

# MOVING TOWARDS SYNTHESIS: THE INCORPORATION OF TECHNOLOGY IN MUSIC THROUGH A CASE STUDY OF THE FLUTE

Gerardo Lopez

University of Redlands  
Redlands, CA, USA

gerardo\_lopez@redlands.edu

## ABSTRACT

The following paper explores the integration of technology in music, specifically through the scope of flute composition and performance. By surveying pieces from the flute repertoire, the existence of three emergent stylistic categories that have distinct techniques and aesthetics will become apparent. The idea of a fourth category will also be discussed, but this particular category remains speculative as it has not emerged empirically, except for a few precursory examples. The importance of understanding this classification and categorization rests with being able to examine the evolving nature of the human-technology relationship within an artistic space, specifically, live performance.

## 1. INTRODUCTION

This story begins with a car ride on the infamous 10 Freeway in Southern California. After an afternoon in Los Angeles, a few friends and I found ourselves discussing technology and music, having spent most of the afternoon visiting the Griffith Observatory. During the course of the conversation, I jokingly brought up the question: “So when do you think we will be replaced?” This was in response to the idea that the current rate of automation and advancement in AI indicates total integration within certain sections of our society and complete takeover in others will happen in our lifetime [1]. My question toyed with the possibility that the advancing technology would replace performers, once it becomes sophisticated enough. I received scoffs as an answer and then: “That’s not going to happen. What are people going to do? They wouldn’t let it happen, they would actively resist it.” Shortening the discourse that ensued after that statement, we came to two conclusive

*Copyright: © 2018 Gerardo Lopez. This is an open-access article distributed under the terms of the [Creative Commons Attribution License 3.0 Unported](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.*

predictions: technology would either dominate major aspects of music performance or, there would be a synthesis between human and machine.

## 2. CLARIFICATION OF TERMINOLOGY

A recurring issue in the intersection between music and technology is terminology. Before continuing, it would be best to define the parameters for some of the following terms.

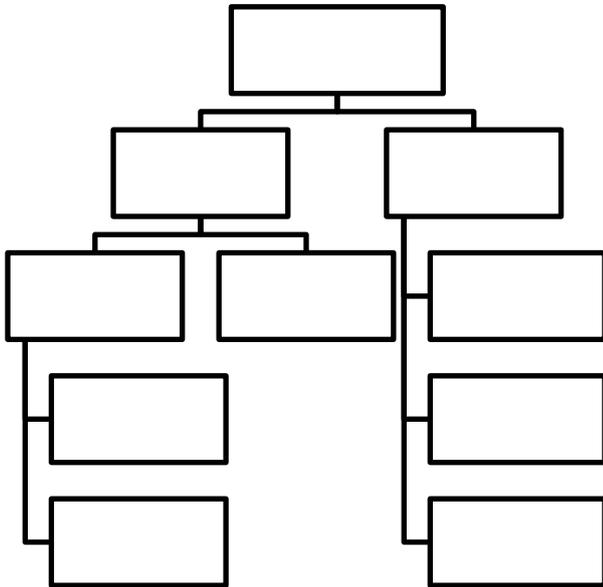
### 2.1. Electro-Acoustic Music

The term *electro-acoustic music* is defined as “[m]usic in which electronic technology, now primarily computer-based, is used to access, generate, explore and configure sound materials, and in which loudspeakers are the prime medium of transmission [2].” An elaboration on “electronic technology” would be useful to ensure readers understand that this term encompasses a diverse array of hardware and software, such as distortion pedals and MAX/MSP patches, not just computers as might be suggested. Also, the term “amplification system” may be better suited than “loudspeakers,” because one may be incorrectly led towards imagining monitor speakers on a stage as the only manner for electronic amplification. This blocks the inclusion of other systems, such as portable mini-speakers and those that have not been created yet. The importance of this clarification also rests with understanding a critical split in sound production: *acoustic music* is created and transmitted by “naturally resonating bodies,” as compared to *electro-acoustic music*, which has components of its composition that use electronic technology for its production and transmission [3]. With this definition, the realization can be made that there are aspects of our current musical society classifiable under *electro-acoustic music*, even though it may not have been formally thought of as such before [3].

### 2.2. Subgenres

The discussion within this paper mainly focuses on works of *live electronic music*, which involves the use of electronic technology within a live performance space [2]. Best thought of as a collaboration between itself and oth-

er agents, this technological incorporation can include the voice and acoustical instruments, electronic instruments, and other devices and controls in a variety of ensemble combinations [2]. This is in contrast to *acousmatic music*, which has been created in a studio and exists in recorded tape form [2]. Under these two categories exist more defined categories, as illustrated in the figure below.



**Figure 1.** This is borrowed from Schrader (see [3]), with the edit of “acousmatic” instead of “tape.” He mentions it as by no means a complete categorization of the field but uses it a framing tool and the reason for including it here is the same.

### 3. RELATIONSHIPS

At the core of technological integration is the evolving relationship between the human and machine. Traditionally, listeners have been able to associate the production of sound to the performer(s) on stage as a direct result of an action enacted through their respective instruments. With the introduction of certain technologies, such as “tape,” this is no longer the case. The split is captured well by the “local/field” distinction [4]. These terms are defined as two spaces created in a live performance; the “local” level deals with the performer’s actions and the resulting sounds, whereas the “field” level encompasses the whole of the environment in which the “local” is a part of [4]. Expanding on the “tape” example, in a performance the “local” would be the instrumentalist playing their instrument as per the composed score and the “field” would include the elements presented in the electronic track. The electronic track exists in the “field” as another “agent,” but is not another “local” since it is neither human and it breaks the “action-sound” relationship of the human performer’s actions [4]. The manner in which a composer, and in some cases the performer, goes about managing these relationships is what ends up creating the work’s unique aesthetics and definable elements.

This negotiation between human and technological elements can be understood through levels of interac-

tion. The definition of interaction within the context of this discussion can be understood as the crossing of elements between the “local/field” split. Termed another way, the manner in which either the performer encounters the electronics or how the technology adapts to the performer. With the inclusion of technology, the perception of these relationships can be manipulated through the use of “real” and “imaginary” causal interactions [4]. On a “local” level, such examples can include the transmutation of the acoustical sound of an instrument into a completely different one through the use of effect pedals or software, or the triggering of specific electronic track events with the aid of motion sensors. This can also occur in the “field,” such as with the creation of artificial “call-and-responses” in which the instrumentalist or electronic track “responds” to the other in a seemingly quasi-improvised manner.

#### 3.1. Static

Drawing upon the “tape” example again, within this relationship, both the human and technological components are static in their interaction. The performer mainly functions in the “local” and the electronic track mainly in the “field.” This is a common critique of some compositions that involve tape and live acoustic instruments, the tape serves merely as an accompaniment or that the instrumental component is subservient to the electronic track [4]. However, this would miss the idea of a composer playing with perceptual relationships. Though a perceivable “real” interaction may be created through creative scoring, it remains “imaginary” since no actual relationship exists, since neither of the components cross the “local/field” spaces.

#### 3.2 Active

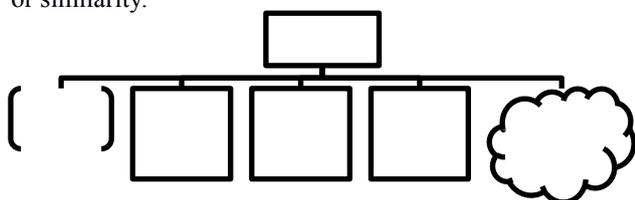
A more active relationship would require that one of the elements make a “real” relationship between the “local/field.” For example, a work that uses pressure or movement sensors to trigger certain events has a “real” relationship between the motions occurring in the “local” and what ends up manifested in the “field.” This is different in the case of a work that uses effects pedals to distort the sound of an instrument; in this scenario, the “field” has been reduced into “local,” since the actions are not used to trigger, but have become enhanced in order to shift the focus solely onto itself.

#### 3.3 Interactive

In short, it can be understood as a return to the traditional relationship that exists between musicians in a chamber group; the creation of another “local” within the “field,” or the inclusion of another “agent” in the “local.” This new “local/agent” however, is no longer a human, but an autonomous or highly-interactive system. Within the context of these relationships, this new element is easily absorbed into the paradigm as another “local/agent,” and the question of how to understand or deal with this relationship is answered: constructive and collaborative.

#### 4. CATEGORIES AND SUPPORTING REPERTORIE

While the examples of supporting repertoire will be pulled from the flute literature, the terms and relationships are by no means solely applicable to the instrument; a future exploration of the universality of these categories into other domains may provide interest points of contrast or similarity.



**Figure 2.** These are the proposed emergent categories within the flute literature.

The bracketed *Music for Live Electronics* will not be developed because many of the other categories already use live electronics (pedals, software, etc.). However, it is not being discarded from the diagram since it captures the idea of “electric flutes.”<sup>1</sup> Still, the integration of technology concerns the traditional acoustical flute, and the “electric flute” would extend beyond the scope of this paper, though this would be an interesting area for future research. Also, an argument can be made for the existence of subgenres underneath these proposed categories. Again, for the purposes of this paper, that discussion would be more detailed than necessary since we are mainly looking at broader style characteristics.

##### 4.1. Fixed Media and Flute

This category has the longest history among the other categories, appearing as one of the first methods for incorporating electronic technology into a performance setting. One of the earliest pieces that featured both live acoustical flute and electronic technology, in this case a tape recording, was *Musica su Due Dimensioni (Music in Two Dimensions)* by Bruno Maderna in 1952, written for flute, percussion, and electronic sounds on tape [5]. A quick note on the term “tape,” which has traditionally been used in describing a fixed element that accompanies a live performance. Within this discussion the term “fixed media” is offered as an update since the technological advancements have far surpassed the original parameters of “tape.” The update takes into consideration other forms of recorded mediums, such as CDs and digital files.

##### 4.1.1. Pray (2010)

“Pray” by Allison Loggins-Hull was written for solo acoustic flute and an electronic track, with its conception coming “from a need of serious reflection and patience [6].” As a consequence, many of the sounds on the electronic track signify religious elements, such as with the

inclusion of “organs, whispers, flute harmonics and chants... the sounds of various places of worship [6].” Using some of the language suggested by the “local/field” discussion, the relationship between the performer and the electronic track in “Pray” is supportive and re-sponsorial [4]. For example, the fragments of melody are created within the context of call-and-response. In the track, there are snippets of chant calls used that the flute melodic material frequently seems to respond to. If not specifically chants, there are acoustical “events” that take occur, such as an electronic swell, that puts the flute part into context. The rhythmic profiles of each section are also solidified: in the freer sections, there are layers of disjointed rhythms and the pulse is occasionally lost, as compared to other sections that have a constant pulse and stable rhythms.

The performer-technology relationship is also static. The creation of the responsorial environment suggested above is an “imaginary” relation, one that the composer has used in order to create an interesting and engaging “field.” This would not be possible without the use of timestamps, which help guide the performer through the notated score and ensure synchronization with the electronic track. The ultimate success of performing the work rests with being able to unite both components. In this respect, it can be observed that neither the “local” nor the “field” cross or interact, rather they function separately in creating the whole of the work.

This also speaks to changes in practice/rehearsal pedagogy. Since the performer would need a solid “feel” of how the electronic track fits with the notated score to have a successful performance, it can be assumed that they have practiced the whole of the work multiple times. While in a traditional setting this may be dismissed, since both performers can adapt in the moment, within this context that is harder to do since one component is nonresponsive.

The use of electronics also achieves something that would have been harder to put together acoustically; the creation of a “digital” ensemble. For example, something as simple as the inclusion of chants, traditionally, would have involved not just an actual performer on stage but would require someone with the specific skill set to sing the chant material in style. Also, rather than having this envisioned performer, or others who would be needed to replicate the track such as a bass player or synthesizer, these people and their equipment would take up room on the stage. The use of an electronic track allows for mobility since it only now requires a flutist and the electronics. This allows for greater flexibility in terms of the performance venue, which is apparent in the reference video [7].

##### 4.2. Enhanced Flute

The emergence of this category comes more from the influence of the popular music sphere rather than the classical.<sup>2</sup> The term of *enhanced flute* includes technology that works specifically with altering/modifying the

<sup>1</sup> An example of this can be seen in the work of Bryan Jacobs at <http://bryanjacobsmusic.com/mechanicalflute.html>

<sup>2</sup> Specifically referencing the rise of the electric guitar and the use of microphones in jazz.

sound produced by the flute, such as microphones for amplification, distortion and looping pedals, and software. While there exist a variety of pieces that use microphones to amplify the flute, there are fewer that use pedals or software.<sup>3</sup>

#### 4.2.1 *Eruption* (2012/2014/2016)

“Eruption” by composer/performer Melissa Keeling is a transcription of rock guitarist Eddie van Halen’s solo [8]. Aside from the electronic components, which will be mentioned shortly, the piece includes the use of improvisation, “multiphonics, singing and playing, harmonics, residual tones, tremolos, and circular breathing [9].” In short, this piece should be “performed with a sense of power, ease, and virtuosity [9].” Also, just a small aside on the use of the “glissando headjoint,” which is a relatively new acoustical hardware introduced to the flute by Robert Dick, which allows for noticeable bending of the pitch as if it were a guitar “whammy [10].”

This work can be performed without electronics, just solo flute with a glissando headjoint. However, the element that makes this work really stand out is the use of the pedals. Right from the beginning and throughout the work, the distortion pedal is set and the flute sound projected from the speakers is no longer the traditional flute but has taken on the sound of a distorted electric guitar. The other elements mentioned above in conjunction with the other pedal effects combine to accomplish the composer’s goal, an almost exact replication of the original rock guitar solo on a foreign instrument.

While it may seem that the use of distortion pedals is something novel that has appeared within the last decade, there is a history from which this emerges: some of the earliest *enhanced flute* works used software for distorting or manipulating the sound, such as Kaija Saariaho’s *Laconisme de L’aile* (1982) and Judith Shatin’s *Kairos* (1991) [11,12]. However, the direct use of distortion pedals in a formalized setting such as this is relatively new.

Also, a noticeable difference from this category to the previous one is in regard to the involvement of the performer with the technology, since there are now more parts. With this work, for example, a BOSS VE-20 Vocal Effects Processor is used for a “flanger effect,” a BOSS DD-7 Digital Delay pedal for delay, and BOSS DS-1 for distortion [8]. While there are more components involved than an electronic track, the piece is still quite accessible when a performer has the will to practice with the accompanying electronics. This in contrast to similar works previously mentioned which produce some of the same results but through software, involving complicated lines of code that the average performer may not be familiar with.

In this framework, the relationship becomes more active. The idea of the “field” being reduced into the “local” is created when they seem to become one-in-the-same. There are no other “agents” to consider, the

singular “local” has been enhanced to extend beyond the normal parameters, in this case distorting the sound to that of an electric guitar. Rather than having this work be a duet between a live electric guitar and solo flute, the composer has opted to bypass the physical and acoustical limitations through the use of technology. This example showcases one of the benefits of technological integration, the expansion of the sonic palate. Now, composers and performers are not just limited to the traditional acoustic properties achievable on the flute but can reach beyond to include an endless possibility.

### 4.3. Augmented Flute

As compared to the previous categories, this one is still quite new in its development. The term *augmented flute* encompasses technology that functions independently of the tone and involves adding a device(s) to the flute and/or flutist. This would be in contrast to the *enhanced flute*, which deals specifically with manipulating the tone; in this context, the sounds produced by the technology may be produced by other aspects of the performer, such as physical gestures and biometric information. This would include technology such as motion sensors that detect the position of the flute in space, pressure sensors that measure the force of the fingers on the keys and can even be extended to include physiological measurements through galvanic skin response sensors and EEG headsets. This technology then uses the raw information passes it through software that turns it into sonic material that can be used in a musical context.<sup>4</sup>

#### 4.3.1 *Le cercle des catharsis* (2010)

Work in this area is prevalent in the compositions of Cléo Palacio-Quintin. As flutist and composer, she has created and advanced what has become known as the *hyper-flute* [13]. What can be better described as a system, she retrofitted a standard flute with sensors in various locations each capturing unique information [13]. It is of note that developments in with this system have been rather new, and Cléo Palacio-Quintin has been a champion, the only one in actuality, composing works for this instrument. The composition being focused on here is “Le cercle des catharsis,” which is played on hyper-bass flute.<sup>5</sup>

One of the issues she dealt with was deciding where to place the sensors. Some of the sensors she attached to the flute included: an ultrasound sensor to measure the distance of the flute from the computer; pressure sensors to detect pressure levels in the left hand and thumbs; and mercury tilt switches to measure the tilt and rotation of the flute [14]. She mentions how limiting the space can be when considering the element of mobility and placement in a manner that does not adversely affect the performance [14]. This is a reason for her liking of the hyper-bass, which is a bigger instrument and provides more room for more sensors [14].

<sup>3</sup> For reference, there is an extensive catalogue compiled by Bassingthwaighe (see [5]).

<sup>4</sup> For more information on the process of sonification, reference T. Hermann, "Taxonomy and Definitions for Sonification and Auditory Display," *Proceedings of the 14th International Conference on Auditory Display (ICAD 2008)*, P. Susini and O. Warusfel, eds., Paris, France: IRCAM 2008.

<sup>5</sup> Similar to the hyper-flute system except on bass flute.

The continued discussion of electronics in this work becomes a bit more tangled than the previous ones. Mainly, the manner in which the sensors are used can be argued as an extension of the *enhanced* category, since in some instances it uses a triggering mechanism similar to a foot pedal. For example, in the figure below the down arrows indicate to the performer that they should lower their foot joint to allow the pre-recorded words notated above to play. However, the key distinction between this use of motion and the pedal is the intention; previously it seemed that having to press a foot pedal was extraneous motion to the music. In this instance, it has become a part of the music. This becomes more apparent with the use of lopsided “U” with “RevFX,” which indicates that the performer should tilt their embouchure in that direction which activates the reverb.

While I was not able to provide a solid example of a work that truly uses sensors in manner described under the *augmented* label, the composer does have works that fit within these parameters. This is particularly true of some of her improvisations, which are hardly notated [15]. In corresponding with her, she expressed the difficulty with not only notating the nuances of this system into notation (such as how one would go about notating pressure levels), but also the fact that she has composed in a manner that is not intended for general sale since she is the only *hyper-flute* player [16]. However, the existence of this system and the fact that work is currently being done within this domain allows for this discussion to have some evidence on which to make the categorical argument and classification.

Similar to the previous example, this category provides another active relationship. In this situation, there is a “real” relationship being created between the “local” and the “field.” The sensors are using the physical motions of the performer as the action by which the sounds are produced. While the sounds maybe exist as imaginary, since the flute is not capable of electronic sounds, the movements of the performer have been elevated into being part of the music rather than being a byproduct; it has been enlarged into the “field.”

#### 4.4. The Fourth Category

As had been stressed early in the paper, this area is the most speculative. A better title for this section might be “Directions in Music Technology,” but with the previous discussion, one might be able to see this as a very probably “next step.” Firstly, AEE stands for “autonomous electronic entities”, which includes AI and highly interactive systems. While advancements have been made in this area, it has not reached a stage where the technology is actively being used in the performance sphere. The software components of this system may in fact be ready, but the presentation of it takes the shape of previously presented mediums, such as computer interfaces or software. These are the interactive systems, which can be better thought of as pre-autonomous systems, which have already been used in some works, as presented below.

##### 4.4.1 *Out, Out* (2013)

Composed by JP Merz, this work serves not only as a representative for the fourth category but as well as a

synthesis for some of the tension surrounding human-machine relationships.

“Out, Out-” captures the idea that was previously mentioned with the categories not being mutually exclusive to each other. Here, a foot pedal is used to activate electronic tracks as well as to trigger effects (reverb). The interface was also created in a manner that allows relatively easy access to any performer interested in presenting this work, with the software packaged as a stand-alone MAX patch.

The distinction comes at the end of the work when the software accompanying the performer begins to “improvise.” This example is an example of what can be better described as pre-autonomous systems. They can take the shape of highly-improvisatory software or technology and give the illusion of “improvisation” despite adhering to strict coding parameters. While it may be reaching towards the interactive relationship described earlier, it is still really more within the active category. In this instance, the “improvisation” is taking place with the material being feed into the software by the performer, which is then manipulated and presented through the speakers. Here, the “local” is seen as directly affecting the “field,” though the resulting “field” may be substantially different every time (not just in terms of nuance: notes, dynamics, articulation, etc.). However, the use of an “imaginary” relationship here is not just a tool to create an illusion but inadvertently serves as the propping up of an ideal not yet here.

What is this ideal? It is being presented within this discussion as a system that is able to mimic the expressive qualities of a human performer. This whole branch of technological incorporation breaks from the constraints put upon musical interpretation by composers, best captured by the historical emergence and evolution of musical notation [17]. Beginning with the earliest notation and later constrained/refined in the early Romantic era and into the 20<sup>th</sup> Century, the score was developed with finer and finer instructions to be realized by a performer resulting in less and less creative input into the composition by the performer [17]. Technology is now being granted the ability to creatively realize a composition rather than being the ultimate performer or “Platonic dream,” which stems from the idea that technology allows composers to eliminate the human element of physical bodies and subsequent “flaws” from the music [18]. Now, technology is allowed to be as “flawed” as humans.

## 5. CONCLUSION

It is without note that the idea of having a fully functioning humanoid robot performing in a Brahms quintet alongside other humans is still ways away. However, dismissing the idea or refraining from discussing it may not be in our best interest.

This is particularly true within the educational/pedagogical spheres: technology is not leaving music but instead will continue to expand. Understanding this realization, it becomes pertinent that music curriculums should include classes or instruction familiarizing their students with these emerging technologies. As may have been noted in the discussion of the pieces above, they

require a set of skills that traditional education does not focus on, leaving many to figure things out on their own. While it has worked so far, this must be overcome in order to more performers accessibility, which in turn would allow for a reception of these works by a larger audience. It also has certain implication within the practice space: imagine having a robot next to a piano that you can program to play the piano part to a flute and piano sonata, while it may not replace a human in a live performance setting, it would have great applicability in terms of rehearsals. This is just one idea of many that can be drawn from envisioning the future role AEEs in the musical domain.

Taking one step into a really speculative area, this integration can be an example of how the future synthesis of technology into our society can continue. Music may be an area where humans one day might be surpassed by technology, a future where, for example, people would be more willing to purchase a robotic string quartet for their homes rather than paying to see human performers in a concert hall. While a hypothetical, it is important to understand that technology in music cannot be ignored; we must focus on fostering a collaborative relationship these technologies and create spaces for incorporating them into our existing paradigms.

#### Acknowledgments

Many thanks to Dr. Mark Dancigers for helping overseeing this small project and for his guidance with moving towards exploring the different relationship dynamics that exist as a core idea in human-technology integration.

## 6. REFERENCES

- 1.R. Zinn, "The Future Of AI And Automation In The Workforce," *Forbes*, May 5, 2017. [Online]. Available: <https://www.forbes.com/sites/forbestechcouncil/2017/05/05/the-future-of-ai-and-automation-in-the-workforce/#4dcf44004e36>. [Accessed Sept. 21, 2017].
- 2.S. Emmerson and D. Smalley, "Electro-acoustic music," *Grove Music Online*, Oxford Music Online, Oxford University Press.
- 3.B. Schrader, *Introduction to Electro-Acoustic Music*. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1982, pp. 1-3.
- 4.S. Emmerson, *Living Electronic Music*. Aldershot, UK: Ashgate Publishing, 2007, pp. 92-95.
- 5.S.L. Bassingthwaighte, "Electroacoustic music for flute," Doctoral dissertation, University of Washington School of Music, Seattle, 2002, Chapter II. [Online]. Available: <http://www.subliminal.org/flute/dissertation/TOC.html>.
- 6.A. Loggins-Hull, *Pray*, Brooklyn, NY: Flutronix Music, 2010. [Music Score].
- 7.flutronix, "Flutronix - Pray - Live at The Cell," *YouTube*, Nov. 20, 2010 [Video file]. Available: <https://www.youtube.com/watch?v=k6TW6F0zJIU>. [Accessed: Sept. 16, 2017].
- 8.sonyqTV, "'Eruption' (Van Halen/Keeling) - Melissa Keeling, electric flute," *YouTube*, Aug. 16, 2016 [Video file]. Available: <https://www.youtube.com/watch?v=WJrrZRNkVjs>. [Access: Sept. 16, 2017].
- 9.M. Keeling, *Eruption*, 2012/2014/2016. [Music Score].
- 10.R. Dick, "Glissando Headjoint from Robert Dick," Robert Dick. [Online]. Available: <http://robertdick.net/the-glissando-headjoint/>. [Accessed: Sept. 16, 2017].
- 11.K. Saariaho, *Laconisme de L'aile*, Paris, FR: Edition Wilhelm Hansen, 1982. [Music Score].
- 12.P. Spencer, "The musical shape of technology," *The Flutist Quarterly*, vol. 19, no. 3, pp. 47-51, Spring 1994. [Online]. Available: <http://judithshatin.com/kairos/>. [Accessed Sept. 23<sup>rd</sup>, 2017].
- 13.C. Palacio-Quintin and M. Zadel, "Interactive Composition and Improvisation on the Hyper-Flute," in *ICMC 2008, Belfast, North Ireland* [Online]. Available: <http://hdl.handle.net/2027/spo.bbp2372.2008.088>. [Accessed: Sept. 17, 2017].
- 14.C. Palacio-Quintin, "Eight Years of Practice on the Hyper-Flute: Technological and Musical Perspectives," in *NIME 2008, 4-8 June 2008, Genova, Italy*.
- 15.Département de musique de l'Université de Moncton, "Improvisation avec la Hyper-flûte – Cléo Palacio-Quintin," *YouTube*, October 10, 2014 [Video file]. Available: [https://www.youtube.com/watch?v=X1zJca\\_VaBw](https://www.youtube.com/watch?v=X1zJca_VaBw). [Accessed: Sept. 17, 2017].
- 16.C. Palacio-Quintin, [Email], Dec. 10<sup>th</sup>, 2017.
- 17.I. Pace, "Notation, time and the performer's relationship to the score in contemporary music," in *Unfolding Time*, D. Crispin, Ed. Leuven University Press, 2009, 151-192. Available: <http://openaccess.city.ac.uk/5418/>
- 18.S. McClary, "This is Not a Story My People Tell: Musical Time and Space According to Laurie Anderson," in *Feminine endings: Music, gender, and sexuality*. Minneapolis, MN: U of Minnesota Press, 1991, p.136.