrument enacted by the performer-instrument will be perceived by the listener. This vast soundscape will be most readily understood as those sounds for which the listener can readily identify the source. Sounds that are played in a "traditional" manner—such as the splash of a cymbal, the sustained roll of the snare drum, or the sound of the Cajon when played with hands—are easily discernible by even the most novice listener. However, with the addition of implements less familiar to the instruments' native sound-world—such as the bowing of a cymbal, scraping of a snare drum with brushes, and the use of the superball mallet on the Cajon—the differentiation of the perceivable sounds' source is greater, making it increasingly more obscure. It is this cross-section of the perceptible and imperceptible sounds within indefinite-pitched percussion that obscure the identification of the sound source and whether or not it was produced by an instrument played by the performer or as sounds created by the computer. While the differentiation of sound-source is problematic enough on its own, the addition of amplification and the resulting diffusion of the sound throughout the venue muddy the perception of sound even further. Perhaps it is this obscurity

that renders this genre of music most effective, requiring the listener to be simultaneously attentive and mistrusting of their senses.

Tools and Specifications for Performance

The sound-world of these pieces, regarding their mechanical needs, is straightforward. For *Music for Hi-Hat and Computer*, the sound-world is derived from the use of the hi-hat, typically associated with its incorporation within the drum set, which is played with sticks, brushes, and feet. There are less traditional methods, such as the use of bow or chains, which do alter the sound-world but are used rather idiomatically. In *Music for Snare Drum and Computer*, much like for *Hi-Hat and Computer*, the snare drum is widely utilized traditionally. The lone stipulation to which the snare drum must adhere is that it must be capable, at times, of exclusively using wired snares. Lastly, and most uniquely, in *Duo for Cajon and Computer*, the Cajon must be able to respond to various implements, including hands, brushes and the superball mallet. This specification for the instrument to react to a wide variety of implements led the composer to suggest that the Cajon, with its smooth sides, be altered to add a textured surface with which the brushes and superball mallet can easily interact.[179]

The computer as an instrument functions very similarly in all three works. It requires the use of a computing device capable of Max/MSP and additionally requires the use of the patch from the composer's website.[180] As the computer is an electronic instrument, it requires the sound to be diffused through external equipment; the internal amplification of the computer is insufficient to allow the listener to perceive it. In all three works, the composer stipulates that the sound from the performer should be captured with a cardioid or super-cardioid microphone,

[179] In the author's personal experience, the addition of a textured surface is useful, but not necessary for enacting the various implements, or the patch responding to their input.
[180] The patch is made available publicly through the composer's website. http://www.music.buffalo.edu/faculty/lippe/compositions#nav

which is then combined with the sound from the computer as captured through an audio interface. This sound is subsequently diffused through a mixer to stereo outputs, from which it can be perceived "acousmatically" by the observer.[181] The general implications of the resulting sound-world have been thoroughly discussed above. However, the results of the unique interactions within each work will be discussed below.

The Process of Performer's Analysis

The performer's analysis of LEM can be noted through the processes of "focused listening," "score study," and "practice." The focused-listening segment of the analysis of this work adopts the language and approach of Spectromorphology to discuss electronic textures. In contrast, this analysis distinguishes between the hi-hat and the computer as separate textures, which are not an electronically "whole," presenting a fundamental difference from the "focused listening" usually attributed to Spectromorphology. The next segment of analysis, score study, is very similar to that in the performer's analysis proposed by Rink, with the exception that the computer part is not notated, which forms a key distinction between this analysis and the authority present in the score study of traditional acoustic works. Lastly, the final segment of analysis, "practice," is much like that typically associated with chamber music of any kind, as the performers may interact, and the performer becomes increasingly more aware of the potential of the computer as musical partner. Together, these three segments comprise the "performer's analysis" of the work and allow for the unique "shape"-oriented perspective that the performer provides. Each of the subsequent analyses will incorporate aspects of the works' organization, movement, and quality, structural aspects of the work noted in the methodology. To illustrate the partial nature of each

[181] The cardioid microphone is a type of unidirectional microphone with a "heart-shaped" pattern of sound reception; "acousmatically" refers to a division of the "audience"-the individual perceiving the music- as "listener" and as "spectator"

mode of analysis on its own, the subsequent analyses will each focus on a separate work. Through doing this, the reader will be able to observe the gaps in knowledge between each of the analytical insights, which in turn provides support for the use of each technique as a segment within the performer's overall analytical process.

"Focused Listening": Analysis of Recording of *Music for Hi-Hat and Computer*[182]

The work begins with a persistent grainy buzz that gradually becomes more present. The hi-hat enters shortly after around 0:01/2 and has an irregular "tick" that increases and decreases in regularity. The cycles of perceptibility decrease in regularity and climax at 0:38 with a deep bell tone that enacts the next sonic field. Within this "field," the presence of the computer as instrument becomes more notable. There is a sine tone, seemingly triggered by the hi-hat at 0:44, that sets off an array of sustained waves that morph into each subsequent wave of sound resulting from an iteration in the hi-hat. These iterations are flurries of sound that seem to trigger a series of rising bell tones that are reminiscent of "rings" like those from the video game Super Mario Brothers. The "ring" motive in the computer gradually morphs into a grainy texture that soon overtakes the bell tones in this texture. This transformation leads to a shift in the function of the computer to that of enhancing the sound-world of the hi-hat at 1:14. The subsequent iterations appear to be instantly transformed into a unique instrument unrecognizable as the hi-hat. Near 1:41, the surface rhythm changes in the hi-hat to a more regular pattern in which the transformations morph together to form a cloud of transformed sound. At 1:54, this cloud of sound dissipates and the remnants of the cloud return, with the increasingly sparse iterations by the hi-hat. At 1:59, the hi-hat is clearly heard, with distinct "tick" iterations triggering the next

[182] Cort Lippe, *Music for Hi-Hat and Computer*, J.L. Cosgrove. Music from Berlin International Computer Music Conference, Berlin. (2000).

soundscape. These transformations appear to function much like those commonly noted via Neo-Riemannian transformation, with each soundscape bringing out different but closely related soundscapes from the common-tone of the hi-hat.

Following the "transformations" is a seamless introduction of silence between 2:31-2:37, a jarring moment of repose that segues into the naked exposure of the hi-hat with the computer silent. This silence reveals the dampening of the hi-hat's tone in subsequent iterations. These iterations seemingly trigger a "smooth," somewhat grainy sound sample at 2:44 that appears to be processed "live" by the computer, as noted in the delay between hi-hat and computer. This relationship of delay to the resulting somewhat compressed sounds from the computer creates the impression of an echo in the computer part. At 3:54, the soundscape again changes to where the computer becomes the dominant voice, with the hi-hat functioning much like a grainy component within the larger computer texture.

This shift in ensemble is short-lived, as at 4:15 the hi-hat subsumes the dominant voice for a brief moment, with previous waves of sound diminishing in presence and resuming the echo effect as noted previously. However, by 4:20, the wave sounds are heard to be triggered by a "splash" in the hi-hat, causing the waves to grow in presence. The waves are seemingly a pre-composed component of the patch within which the hi-hat is functioning as a textured element. At times, it mimics the waveforms within the computer, and at other times it creates abrupt iterations within the wall of wave sounds presented by the computer. This wall of sound constantly morphs through narrowing and directionality, at last forming a stream of sound that crescendos to climax at 4:55, only to suddenly disappear, giving way to a regular, metrically recognizable pattern in the hi-hat, reminiscent of rudimental drumming. This "march-like" section presents a view of the hi-hat and computer as equals. At times, the computer is

accompanying the hi-hat, as noted at 4:58, and at times the hi-hat seems to be accompanying the computer, as in 5:28. Throughout this section, there are no noticeable transitions of soundscape, as the rhythmic and textural material seem cohesive through 5:34. At 5:34, there is a shift in texture noticeable in the hi-hat, as the iterations are less metrically distinct, and there is a slowing in the surface rhythm of the hi-hat within the context of the previous material, much like a *molto ritardando*. The resulting texture is that of a chalky grain left over from the previous section, with each sporadic iteration by the hi-hat sparking new transformation by the computer. This new soundscape is signaled by the hi-hat at 5:46/7 with a beacon-like tone resulting from the computer. At this point, the hi-hat is heard as the principle voice, with a return to the computer transforming each subsequent hi-hat iteration into contrasting soundscapes, each with a murky texture, and a "pitched" space-like tone emerging from each texture. This ethereal sound is then mimicked by the hi-hat at 6:15, with a sustained bending texture. In this soundscape, the computer appears to be enhancing the sustain of the hi-hat, with minimal coloring of the sound.

At 6:24, the computer can be heard extracting what is perceived as overtones from the hi-hat and transforming them to straight "sine"-like tones that are sustained. Each subsequent iteration by the hi-hat gradually clears away its preceding texture and assumes its unique soundscape, with very little overlap, from the previous texture, clouding the subsequent texture. Each soundscape grows in presence until the hi-hat iterations become less noticeable. At 8:05, the subtle murmur of the computer can be heard, followed by the computer resuming the role of extending the soundscape of the hi-hat at 8:08. The extension of the hi-hat once again morphs into Neo-Riemannian-like transformations of the sustain beginning at 8:14. This is short-lived, as at 8:19 the computer changes the sounds of the hi-hat to splash-like samples. At 8:22, the surface rhythm of the hi-hat increases, with space-like wave samples that are splashy in nature. The

preceding leads to a “splashy” texture in the hi-hat that triggers a cavernous-like soundscape in the computer at 8:25. The soundscape then shallows and dissipates, giving way to quick, rhythmically active iterations in the hi-hat that are reminiscent of the rudimental motive at 4:55. Contrastingly, this motive quickly gives way to a call and response between hi-hat and computer. This shifting of soundscape alternates between “tutti” and “call and response”-like sections, with the computer at times offering circuit-like buzzes, paddle-like tones, and at times smooth or grainy textures are orchestrated above and/or below the hi-hat. Within this call and response-like section, the computer is most distinct when it “clunkily” envelops the hi-hat at 8:54.

At 9:00, the soundscape shifts to a more ethereal light whooshing that ebbs and flows with the whoosh-like splashes present in the hi-hat. This lighter texture gives way to a clearing of the soundscape back to one that is free from background computer coloring. At 9:37, the iterations of the hi-hat are heard as singular “rain drops” that are changed in pitch by the computer, resulting in a quick ripples-like effect in the soundscape that is not sustained. By 9:51, the computer becomes more active, once again coloring the background with a cloudy wave of sound.

The iterations by the hi-hat become increasingly duller, alternating in call/response with the previous drop-like motives until 10:24. At this time, the hi-hat fizzles into a growing grainy electric rocket-like explosion that moves into the distance, transforming into a grainy-pitched tone as soundscape. Within this new soundscape, the computer can be heard transforming each, now broader, iteration from the hi-hat into miniature sound-worlds full of smooth and textured components, overlapping one after the other. At 10:49, a roll-like iteration from the hi-hat emerges from the texture, triggering a propeller-like motive in the computer. The hi-hat repeats its rolled motive with its splashy texture at 10:51, transformed into more jagged electric tones in

the computer that morph between grainy and whooshing rocket-like elements that themselves shift in intensity. The hi-hat continues its rolls through this texture, tearing through at times to become recognizable, but at times subsiding into the morphing soundscape. This propeller-like sound combines into one grainy whooshing texture at 11:14 that shifts in orientation from side to side in stereo, and then this texture narrows and diminishes in volume to become a part of the hi-hat's grainy texture. The hi-hat then diminuendos to niente, which sonically appears to be controlling the quaint propeller, jet-stream-like texture in the computer that diminishes toward silence at 11:57, the end of the piece.

This type of analysis was completed away from the instrument, away from the score, and simply focusing on the interaction within the piece. For the performer, this nature of isolated focusing on an interpretation can be a source of creativity and inspiration. However, to glean the amount of detail present in the previous analysis, the performer risks ingraining certain interpretive constructs that may inhibit their creative processes. As such, the performer is in danger of settling for imitating the performance of another as opposed to using their performance as a learning tool.

Score Study: An Analysis of Notation in *Music for Snare Drum and Computer*

When approaching the score for *Music for Snare Drum and Computer*, there are several variables that are quickly noted and that should be accounted for. Although the piece is fully realized using Western notation, it is a performer-directed work that can be read as a fully improvised work if desired. Lippe writes this in the Performance notes for the piece:

> The performer is urged to make use of the detailed staff notation for each event as a guide for an improvisation. Sometimes the notation can be thought of as an *out-of-time* prompt for techniques and gestures, while at other times, the notation can be used as an *in-time* prompt for techniques and gestures. In other words, the notation can be used literally at times and as a mnemonic at other times.

He later writes that the rhythms from this notation can serve as a guide for the "flow" and "gestures" of the piece, or, if reading from the notated score, the rhythms can be interpreted "proportionally and/or following the specifically notated rhythms."[183] This freedom within the work is perhaps why the work comes with three separate representations of the score. The composer provides a score with realized notation, one with a written description of each event in prose (or "score of prose"), and a "Performance Timeline" for each event. While the latter two representations of the music are similar, the "Performance Timeline" is vaguer in its description of each event.[184] The notated score presents notated iterations—each of which is unmetered—that may occur during each event. It should be noted that these iterations are not entirely unmetered, as they are spatially notated for a given temporal measure.[185]

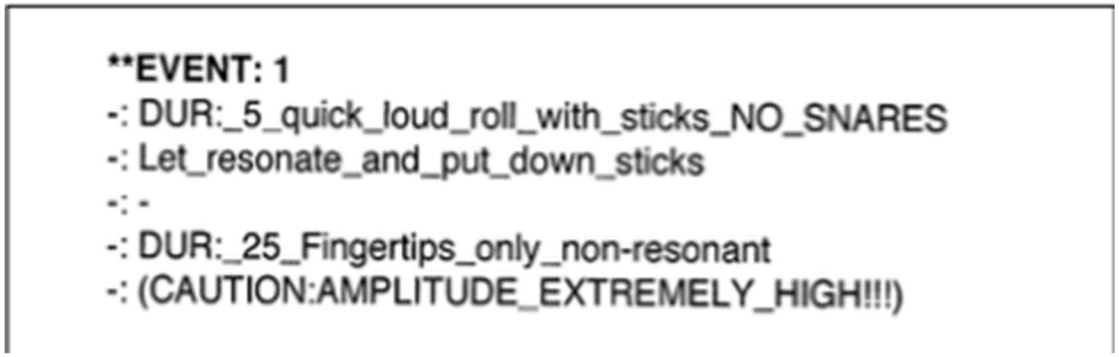

Fig. 6 Event 1 Performance Timeline.

[183] Cort Lippe, "Music for Snare Drum and Computer," score, 2005, Cort Lippe Faculty Website, University of Buffalo, accessed February 24, 2017, http://www.music.buffalo.edu/faculty/lippe/compositions#nav.
[184] See Figures 5 and 6.
[185] See Figure 7.

EVENT 1 (30 seconds)
SNARES OFF, 2 STICKS. Begin with one very fast, loud roll with sticks. Then put down sticks. **Wait 5 seconds.**
CAUTION: AMPLITUDE BECOMES EXTREMELY HIGH HERE! Make sure to avoid feedback.
FINGERTIPS. (After putting down sticks start playing very softly with fingertips.) Listen closely to computer output and use only the fingertips, while damping the drum with the heels of the hands. This event serves to "tune" the drum, metaphorically. Playing should be very tentative at first, with long rests. Gradually add very short bursts of faster notes. Notes that are struck very softly do NOT change the timbre of computer output, while notes that are struck with more force change the timbre. One hand should be very close to the mic and the other as far away as possible to give maximum variance to the sound. Do not move hand positions, as this will make sound. Make sure that finger strikes stay on the skin for maximum damping because lifting the fingers also makes sound. Gradually add notes without heel damping.

Fig. 7 Event 1 Score of Prose.

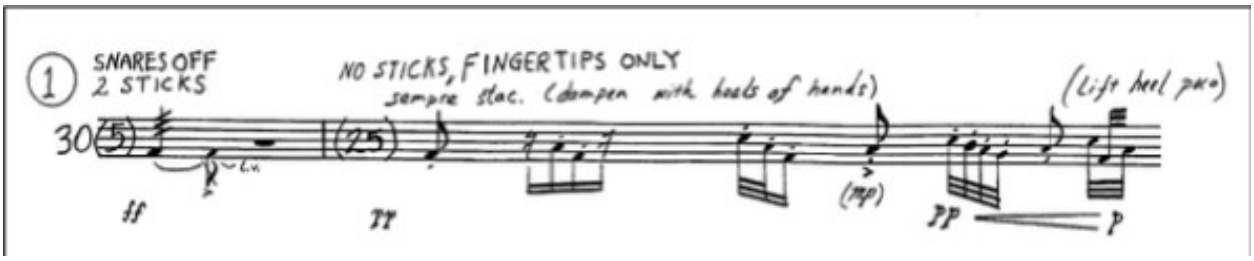

Fig. 8 Event 1 Traditionally Notated Score.

As there is now a distinction between scores, it is prudent to discuss the observations as noted within the scores. As the "score of prose" thoroughly outlines the interactive elements throughout the work, the interpretive elements that can be gleaned from score study will deal with the realization of the snare drum part.[186]

The snare drum part, though fully realized in the traditionally notated score, provides insights on the piece's "flow" and "gestures."[187] The "flow" can be noted through the use of language such as *lift heel poco*, *poco a poco more active*, and *subito less active*. These descriptions serve to outline the activity present throughout the piece. This activity is more

[186] See Table 6.
[187] Flow and gesture are used in accordance with their application by Cort Lippe in the Performance Notes for *Music for Snare Drum and Computer*. Cort Lippe, "Music for Snare Drum and Computer: Performance Notes," 4.

clearly outlined through the "score of prose" with descriptions much like the following: "slightly less activity on the drum than in the previous event."[188] Such descriptions have the benefit of preventing surprises for the performer, although they may run the risk of inhibiting creativity as the performer may take fewer chances. The range of activity within a work is commonly referred to as its "energy"—Lippe calls this "flow"—and for the performer, understanding and outlining such energy is important. Manipulation of the energy in a piece—technically understood as small tempo fluctuations—gives the work its sense of pace and phrasing.[189] As phrasing is a significant way for performers to alter their "reading" of a work, it is essential to the identity of an interpretation. The "flow" of activity for this work can be observed as a series of peaks in energy, with the maximum activity occurring in Event 16 and Event 27. Each of these developments is preceded by gradual increases in activity and is followed by an immediate drop-off in surface activity to events with much less active textures. For the performer choosing to improvise his/her iterations, this is vital information, as this knowledge will help him/her formulate ideas that correspond to the "flow" of energy.[190] While the energy graph can illustrate the energy of the piece in regard to the snare drum, it does nothing for understanding the overall energy of the piece, as it does not account for the activity of the computer. It can be readily observed through notes, such as in Event 19, where Lippe writes in the "score of prose" that "[t]his event should be practically an electronic solo," that energy of the computer does not always align with the energy of the snare drum. As in Event 19, the snare drum is playing with

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[188]Note derived from Event 7. Cort Lippe, "Music for Snare Drum and Computer," score, 2005, Cort Lippe Faculty Website, University of Buffalo, accessed February 24, 2017, http://www.music.buffalo.edu/faculty/lippe/compositions#nav.

[189] The concept of tempo fluctuations, especially as it relates to interpretation, is drawn from the writings of John Rink. John Rink, "Analysis and (or?) Performance," in *Musical Performance: A Guide to Understanding* (Cambridge: Cambridge University Press, 2002), 37-42.

[190] For a complete detailing of the fluctuations in energy throughout this work, see Figure 8.

less activity, a signification that implies that the computer/electronic part exerts a different amount of energy.

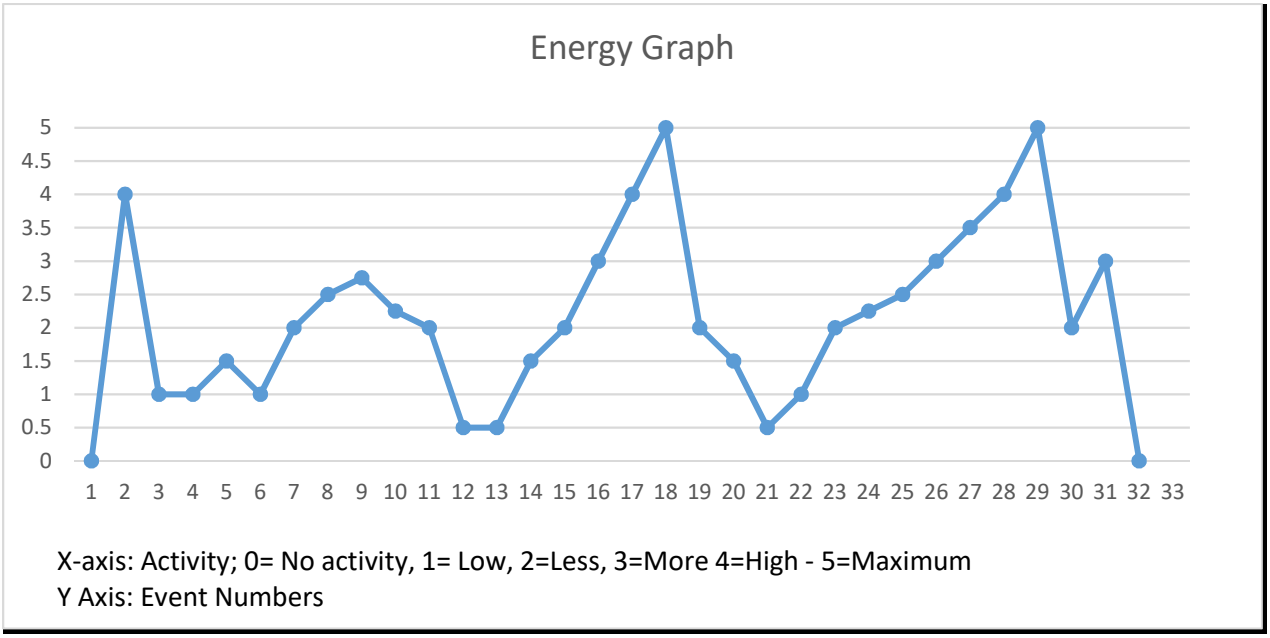

Fig. 9 Energy Graph illustrating the changes in surface activity-energy in *Music for Snare Drum and Computer*.

To more clearly follow the energy of the computer, a different form of score study is necessary. As previously discussed, the realization of performance through a recorded medium can function as a "score" from which readings can be derived. With this mindset, it is useful to turn to the software EAnalysis, capable of rendering sonograms of electroacoustic works. The rendering of *Music for Snare Drum and Computer* by EAnalysis illustrates a slightly different perspective of the overall energy of the work. This rendering shows not only what is happening with the computer, but additionally what is taking place in the computer/electronic part. The benefits of this score are that it tracks iterations that are measured temporally, much like in the notated score. Therefore, during the "electronic solo" in Event 19, what the computer is doing

can be observed without having to listen to the score. According to the score, Event 19 would occur between 6:40 and 7:00. When referencing the sonogram during this time point, we notice a peculiar wavy pattern with grain to its texture. This illustration allows the performer to predict the types of soundscapes that the computer will enact and account for how long its sonic traces will be felt. Another use of the sonogram for score study is its visual representation of form. As there is no score to the electronic part, the sonogram allows for the structure of the sound to be observed and studied. This will aid the performer not only in using the energy graphs to understand how others have performed the work but also in using them as a study-aid when recording themselves playing electroacoustic works. As noted in Figure 9, there are several formal events that have been marked. These formal events represent new sections in the work that illustrate the energy of the piece as a whole. Ten such events are marked to portray the large-scale formal sections within the work, similar to the types of observations noted through the background and foreground of Shenkerian analysis. In contrast to Shenker, these graphs do not detail the harmonic structure of the piece, but rather the "shape" structure of the piece. This type of observation is ideal for score study and "performer's analysis" as a whole due to its representation of the sonic contributions of both the performer and the computer. While this form of score study is not infallible, much like that conducted through traditionally notated scores, where errant marks by the composer or overzealous editors may change the accuracy of the work, it does present a unique perspective for the performer that can be a useful tool when preparing an electroacoustic work.

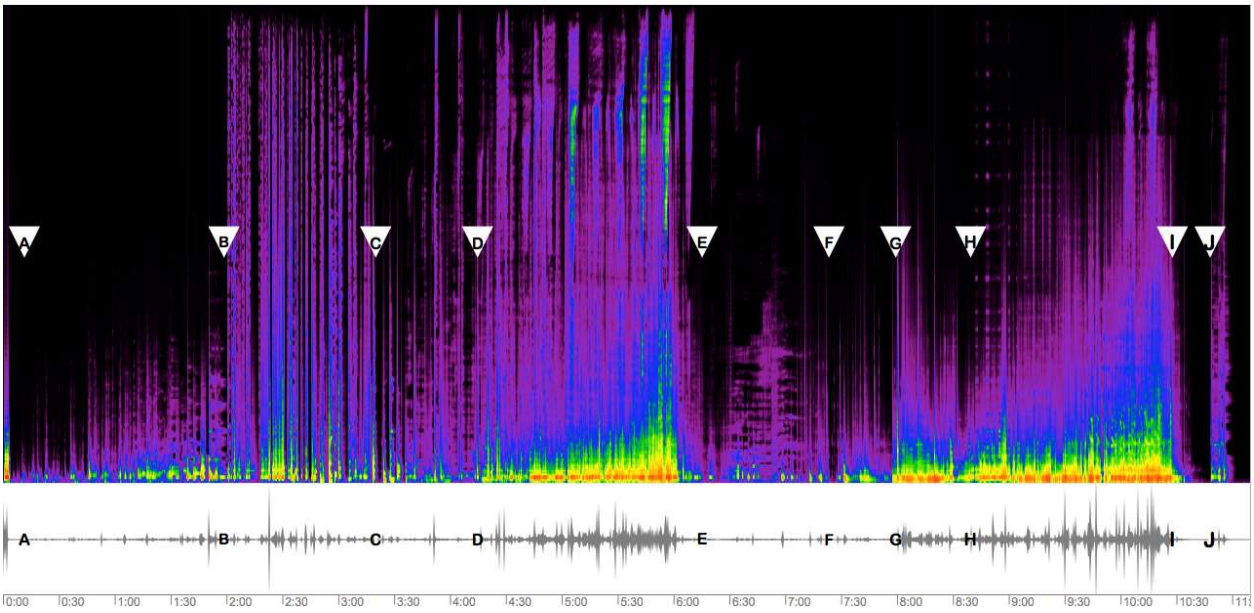

Fig. 10 Sonogram developed from a CD recording. [191]

Practice: Analysis of Performer's Insights Through the "Practice" of *Duo for Cajon and Computer*

In the practice of *Duo for Cajon and Computer*, there are several noticeable functions present within both the computer and the Cajon. These roles, or functions, are constantly shifting, and through this interaction, the computer's output is shaped in real time. Lippe describes this as a freeing operation for the performer, with which they can make expressive decisions based upon their interpretation. In his words, this simultaneously makes the computer "an extension of the Cajon" and "an independent agent," a duality that calls into question the means with which the performer engages with the resulting output from the computer processes. With the understanding of these different roles, the interactivity between the Cajon and the computer is observed in how they appear to be working together or functioning within a

[191]Cort Lippe, *Music for Snare Drum and Computer*, Pedro Carneiro, Music from SEAMUS, Volume 20, EAM 2011 (2011).

hierarchy, like that noted in chamber music.[192] Evidence of these types of interaction is felt through the use of style to establish large-scale formal markers, as well as various events in which the Cajon and computer seem to have a high level of interactivity with regard to the specific pitch and harmonic outputs by the computer.

From an aural perspective, the form in *Duo for Cajon and Computer* feels very free and is not easily discerned by exclusively viewing the score. Through playing it with the computer, it is noticeable that the piece does not derive its structure from the expected application of repetitive or transformational processes to the rhythmic material. The iterations, while timbrally distinct, flow together in various phrases—whose surface rhythm is largely derived from sixteenth notes—and function as a barrage of consistent syncopated patterns. Thus, the structure is more easily felt through changes in form. This discussion of "form" is felt through the use of variations of timbre within the piece. Such variations are notable through the computer's audible use of various algorithms and transformations that are triggered by the output from the Cajon. In contrast to the Cajon, the computer part is not notated in the score. The only exception to this is the inclusion of computer event indicators throughout the work. Such indicators represent phases of computer processing, each with their own set of parameters. In total, there are twenty-four different event indicators: the first event is five seconds, events two through twelve last for thirty seconds each, and Events 13-24 for twenty seconds. This division splits the piece roughly into two halves.

On some level, this division implies a binary framework organizing the time span of the events in the piece. This division makes Event 13 the turning point of the piece and the beginning of a new section. Upon first playing Event 13, it does not appear to offer the type of

[192] Cort Lippe, "Real-time Interaction Among Composers, Performers, and Computer Systems," *Information Processing Society of Japan SIG Notes* 2002, no. 123 (2002), 1-6.

aural implications expected from the start of a new section. It begins almost seamlessly from the previous event and is not aurally distinct in regard to the activity of the Cajon. However, there are two peculiar occurrences that stand out during this event. First is the exposed acoustic nature of the Cajon. The Cajon is heard with minimal processing or computer output accompanying it. Thus, the listeners' attention is drawn to the Cajon in what can be regarded as a quasi-cadenza. Another interesting moment occurs as the event comes to a close. Due to the "'live" nature of this piece, it is impossible to isolate the specific trigger; however, in each instance, the computer initiates a long "sighing" motive. Subsequently, in Event 14, it is useful for the performer to think of the use of the superball mallet, which is capable of producing a similar "sighing" sound, as imitating the computer. While this output could have resulted from a number of processes, even with the potential that it was previously composed and/or stored within the patch from a previous section of the piece, it is experienced as an "interactive" moment within the piece. When this instance is felt in response to the computer's output, it increases the performer's conscious interactivity throughout the work. Subtleties and "decision-making" by the computer, unbeknownst to the performer, allow for an interaction that is meaningful, not contrived, as the introduction of this material is interesting and worth interacting with in order to explore its potential. Given the symbolic shift of the sighing motive and its imitation by the performer, not to mention the cadenza-like exposed nature of the Cajon, Event 13 is perceived as an instance containing the perfect balance for viewing the piece's shift in binary presentation. Additionally, it functions as a subtle foreshadowing of the climax noticed near the end of the work.

One area of the piece that the perceived binary framework does not outline are the changes in timbre through manipulations of playing implements by the performer. The piece as a whole is saturated with variations in timbre. While the computer's use of timbre is singularly

experienced audibly, the variations in timbre from the performer are experienced both aurally and visually. This recognition of timbral changes is pervasive throughout the piece, as upon first playing the work, five unique and distinct timbres on the Cajon that range from bright to dark must be selected. Additional selections must be made from complementary implements prescribed by the piece, varying from the use of hands or fingers to the utilization of a scraper or a superball mallet. From this vantage point, the Cajon is played in two distinct ways, traditionally and non-traditionally. The traditional way of playing the Cajon would be with the hands and fingers, while a "non-traditional" way of playing would consist of moments when the performer uses other implements such as a scraper or a superball mallet. Given the binary structure of computer events, it is meaningful and expected that the performer's playing style would share a similar symmetry. In retrospect, this pattern is nearly palindromic in nature, with a form of [ABCAA(D)CBA] that corresponds to the event indicator thirteen as a structural marker.[193] This discovery is useful for the pacing of energy throughout the first twelve events. As a result, it is beneficial to maintain a strong presence in the Cajon toward the end of Event 11 into Event 12. It is also useful to play the dynamics in Event 12 with more presence and distinct movement so as to activate the computer as much as possible. With these manipulations, Event 13, with its open "acoustic" nature, can be experienced as striking in its nakedness.

Another observation noticeable through "practice" is the almost harmonic presence of the computer, which acts in very different ways. While each event has a purpose for its use, the events that begin the work, Events 2 and 3, are worth mentioning. During these events, the Cajon produces pedal tones, with these sounds representing the darkest of those available for the instrument. These tones are all played at varying amplitudes of loudness, with several of the

[193] See Figure 1.

entrances embellished with figures of a brighter timbre. These events are all isolated from each other and do not extend metrically beyond the measure in which they are initiated, allowing them to be both easily perceived and comparable. The isolation of these events allows the computer to transform these flourishes into harmonies that can be heard above and below the range of the Cajon, allowing for the listener to hear a broad spectrum of pitches and to perceive the Cajon as melodic. The resulting textures form chords that are open and vary between quartal/quintal in presentation.[194] There is a great deal of instability within the upper partials of these harmonies, alluding to the prospect of the harmonies being spectrally based transformations of the Cajon's flourish and not explicitly stored harmonies. This instability underlines the need to execute similar tones on the Cajon at various amplitudes of loudness. This demand on the performer is somewhat problematic, as it requires the manipulation of several variables including hand tension and arm weight. The most success in uniformity was experienced through reliance on the weight of the arm to draw the hand to the Cajon and use of the wrist to quickly lift the hand away from the Cajon. As this event begins the piece, this event, coupled with an event I will discuss later, Event 21, were my choices for tuning the patch, a process that the performer does for the computer to be able to recognize the previously chosen timbres. While in this performance of the piece, there were not multiple instruments available, it would be interesting to explore the effects of instrument choice on the quality of the deep-bass tone needed for these iterations.

The next events that stood out through practice were those that utilized pitch and noticeable interactivity between Cajon and computer. While preexisting musical experiences inevitably lead toward interaction with the computer, the degree to which this interaction was conscious may vary. In Events 4, 6 and 10, where there is a feeling of initiating the phrase, there

[194] See Figure 2.

is a tendency for the Cajon to function more like a soloist. However, in Events 5, 8, 17, the Cajon comes across as part of the conversation and not a solo voice. It is most apparent through experiencing sections such as these that the Cajon is not autonomous from the computer, a fact that renders both entities as codependent.[195] Similar codependent relationships to this can be recognized in many other forms of music, such as the construct of the conductor and the soloist, or even through musical forms such as the theme and variation, which offer very little in the way of unbridled interaction.[196] Experiences such as these direct the approach to interaction throughout this piece.

Two events that draw particular attention to the use of pitch and how it can be used to observe interactivity between the performer and the computer would be Event 9 and Event 21.

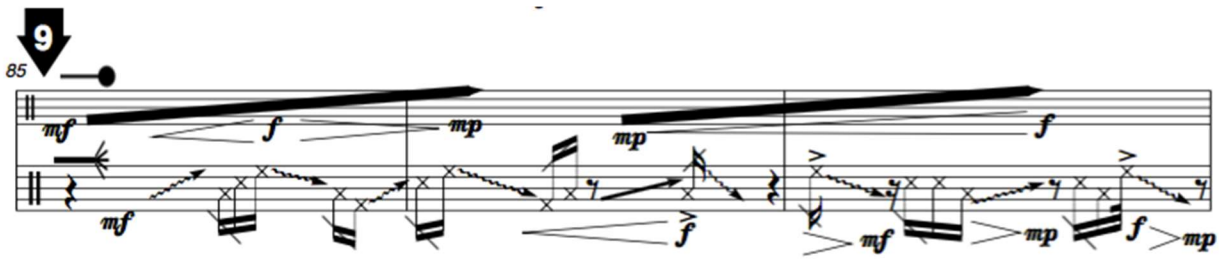

Fig. 11 Event 9, portraying implied polyphony in the Cajon.

Event 9, shown above in Figure 11, is interesting as it relates to pitch. This is for a few different reasons, beginning with the observed instances of implied polyphony in the score. This notation encourages the execution of each of these notations as separate textures. To develop this

[195] Cort Lippe, "Real-time Interaction," 1-6.
[196] Cort Lippe, "A Look at Performer/Machine Interaction Using Real-Time Systems," in *Proceedings of the International Computer Music Conference*, International Computer Music Association (1996), 116-117.

feeling, each pattern is played in exclusion, "sung" over the opposite pattern, and lastly, put together. The problematic area regarding technique can be noticed when attempting to maintain the accuracy and continuity of each upward "sigh" with the superball mallet. Moreover, unique in this passage, the computer can be heard tracking the various timbres in the scraper and transforming them into pitches that are heard in real time. This event is an interesting microcosm of the present loop of interaction. The performer is interacting with himself/herself through the use of different implements, while also interacting with the computer, which is interacting with the implements' output. Such interaction allows the performer the option for increased flexibility in how to emphasize the melody in the scraper. In contrast, a similar passage, as noticeable in Event 17, where the computer does not track the melody independently of other processes, results in the two voices being buried within an aggregate rhythm.[197] This is an instance that focuses the interpretation toward clarity of the aggregate, as opposed to the clarity of the individual voices.

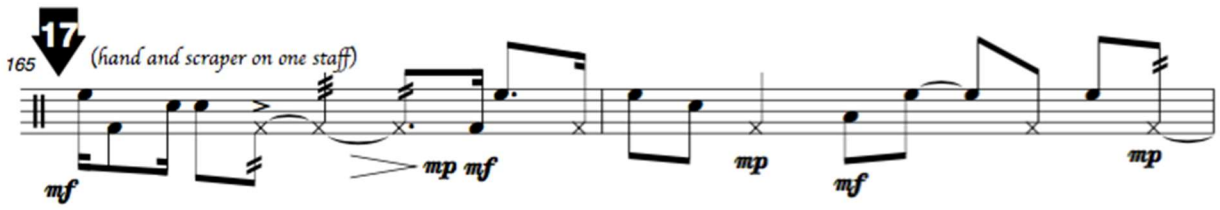

Fig. 12 Polyphony written emphasizing the aggregate.

The last example of interactivity that became noticeable upon playing—the "practice" of—this piece was the climax of the piece during Event 21. As mentioned earlier, when

[197] See Figure 11.

discussing form, the concept of traditional versus non-traditional manners of playing was presented as structural. This means of understanding the pieces' underlying framework is useful for observing the interaction during this event. Previous to this event, the computer has displayed a substantial amount of interactivity through the transformation of material by the Cajon that at times bordered on aggressive or where it functions as an independent voice, although prior to this event, the computer could always be perceived as a secondary voice—Nebenstemme—to the Cajon. This changes in Event 21, as the computer becomes increasingly present and soon overtakes the Cajon in terms of volume and surface activity. The computer can then also be heard transforming the accents in the Cajon to guitar-like samples, which creates the perception of the Cajon performing in its popular modern role of surrogate for the drum-set. With this use of sampling and transformation, this event flips the model of the computer Nebenstimme to the Cajon in order to create a new impression of the Cajon as secondary to the computer. This is done through the use of the relatable construct of rock-influenced music. Therefore, the observer/listener would be able to perceive the computer as the dominant voice while simultaneously understanding the existence of interaction between the computer and performer, where the performer is not always in control and responds to the computer.[198]

[198] See Figure 12.

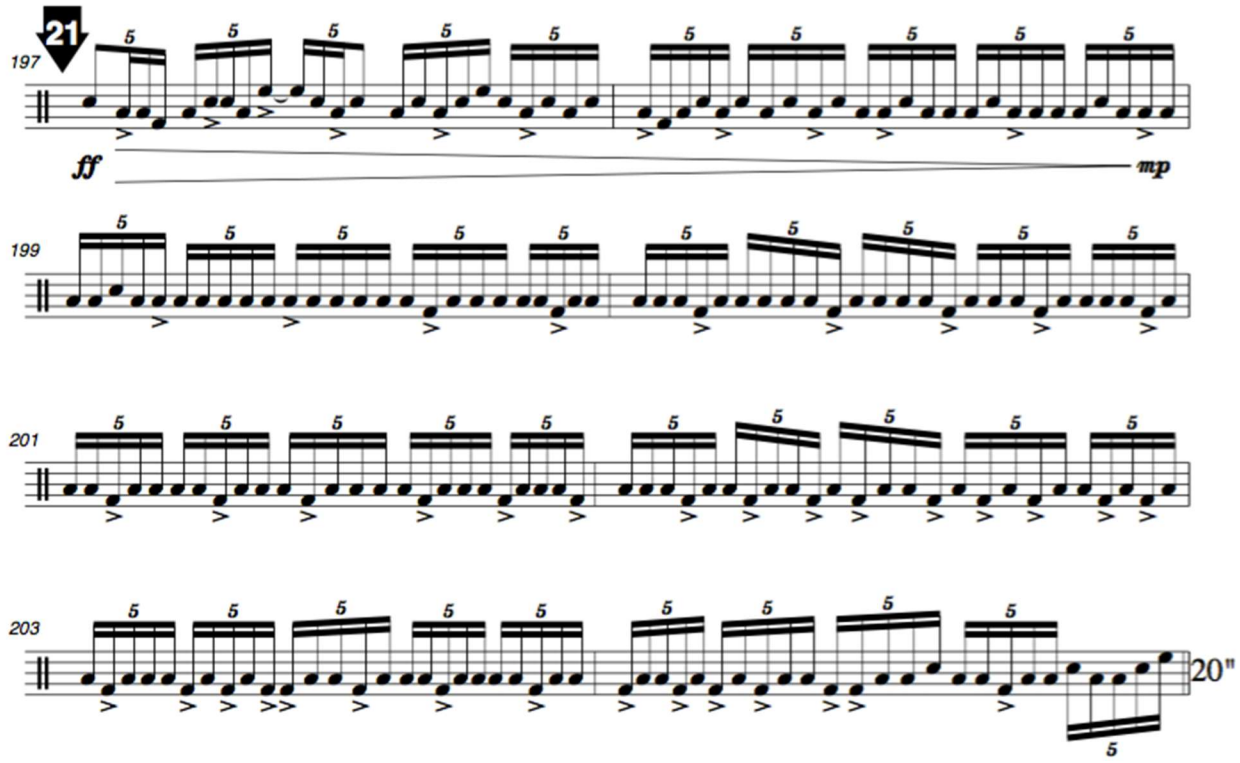

Fig. 13 Event 21, Cajon as accompaniment to the computer.

Within this section, though the surface activity is a physical act, it is useful to embrace this role of accompanying the computer and not feel pressured to overcome or be heard as a distinct voice from the computer's sonic contribution.

The various roles presented through this work make the over-arching goals of its performance flexibility and adaptability, experiences that are somewhat universal to ensemble performance.[199]

[199] Elaine Goodman, "Ensemble Performance," in *Musical Performance: A Guide to Understanding* (Cambridge: Cambridge University Press, 2002), 153.

Concluding Thoughts

Each of the above analytical techniques offers something unique to the performer process of analysis. Focused listening allows the performer to listen for interactions within the work without being encumbered by the score and its biased nature of exclusively presenting notation for the traditional instrument. Score study, as noted in works for traditional instruments, allows the performer to witness connections in the music and make insights about the music that they may not easily hear. Finally, for the performer, "practice" is indispensable, as it forces the performer to make decisions about what is important and what they hope the listener will take from their reading of the work.

As each of these analyses was for a different work, there are several shortcomings that can be noted. In "focused listening," the performer runs the risk of over-listening to a work and losing their own creative impulses in favor of the impulses of others. Additionally, this process does not reveal to the performer any of the technical changes in the piece outside of temporality. Such changes, like stick or other implement changes, rhythmic material, and changes in playing area, are critical for understanding a work. With "score study," while it does not present a problem with the amount of specific detail present within a work when applied on its own, it does not allow the performer a chance to understand the sonic interactions within a piece, which is a problem when determining the functionality of instrument and implement choices, not to mention the practicality of certain phrasing choices. Practice, while it allows the performer to develop an interpretation, observe the written score, and interact with the sonic material, if approached without prior knowledge of the piece, can leave the performer without a clear direction for how to develop his/her interpretation.

Thus, it is seemingly most comprehensive for all thorough modes of analysis to work concurrently as a "mixed" analytical process. Each of these tools enhances the other and would likely be most beneficial as a "loop" in which the performer can move fluidly among the various forms of analysis to develop a reading of the work that is unique to them. While this "mixed" analytical tool provides the performer with a process for approaching Live Electroacoustic Music (LEM), its efficacy should be examined through comparisons with other works written for the medium. Additionally, as researchers have called for increased performer training in the area of LEM, such training would equip performers with more sophisticated terminology and a deeper understanding of LEM that would further enhance methods of analysis such as this. Moreover, such training could prove beneficial for the composer-performer-computer chain of interaction, allowing performers and composers increased insight into the various challenges presented by these works. Additionally, interdisciplinary study with the fields of Cognition or Semiotics could enhance analytical processes such as this to further understand the extent of performer observations and their significance in the interpretation of live electroacoustic works. The study of interactivity, especially as it relates to live electroacoustic works, is an important field that has seen major advancements in regard to understanding computer interaction. Hopefully, through the exploration of questions like the one posed here, there will be continued dialogue exploring the analytical needs of, and the observations from, the performer.

CHAPTER 7

DISCUSSION

One of the obstacles facing the development of Live Electroacoustic Music (LEM), aside from the technical problems performers face when preparing works, is that there is an assumption that the performers are not interested in understanding how the "piece" works. This theme is noted in the friction surrounding "performer's analysis" within Performance Studies, or in the exclusion of dialogue directed at performance in the field of Live Electroacoustic Analysis. Presumably, this is due to an impression that the "performer" is preoccupied with learning his/her part in the music and disinterested in learning about the role that the electronics play within the work. Throughout this paper, an argument has been presented for the viability of "performer's analysis" and how its unique perspective of "shape"-oriented analysis is suited for analyzing LEM.

Initial discussion alluded to the perception that the performer may have been deprived regarding his/her authority in analyzing LEM due to the absence of a score. Upon post-facto reflection of the "performer's analysis," it is possible that the feeling of deprivation lies within the willingness of the performer to invest in both the piece and the genre as substantive. LEM, like other areas of focus in music, can be pursued with a passing or a passionate interest, as noted in the difference between the percussionist who plays in the orchestra as a "gig" as opposed to those who choose to approach this music as their life's work.

These differences can be analogous to the various modes of practice discussed by Rob Knopper, in which he makes a distinction between preparing for an audition through learning

correct notes, rhythms, and tempos in isolation, as opposed to creating a tiered process for preparation that is cumulative and inclusive of each "failed" audition as preparation for the "winning" audition.[200] Similar arguments about the cumulative nature of performance can be noted in the writings of Edward Cone, who says

> The more complex…[the] composition, the more relationships its performance must be prepared to explain—and the less likelihood that a single performance can ever do the job. The composition must proceed inexorably in time; we cannot go back to explain; we must therefore decide what is important and make that as clear as possible, even at the expense of other aspects of the work. After all, there will be other performances![201]

These sentiments by Cone and Knopper, while different in scope, both underline the cumulative nature of performance and performing as post-facto analytical tools. It is with this stance that many of the benefits that are notated in the score can be obtained by the performer.
As such, this, as Lippe prescribes, requires an adoption of "the dedication, seriousness, intellectual conviction and responsible actions of pioneers who were instrumental in the development of the field of electronic music."[202]

The benefits of a written score for LEM require no mention, but the intuitive decisions that result from performance alone can be likened to those of any genre. The insights that are sought after by performers, such as the ability to make informed decisions about how to manipulate interaction between performer and computer and accommodate "ensemble

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[200] General perspectives from Rob Knopper, as evaluated through the writings associated with his blog. Rob Knopper, *Audition Hacker* (blog), accessed May 25, 2017, http://www.robknopper.com/blog?tag=audition. Additional insights into the cumulative nature of orchestral auditions drawn from his interview with Jeremy Epp, where Epp is quoted as saying, "I'm someone who really believes that your success at auditions, your preparation for auditions is cumulative." Rob Knopper, "Interview with Jeremy Epp," *Audition Hacker* (blog), accessed May 25, 2017, http://www.robknopper.com/blog/2016/6/10/auditiontalk-episode-1-jeremy-epp.
[201] Edward Cone, "Inside the Picture: Problems of Performance," in *Musical Form and Musical Performances* (New York: W.W. Norton & Company Inc., 1968), 33-34.
[202] Cort Lippe, "Musings on the Status of Electronic Music Today," In Proceedings of the *International Computer Music Conference and Sound and Music Computing Conference* (2014): 39.

performance," can be discovered as easily through the investment of time within a piece as through the "study" of a notated score. This "discovery" requires a "pioneer" mindset about LEM and about the works they produce. This sentiment is not singular to Lippe, as Cone also alludes to the benefits of multiple performances of a work—*post-facto* analysis—when he writes, "every valid interpretation thus represents, not an approximation of some ideal, but a choice: which of the relationships implicit in this piece are to be emphasized, to be made explicit?"[203] Thus, it is seemingly apparent that as performers, the literature of LEM, and "modern music" as a whole, is treated as "one-and-done," a sentiment not shared by the classical or baroque masters whose partitas and sonatas are considered a life-long journey. Perhaps this is the "surprise" that Lippe refers to when he writes, "[i]t may come as a surprise to some that presently it is still possible for performers, musicologists, and composers to complete their secondary education through the Ph.D. without ever coming into contact with electronic music."[204] This statement is, in effect, a call for increased performer education on LEM—a necessity, if performers are to fulfill their role as analysts within this music. Bruno Bossis's call to the field of Musicology for an increase in knowledge about the composers and their techniques for writing LEM raises the questions: Why is this insight is directed singularly towards musicologists?[205] What are our expectations for performance?

As previously discussed, there are major linguistic obstacles to the acceptance of the analytical insights of the performer as viable. It is not until the performer adopts the "illocutionary force" of the "musicologist"—through integrating their terminology—that their

[203] Edward Cone, "Inside the Picture: Problems of Performance," 33-34.
[204] Cort Lippe, "Musings on the Status of Electronic Music Today," 40.
[205] Bruno Bossis, "The Analysis of Electroacoustic Music: From Sources to Invariants," *Organised Sound* 11, no. 02 (2006): 101.

insights are considered viable by the scholarly community at-large.[206] Within this field, the epistemological research has been seemingly dominated by musicologists, with performer insights dismissed out of hand as "prescriptive."[207] However, in taking a historiographical perspective to analysis, it appears that the modern analytical techniques that are inseparable from the structurally based, theoretical analysis of musicology are driven by performance and an attempt to develop and legitimize interpretation. Aside from the hubris presented in his writings and insinuation of superiority over the performer, even Riemann, a "father" of modern theoretical discourse, came to his thoughts through an intrinsic need to affect performance. He describes "the utter undiscernibleness in the original marking of the relations and considerations [of the] the older composers" and questions "to what degree they consequently counted on the musical feeling of the performer."[208] While Riemann, later in the same text, insults the insights of the performer as composed of "disturbing and confusing impressions," even he cannot explain away the merits of performer insight. The fact that Berry, Rink, Cone, Schmalfeldt, and Leong all publicly label themselves as both performers and musicologists within their manuscripts alludes to the merits of performer insights on performance studies.[209] If not, acknowledging this authority would be superfluous to their point.

The performer must now take ownership of the scholarly study of music, with which they are concerned and interested, and contribute to the epistemological research through keeping

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[206] John Rink, "Analysis and (or?) performance," In *Musical Performance: A Guide to Understanding,* (Cambridge: Cambridge University Press, 2002):36.
[207] Nicholas Cook, "Performer's Analysis," in *Beyond the Score: Music as Performance* (Cambridge: Oxford University Press, 2014), 48.
[208] Hugo Riemann and Carl Dorius Johann Fuchs, *Practical Guide to the Art of Phrasing: An Exposition of the Views Determining the Position of the Phrasing-marks by Means of a Complete Thematic, Harmonic and Rhythmic Analysis of Classic and Romantic Compositions* (New York: G. Schirmer, 1890), 136-137.
[209] As observed in their previously cited books and articles.

written records of their insights. As Rink writes, "Performers are continually engaged in a process of 'analysis,' only of a kind different from that employed in published analyses…[with] performers often [understanding] music along the same lines as those carrying out 'rigorous analysis,' but in different terms—a parallelism that we ignore at our peril."[210] Therefore, as performers, it is essential to provide written records of our insights, as they have "true" meaning and are unique to that act of performance, much like the more "rigorous analysis"—perhaps better noted as "differently rigorous analysis"—previously referred to by Rink.

This inquiry is not advocating for the omission of musicological insights on music, but rather is calling for increased contribution and consideration of performer insights in the field of musicology. With this outlook, the appeal made by Bossis when he writes that it is essential for musicologists to "pursue and intensify their investigative, analytic, biographical and historical work"—in regards to a need for further documentation of LEM—is incomplete.[211] It is essential that an appeal is additionally made to document the experience and insights of performers, including their unique interpretive voice within the analytical discussion. This, in turn, charges performers to inspire and demand analysis of these works through the treatment of the "masterworks" in LEM as deserving of mastery. If performers are empowered by knowing that their observations through "informed intuition" or "performer's analysis" can provide meaningful readings of these works from an analytical perspective, then they will be more likely to involve themselves in the dialogue about LEM and seek to understand the pieces and its software on a deeper level. As a result, the performer will have joined the feedback loop with the

[210] Rink, "Analysis and (or?) performance," 36-37.

musicologies—theory, musicology, and ethnomusicology—and further enriched the analytical conversation regarding LEM.

REFERENCES

Adams Jr., Timothy K.. “Cymbals and Bass Drum” (*Percussion Masterclass*, University of Georgia, November 2016)

Austin, J.L. , J.O. Urmson and Marina Sbisa, *How To Do Things With Words.* Cambridge, Mass: Harvard University Press, 1975.

Ballora, Mark. "Expanding Frames of Reference: Teaching the History of Electro-Acoustic Music." In *College Music Symposium*, vol. 46 (2006):1-16.

Bossis, Bruno. "The Analysis of Electroacoustic Music: From Sources to Invariants." *Organised Sound* 11, no. 02 (2006):101-112.

Bradshaw, Susan. Review of *Performing Music: Shared Concerns*. by Jonathan Dunsby. *The Musical Times* 136, no 1832 (Oct. 1995):546-547.

Bullock, Jamie, Lamberto Coccioli, James Dooley, and Tychonas Michailidis. "Live Electronics in Practice: Approaches to Training Professional Performers." *Organised Sound* 18, no. 02 (2013): 170-177. doi:10.1017/S1355771813000083

Butler, Judith. *Gender Trouble: Feminism and The Subversion of Identity.* New York: Routledge, 1990.

Camilleri, Leilio and Denis Smalley. "The Analysis of Electroacoustic Music: Introduction." *Journal of New Music Research* 27, no. 1-2 (1998): 3-12. doi:10.1080/09298219808570737

Clarke, Eric. Review of *Musical Structure and Performance.* by Wallace Berry. *Music and Letters* 72, no.1 (Feb. 1991):86-88.

Cone, Edward T. *Musical Form and Musical Performance*. New York: W.W. Norton & Company Inc. 1968.

Cone, Edward. “Inside the Picture: Problems of Performance,” In *Musical Form and Musical Performances*. New York: W.W. Norton& Company Inc., 1968.

Cook, Nicholas, "Between Process and Product: Music and/as Performance," *Music Theory Online* 7, no. 2 (2001): 1-31.

Cook, Nicholas. "Analysing Performance and Performing Analysis," edited by Nicholas Cook and Mark Everist, 239-261. *Rethinking music*. Oxford University Press, 1999.

Cook, Nicholas. *Beyond the Score*. New York: Oxford University Press, 2013.

Dack, John. "Strategies in the Analysis of Karlheinz Stockhausen's Kontakte für Elektronische Klänge, Klävier und Schlagzeug." *Journal of New Music Research* 27, no. 1-2 (1998): 84-119.

Daniel Barolsky and Edward Klorman,"Performance and Analysis Today: New Horizons", *Music Theory Online* 22, no. 2 (2016). http://mtosmt.org/issues/mto.16.22.2/mto.16.22.2.barolsky_klorman.html

Dembski, Stephen and Joseph Straus, eds. *Milton Babbitt: Words About Music*, *The Madison Lectures*. Madison: The University of Wisconsin Press, 1987.

Doğantan-Dack, Mine. "Recording the Performer's Voice." in *Recorded Music: Philosophical and Critical Reflections,* ed. Mine Doğantan-Dack, 292-313. London: Middlesex University Press, 2008.

Dunsby, Jonathan. "Guest Editorial: Performance and Analysis of Music." *Music Analysis* 8, no.1-2 (1989): 5-20. http://www.jstor.org/stable/854325

Dunsby, Jonathan. *Performing Music: Shared Concerns*. Oxford: Clarendon Press, 1995.

Emmerson, Simon, and Landy, Leigh, eds. *Expanding the Horizon of Electroacoustic Music Analysis*. Cambridge: Cambridge University Press, 2016. ProQuest ebrary. (accessed May 4, 2017).

Epstein, David "Shaping Time: Music, the Brain, and Performance," a Response to William Rothstein," *Journal of Music Theory* 43, no. 1 (1999): 165-90. http://www.jstor.org/stable/3090693. (accessed May 17, 2017)

Fisher, George and Judy Lochhead, "Analysis, Hearing, and Performance." *Indiana Theory Review* 14, no.1 (1993):1-36.

Goodman, Elaine. " Ensemble Performance," In *Musical Performance: A Guide to Understanding,* ed John Rink,153-167. Cambridge: Cambridge University Press, 2002.

Gritten, Anthony. "Alibis, and Why Performers Don't Have Them." *Musicae Scientiae* 9, no. 1 (2005): 137-156.

Hansen,Von. "An Introduction to Interactive Music for Percussion and Computers" DMA diss., University of Kansas, 2014.

Hirst, David. "Analysis of Denis Smalley's Wind Chimes: A Summary," from David Hirst, "The development of a Cognitive Framework for the Analysis of Acousmatic Music" PhD. Thesis, Faculty of Music, University of Melbourne, Australia. http://orema.dmu.ac.uk/sites/default/files/Hirst_Wind_Chimes_Anal.pdf (accessed May 17, 2017)

Howell, Anthony. The Analysis of Performance Art: A Guide to its Theory and Practice. vol.32. London: Routledge, 2013.

Howell, Tim. "Analysis and Performance: The Search for a Middleground." *Companion to Contemporary Musical Thought* (1992), 2:693.

Hugill, Andrew. "On Style in Electroacoustic Music." *Organised Sound* 21, no. 01 (2016):5,11.

Jordá, Sergi. "Interactivity and Live Computer Music," eds Nick Collins and Julio d'Escriván, 89-125. *The Cambridge Companion to Electronic Music*. Cambridge University Press, 2007.

Knopper, Rob. "Interview with Jeremy Epp." Audition Hacker Blog. Accessed May 25, 2017. http://www.robknopper.com/blog/2016/6/10/auditiontalk-episode-1-jeremy-epp

Knopper, Rob. "Audition Hacker Blog." Accessed May 25, 2017. http://www.robknopper.com/blog?tag=audition.

Krebs, Harald. "Hypermeter and Hypermetric Irregularity in the Songs of Josephine Lang." in *Engaging Music: Essays in Music Analysis*, ed. Deborah J. Stein, 13-29. New York: Oxford University Press, 2005.

Larson, Steve and Cynthia Folio. Review of *Musical Structure and Performance*. by Wallace Berry. *Journal of Music Theory* 35, no.1-2 (Spring-Autumn 1991): 298-309.

Latham, Edward D. "Analysis and Performance Studies: A Summary of Current Research." *Jahrbuch vom Zeitschrift der Gesellschaft für Musiktheorie* 2-2, no.3 (2005): 157–62.

Leong, Daphne "Analysis and Performance, or Wissen, Können, Kennen", *Music Theory Online* 22, no. 2 (2016), http://mtosmt.org/issues/mto.16.22.2/mto.16.22.2.leong.html (accessed March 18, 2017).

Leong, Daphne and Elizabeth McNutt, "Virtuosity in Babbitt's Lonely Flute." *Music Theory Online* 11, no. 1 (2005).

Leong, Daphne, and David Korevaar, "Repetition as Musical Motion in Ravel's Piano Writing." In *Unmasking Ravel: New Perspectives on the Music,* ed. Peter Kamninsky, 111-142. Rochester, NY: University of Rochester Press, 2011.

Lester, Joel. Review of "Musical Structure and Performance." by Wallace Berry, *Music Theory Spectrum* 14, no.1 (Spring 1992): 75-81.

Lippe, Cort "A Look At Performer/Machine Interaction Using Real-Time Systems." In *Proceedings of the International Computer Music Conference*, INTERNATIONAL COMPUTER MUSIC ACCOCIATION, 1996),116-117.

Lippe, Cort. "Biography." Faculty Website. University of Buffalo. http://www.music.buffalo.edu/faculty/lippe/compositions#nav (accessed May 30, 2017).

Lippe, Cort. "Duo for Cajon and Computer." Score. 2011. Cort Lippe, composer. Accessed February 24, 2017. http://www.acsu.buffalo.edu/~lippe/music4/Cajon/

Lippe, Cort. "Music for Hi-Hat and Computer." Score. 1998. Cort Lippe, composer. Accessed February 24, 2017. http://www.acsu.buffalo.edu/~lippe/music4/hihat/

Lippe, Cort. *Music for Hi-Hat and Computer*. Performed by J.L. Cosgrove. Music from Berlin International Computer Music Conference, Berlin. *CD.* 2000.

Lippe, Cort. "Music for Snare Drum and Computer." Score. 2005. Cort Lippe, composer. Accessed February 24, 2017. http://www.acsu.buffalo.edu/~lippe/music4/snare/

Lippe, Cort. *Music for Snare Drum and Computer*. Performerd by Pedro Carneiro. Music from SEAMUS, Volume 20, EAM 2011. *CD.* 2011.

Lippe, Cort. "Musings on the Status of Electronic Music Today." In Proceedings of the *International Computer Music Conference and Sound and Music Computing Conference* (2014): 37-40.

Lippe, Cort. "Real-Time Interaction Among Composers, Performers, and Computer Systems." *Information Processing Society of Japan SIG Notes 2002*, no. 123, (2002): 1-6.

Lowe, Bethany. "On the Relationship Between Analysis and Performance: The Mediatory Role of the Interpretation," *Indiana Theory Review* 24 (2003): 47-94.

Maus, Fred Everett. "Response to Lawrence Rosenwald." *The Journal of Musicology* 11, no. 1 (1993): 66-72.

McClelland, Ryan. "Performance and Analysis Studies: An Overview and Bibliography." *Indiana Theory Review* 24 (2003): 97.

McNutt, Elizabeth. "Performing Electroacoustic Music: A Wider View of Interactivity," *Organised Sound* 8, no.3 (Dec. 2003):297.

Meyer, Bradley. “Six Japanese Gardens and Trois Rivières: Delta: An Analysis Of Kaija Saariaho’s Two Major Works For Solo Percussion And Electronics.” DMA diss., University of Kentucky, 2011.

Riemann, Hugo and Carl Dorius Johann Fuchs. *Practical Guide to the Art of Phrasing: An Exposition of the Views Determining the Position of the Phrasing-marks by Means of a Complete Thematic, Harmonic and Rhythmic Analysis of Classic and Romantic Compositions*. New York: G. Schirmer, 1890.

Rink, John. “Analysis and (or? Performance,” In *Musical Performance: A Guide to Understanding.* edited by John Rink 36-42. Cambridge: Cambridge University Press, 2002.

Rink, John. Review of *Musical Structure and Performance*. by Wallace Berry. *Music Analysis* 9, no.3 (October 1990): 319-339.

Rocha, Fernando de Oliveira. “Works for Percussion and Computer-Based Live Electronics: Aspects of Performance With Technology.” DMA diss., McGill University, 2008.

Rosenwald, Lawrence. "Theory, Text-setting, and Performance." *The Journal of Musicology* 11, no. 1 (1993): 53-54,62.

Rothstein, William. “Analysis and the Act of Performance.” In *The Practice of Performance: Studies in Musical Interpretation,* edited by John Rink, 217-240. Cambridge: Cambridge Univesity Press, 1995.

Rumelhart, David. "Some Problems with the Notion of Literal Meanings," In *Metaphor and Thought*, edited by Andrew Ortony, 71-82. Cambridge: Cambridge University Press, 1979.

Schekner, Richard. *Performance Theory*. London: Routledge, 2003.

Schmalfeldt, Janet. *.In the Process of Becoming: Analytic and Philosophical Perspectives on Form in Early Nineteenth-Century Music*. Oxford University Press on Demand, 2011.

Schmalfeldt, Janet. "On the Relation of Analysis to Performance: Beethoven’s" Bagatelles" Op.] 126, Nos. 2 and 5," *Journal of Music Theory* 29, no. 1 (1985): 1-31.

Siwe, Thomas. “Siwe Guide to Solo and Ensemble Literature.” Percussive Arts Society. http://www.pas.org/resources/research/ResearchCompos.aspx (accessed May 30, 2017).

Sloboda, John. *The Musical Mind: The Cognitive Psychology of Music.* Oxford: Clarendon Press, 1985.

Smalley, Denis "Spectromorphology: Explaining Sound-Shapes," *Organised Sound* 2, no. 2 (1997):96.

Smalley, Denis. "Spectro-morphology and Structuring Processes." In *The Language of Electroacoustic Music* edited by Simon Emmerson, 61-93. London: Palgrave Macmillan UK, 1986.

Smalley, Denis. "Spectromorphology in 2010." *Polychrome Portraits* 15 (2010): 89-101.

Solomon, Samuel Z.. *How to Write for Percussion: A Comprehensive Guide to Percussion Composition*, 2nd ed. New York, New York: Oxford University Press, 2016.

Stroppa, Marco. “The Analysis of Electronic Music,” *Contemporary Music Review* 1 no.1 (1984): 175-180.

Taruskin, Richard. *Text and Act: Essays on Music and Performance*. New York: Oxford University Press, 1995.

Thoresen, Lasse and Andreas Hedman. "Spectromorphological Analysis of Sound Objects: An Adaptation of Pierre Schaeffer’s Typomorphology." *Organised Sound* 12, no. 2 (2007): 129-141.

“Typo-Morphology.” In *Analytical Toolbox.* Online Repository for Electroacoustic Music Analysis, http://orema.dmu.ac.uk/analytical_toolbox/typo-morphology (accessed May 18, 2017).