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UNIVERSITY OF CALIFORNIA, SAN DIEGO

Dyslexia, Dysgraphia, and My Learning Process in Relation to Musical Notation

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Musical Arts

in

Contemporary Music Performance

by

Stephen James Solook

Committee in charge:

Steven Schick, Chair
Diana Deutsch
Greg Mitchell
Susan Narucki
Chinary Ung

2015

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University of California, San Diego

2015

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ABSTRACT OF THE DISSERTATION

Dyslexia, Dysgraphia, and My Learning Process in Relation to Musical Notation

by

Stephen James Solook

Doctor of Musical Arts in Contemporary Music Performance

University of California, San Diego, 2015

Steven Schick, Chair

This dissertation is an analysis of my relationship with dyslexia, dysgraphia, and musical notation. The period of this experiment was over seven months, and culminated in my final degree recital on May 31, 2014. The works selected ranged from standard to graphic notation. Throughout this process, I noted, analyzed, and critiqued my work method to learn how to expedite my

learning process. My experience with this project has encouraged me to explore learning techniques, which may be beneficial for any musician.

DYSLEXIA, DYSGRAPHIA, AND MY LEARNING PROCESS IN RELATION TO MUSICAL NOTATION

Introduction

During my first quarter at the University of California at San Diego, I learned two very different solo percussion works. Morton Feldman's *King of Denmark,* a graphic score requiring low technical ability that lasts six minutes (Figure 1), was the first work. The second was Charles Wuorinen's *Janissary Music*, which uses traditional notation, is very technically challenging, and is twelve minutes long. (Figure 2) Regardless of these differences, it still took me around the same amount of time to prepare each work. At that point, I realized that a score's notation could be an issue, and an aspect I would have to consider when selecting and/or preparing music. I knew I had a learning disability, but had not considered the correlation between learning music and that disability.

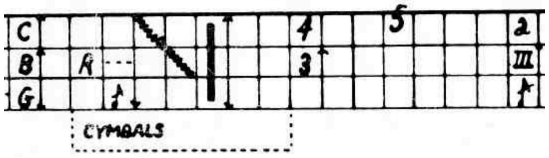

Figure 1: Excerpt from *King of Denmark*

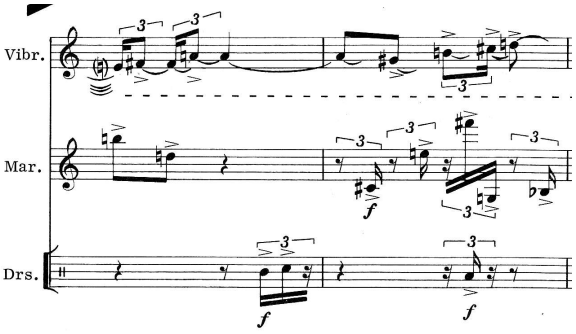

Figure 2: Excerpt from *Janissary Music*

In my fourth year at UCSD, I was diagnosed with dysgraphia and dyslexia, which affect the way I read and write music. Dysgraphia is the inability to write clearly.[1] In contemporary art music, non-standardized music notations are frequently used. A performer may need to re-notate a non-standard musical notation to help him or her understand how to play the music. When writing music or a language, the notation needs to be clear and precise. Because of my dyslexia, if I do not notate music clearly, there is high probability that I will not read it correctly. Dyslexia is a general term for disorders that involve difficulty in learning to read or interpret words, letters, and other symbols, but it does not affect general intelligence.[2] Dyslexia affects the way I read the notes and rhythms on a regular basis, and takes constant attention.

I sought to understand how my disabilities affect my learning process by focusing on them for my dissertation, and possibly determining ways to help others with these learning disabilities. I selected four works based on their notational differences, some compositional relationship to voice, and my interest in the work. The works ranged from standard to graphic notation. The period of this experiment was over seven months, and culminated in my final degree recital on May 31, 2014.

The works selected were Herbert Brun's *Plot*, Nicholas Deyoe's *Lullaby*, Vinko Globokar's *Toucher*, and Iannis Xenakis's *Psappha*. *Lullaby* uses

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[1] "Dysgraphia." Oxford Dictionary Online. 2014. Oxford Dictionary. 3 June 2014 www.oxforddictionaries.com/us

[2] "Dyslexia." Oxford Dictionary Online. 2014. Oxford Dictionary. 3 June 2014 www.oxforddictionaries.com/us

standardized notation (Figure 3). *Toucher* uses spatially notated rhythms and is performed on a set of percussion instruments that correspond to specific vocal sounds while speaking French (Figure 4). *Psappha* is notated on a grid, using dots along a horizontal line to signal when to play (Figure 5). *Plot* is a graphic score that uses no musical notation (Figure 6). A summary of these ideas is in Table 1.

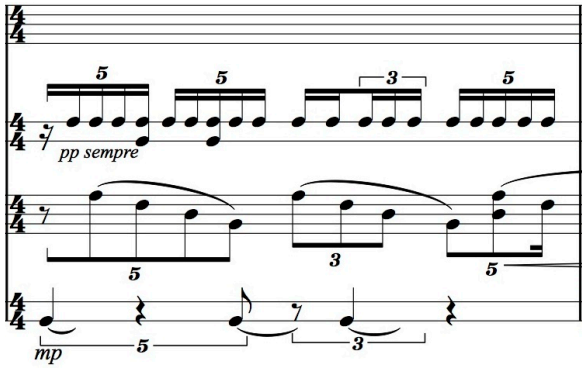


Figure 3: Excerpt from *Lullaby*

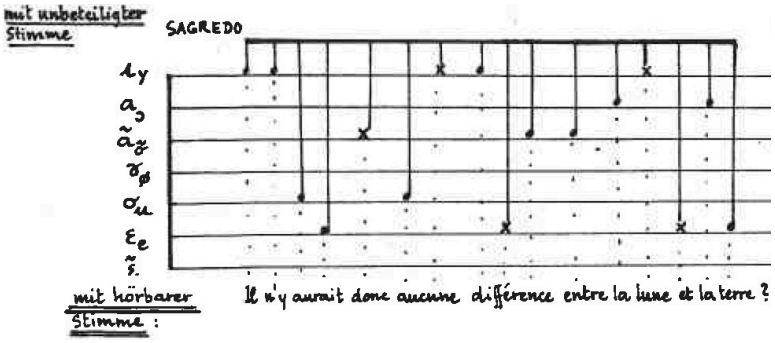


Figure 4: Excerpt from *Toucher*

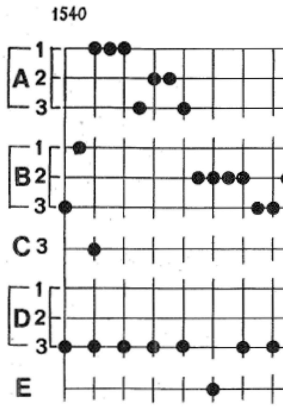


Figure 5: Excerpt from *Psappha*

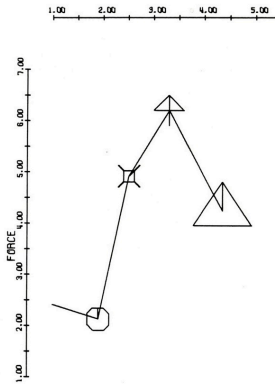


Figure 6: Excerpt from *Plot*

Table 1: A list of notations used in the selected works

Title	Notation	How the music is notated
Psappha	Graphic	Hand Written
Toucher	Spatial	Hand Written
Plot	Graphic	Type-set
Lullaby	Traditional	Type-set

Each piece relates to an aspect of vocal production. My goal with *Psappha* was to try to approach it as if I were speaking the music. The title *Psappha* relates to the name of the Greek poet, Sappho. Many of Sappho's surviving poems

only remain as fragments. Likewise, in *Psappha,* musical elements seem fragmented. I wanted to portray this fragmentation in the music by emphasizing the momentary characteristics of the music that remain and imagining how I would speak them. Even though passages seem to appear or disappear suddenly, I wanted to portray them as if they had been occurring the entire time.

Toucher is composed on a text about Galileo, a man who helped advance the development of the telescope. I wanted to approach this piece as if someone was shifting focus through the lens of a telescope, shifting between vocal and percussive sounds smoothly so the audience member does not know when one shift of volume changes and the balances reverse.

Plot highlights a process of morphing between instruments and achieving several timbres on a single instrument. I relate morphing from one sound to another and shifting between timbres to the vocal production of phonemes and their transition into letters and syllables.

For me, the word lullaby suggests a visualization of a parent singing to a child, trying to help them go to sleep. I view this type of interaction as the passing of time and peaceful interaction. In Nicholas Deyoe's *Lullaby* three different types of time are presented: still/silence, steady, and poly-time. Each of these "times" evokes a different emotion. I wanted to allow each to have its own identity, and approach these "times" as if they were being sung.

I set this process up to be able to analyze the information as objectively as possible. Because this was an experiment about reading ability, I decided to read all of the music on the program, rather than memorize the music. The questions that I was looking to answer were:

1) What were my predictions as to what would be the most difficult? Why?
2) Does the difference between a handwritten and a type-set score make a difference in learning a piece?
3) Were there specific types of musical structures that gave me more trouble or more ease? For the measures that gave me issues, what steps could I take to learn them?
4) Did the amount of preparation time effect my performance?
5) Were my predictions correct? What did I learn from this process?
6) How can others benefit from this information?

My prediction was that *Psappha* would be the most demanding. I determined this from my general knowledge of the piece, witnessing the reaction of peers learning it, and the length of the piece. In the past, I have had difficulty learning languages, so *Toucher* came in a close second place, because the performer must not only play percussion, but also speak in French. *Lullaby* would be the second easiest piece to learn. The notations are clear, but there are some demanding polyrhythmic measures. *Plot* would be the easiest to learn, because the graphic notation appeared simple.

To start this process I needed then to ask myself these initial questions:

1) What order would I start the pieces in? Should the most difficult piece be started first?
2) Would I work on pieces simultaneously?
3) How much time did I want to spend on each piece?

I decided that I would not try to learn all pieces simultaneously. Phase 1 for each piece was to learn the notes up to tempo. Phase 2 was to become more fluid with playing the piece as a whole, correcting small sections, and changing instrument and mallet selections. The plan was to have a good start on each piece, get to understand the nature of it, and then start the next piece. Phase 2 would continue directly after Phase 1, which would take place while learning the next piece on the list. I categorized re-notating music and learning the French for

Toucher as preparation, and these steps would take place while working on another piece. Technical and reading difficulty of the piece, required techniques in the piece, and the amount of preparation needed to begin were the aspects I considered to determine the order I selected and the amount of time given to each piece.

The plan was to learn one page a week per piece for *Psappha* and *Toucher*, and two pages a week for *Plot* and *Lullaby*. By following this plan, all music would be learned a month before the performance. Ideally, I would use this month to become more comfortable with all the pieces. If any piece needed more time, I would take the additional time necessary and adjust the timeline.

The order I selected (with timelines) is as follows:

1) *Psappha* (9 weeks) November 17 – January 10
2) *Toucher* (6 weeks) December 23 – January 31
3) *Plot* (10 weeks) February 1 – April 1
4) *Lullaby* (5 weeks) March 1 – April 1

I believed *Psappha* would be the hardest to learn, so I started with that. I knew learning the French would be difficult, and I viewed learning a language different from playing, so I started learning how to pronounce the text to *Toucher* a week after starting *Psappha*. This would give me a month of learning the text before having to try to coordinate the speaking with my hands. After *Toucher,* I would start *Plot*. I did not want an overlap with *Plot* and *Toucher*, because of the complications in both. I selected *Plot* to go next because of the amount of unknown variables (instruments selection, interpretation, re-notation) in the piece. Additionally, I felt that I should learn something less demanding after two

challenging pieces. *Lullaby* was left until last, because the notation is the most traditional, which made it seem like it could be easier to learn.

Issues of Instrumentation

Psappha allows the performer to select instruments within the given guidelines. It is scored for six groups of instruments, labeled A-F, which adds up to sixteen instruments. In instrument groups A, B, and C there are three instruments in each group; each group is either wood or skin. Groups D-F are seven instruments total and they are all metal. There is a legend in the score that provides a set of possible choices. Accents may be interpreted in the following ways: more intense, sudden change of tone, sudden weight change, sudden addition of another sound and play simultaneously with that of unstressed time, and simultaneous combinations of the preceding choices. Depending on the performers decision more instruments may be used. (Figure 7)

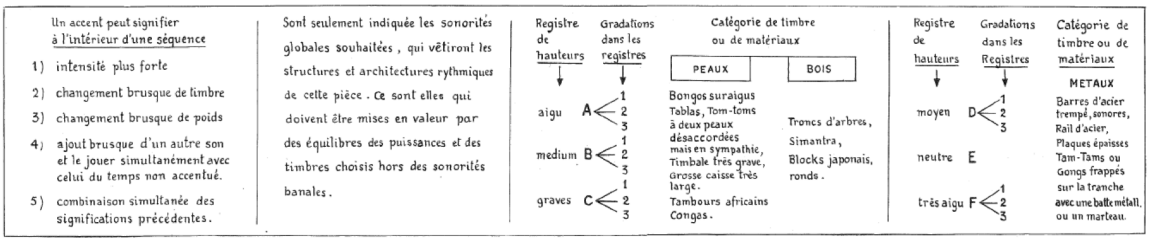


Figure 7: *Psappha* instrument legend

In *Toucher*, the performer selects the instruments within the guidelines. Scored for seven instruments played with the hands, each of the seven instruments is required to make two different sounds that correspond to two specific French

phonetic units (Figure 8). For a majority of the time, each instrument is played simultaneously with the corresponding phonetic unit.

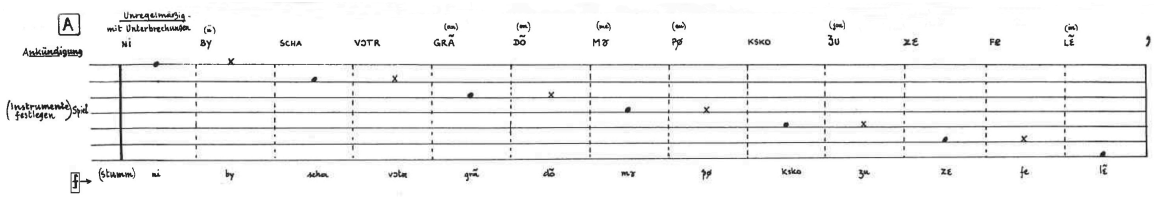


Figure 8: *Toucher* opening measures excerpt, which outlines all the vocal sounds with their corresponding percussive sound.

In *Plot*, the performer selects the instruments, with no guidelines. It is scored for thirteen different instruments or instrument groups. (Figure 9) The concept of the piece is that all percussion instruments have many timbres and have the ability to morph from one sound to another, thus each instrument is required to have multiple timbres. There are suggestions in the instructions how to achieve the different timbres, but the performer decides how to achieve each timbre. The performer also selects the techniques used to morph from one sound to the next, helped by some suggestions in the directions.

13 symbols denote 13 different instruments or instrument groups. The following table shows the symbols and the number of times they appear in the score.

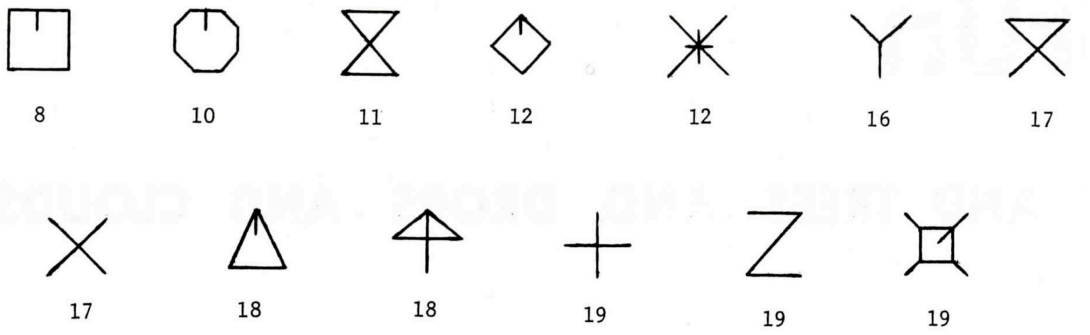
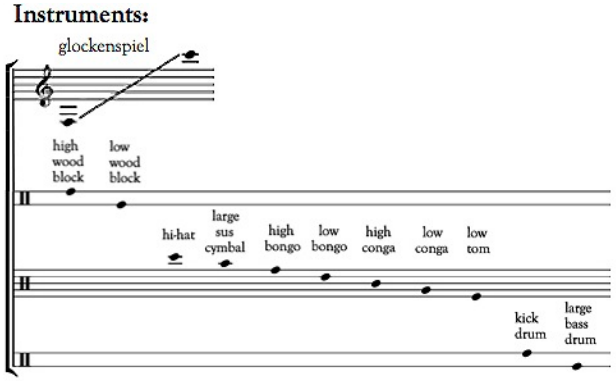


Figure 9: The thirteen symbols used in *Plot*'s score

In *Lullaby*, the composer indicates the selection of instruments. It is scored for twelve instruments and the specific types of mallets/beaters to be used. (Figures 10 A and B)



Mallets/Beaters:

4 medium vibraphone mallets (suggested Balter greens)
4 hard rubber or plastic mallets (suggested unwrapped Balter greens)
1 snare stick (or chopstick)
misc. 1 towel used to suddenly dampen glockenspiel at end of piece.
(even if the glockenspiel has a pedal, it should not be used at the end)

A: *Lullaby*'s Instrumentation B: *Lullaby*'s Mallets/Beaters

Figure 10: *Lullaby* Instrumentation and Mallets/Beaters

Table 2 shows the variables listed above.

Table 2: Variables in instrumentation between pieces

Title	# of Instruments/Groups	Who selects the instruments	How Variable
Psappha	6 groups (16 instruments)	Performer	Guidelines
Toucher	7	Performer	Guidelines
Plot	13	Performer	Open Ended
Lullaby	12	Composer	Closed

Preparations

In *Psappha*, the preparatory decisions I made were about mallets, instruments, setup, and notation. I wanted to use instruments that were common or easy to transport, use as little mallet switching as possible, and find metal sounds

that I had not heard before. I wanted to try to use a single set of mallets on all or most groups. I made this decision to make the learning process and performance easier. I was not convinced that I needed different types of mallets, and I did not want to limit specific sections or instruments to one hand or a specific mallet. Instrument Group A was purple-heart wood simantras, Group B would be bongos or congas, and Group C was double headed toms. I felt this choice of instruments would give a wide audible register. Additionally, on page four, the score suggests to play instrument C3 with a pedal bass drum, so I felt I should simplify the setup and use that instrument the entire time. Double-headed toms relate to the bass drum, because they are all double-headed drums.

The setup would have some influence from other arrangements I had seen, but I wanted additional guidance from the layout of the music. I have previously experienced, when there is a visual relationship between the notation and a setup, it is easier for me to learn the music. Instruments that are lower on the staff are on my left, and higher instruments are on my right. Additionally, I prefer to have lower pitches on my left and higher pitches on my right. Because this was an experiment partially related to reading, I decided not to re-notate the piece, and that I would give any section an earnest try before re-notating any section or the entire work.

With *Toucher*, I first needed to learn the French text, decide which instruments to use and how to set them up, and decide whether to re-notate any of the music. I had several previous attempts to learn the text over two years using a

variety of techniques.[3] I wanted to use instruments that had vocal qualities similar to their corresponding sounds, use a variety of different types of instruments, and have a small setup. Instruments that have a variety of timbres, wide range in dynamics, and pitch variation are the vocal qualities I considered when selecting instruments. I chose: Udu drum, rasp, snare drum, tambourine(s), opera gong, and doumbek. The general idea was to setup according to the score with instruments that were low on the staff placed left and instruments high on the staff towards the right. I decided not to re-notate the work, but the font of the music is very small, so I considered ways of enlarging the music.

With *Plot,* I had to figure out how to: read the score, arrange a setup, select instruments, interpret the timbres, and morph between sounds. I began making charts about the relationships in *Plot* during the middle of 2013. I wanted to be able to consistently recreate my performance, perform the score accurately, and keep the setup as small as possible. As a reminder, one concept in *Plot* is for one sound to morph from one to another. I tried to identify instruments that had vocal qualities by identifying instruments that had malleable sounds and a broad dynamic range. Additionally, I did not want too many instruments of one material (i.e. metal, skin, plastic, etc.). In the instructions, it suggests that different types of mallets can control timbres, so I wanted a diverse set of mallets to present clear

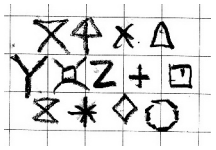
[3] During my first attempt at learning the text to *Toucher,* I was learning the International Phonetic Alphabet (IPA), and had the text translated into IPA. The next endeavor was listening to a version of the text, recorded by a friend, first read slowly and then moving up to a moderate speed. The version that allowed the most progress was having the text entered into a computer program, listening and speaking it back a little bit at a time, combined with a word for word translation next to each word. The amount played back, grouped by syllables, words, or sentences, depended on my comfort ability. As needed, I slowed down difficult syllables electronically to a comprehensible speed.

changes.

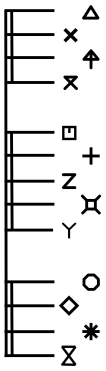
The instructions led me to explore what a “transition” is and to explore alternative ways to make transitions, including ideas such as: different roll types, the amount of overlap between instruments, physical movement of instruments, electronic manipulation, and possibly other techniques. I eventually decided my approach would be to shift gradually from a sustained tone to individual strokes over the course of the entire work. After analyzing all of the materials I was able to determine a setup based upon how often each instrument was played and how often relationships between instruments occurred. I initially drew possible setups on paper, with the symbols used in the score. (Figure 11A) An initial list of instruments included: a mixing bowl, guiro, noah bell, glass bottle, wooden box, piccolo snare drum with a wooden head, plastic water jug, cowbell, opera gong, frying pan. I arranged instruments by height, which made it easier to set up the instruments on a flat surface. Initially, no other aspects influenced the location of instruments within the setup.

Once I figured out the setup, I could then create a notational layout. (Figure 11B) Because I arranged the instruments into three rows, I decided to use three staves. The top row of instruments had four instruments, so the top stave had four lines. The middle row had five instruments, so the middle stave had five lines. Lastly, the bottom row had four instruments, so the bottom stave had four lines. To interpret rhythms and dynamics I overlaid a graph onto each page of the score, and notated the rhythms and dynamics according the graph. (Figure 11C) To figure out the timbres, I compared all the sizes of each symbol and then came up with categories. The result was a score that was sixteenth note based, had

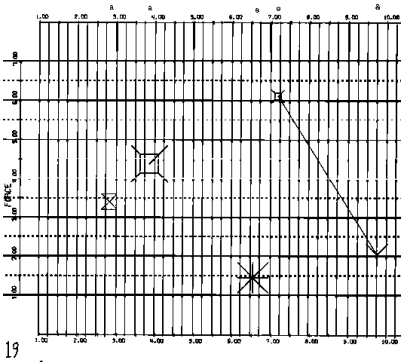
seven dynamic ranges, and five different timbres for each symbol. I decided to use different roll types over the coarse of the piece for the "transitions." Rolls would change at the beginning of each page. The structure of the piece would determine the type of roll on each page. I decided to re-notate the entire piece into a notation program (Figure 11D), because there were so many aspects to consider; the thought of trying to "read" all the information I needed to see in the original score overwhelmed me, and I felt a traditional notation system would be easier for me to prepare.



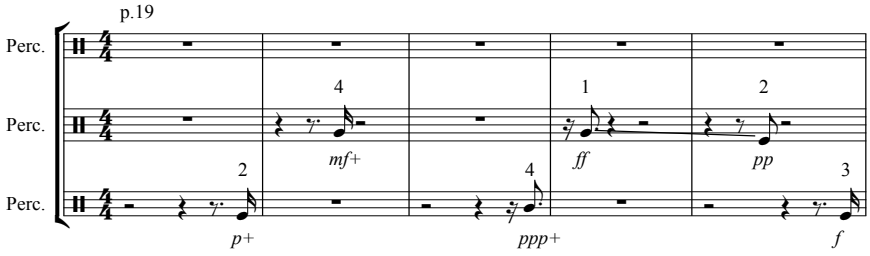
A: *Plot* layout by symbol



B: *Plot* staff notation



C:[4] Original *Plot* page with graph lines



D: *Plot* initial re-notated page excerpt

Figure 11: *Plot* re-notation process

[4] A full size version of this example is available in the Appendix.

Preparation for *Lullaby* consisted of figuring out a setup and a process to learn polyrhythmic measures. All preparation began a few months before beginning. I came up with a setup based on the layout of the music and logistical issues. For the polyrhythmic measures, I decided to re-notate the music onto graph paper.

Phase One Strategies

My goal with *Psappha* was to learn one page per week, which added up to nine weeks. The first issue occurred on the second page. (Figure 12) My eyes would consistently get lost in this passage, and because I was treating this like an experiment, I did not want to re-notate the section. To learn this section I started it very slow and gradually sped up the tempo, but this required more than a week to accomplish. The third page presented another issue; I was getting lost in the number of "rests" notated. The distance between the notes on the page is why this seemed to be an issue. (Figure 13A) After spending more than a week on it I decided to move on, I would return to it after I re-notated it into standard notation. (Figure 13B) Once it was re-notated, I did not have the same issue. On page four, there were long rests that my eyes had trouble tracking. (Figure 14) After writing in the number of rests, the remainder of the page was straightforward. Page five presented both technical and reading issues. (Figure 15) I learned it at a slow tempo and sped it up incrementally, which took extra time. Page six had some of the same issues as pages four and five. I learned the technically challenging sections on page six slow to fast, and with the large number of rests, I wrote in the

number of rests onto the music. Page seven presents consistent vertical dyads. (Figure 16) It was difficult to read and play the correct number of repetitions of each combination. I believed re-notating would not make it any easier, so my approach was to learn it slow to fast. Page eight presented both technical and reading difficulties. The technical difficulties occurred when making an artistic decision to play the notes with two ledger lines above them as alternating sixteenth notes. (Figure 17A) The reading difficulty occurred from trying to execute the sixteenth notes, and not knowing what beat each hand would move on. My solution to the reading difficulty was to write in when the instrument changed. (Figure 17B) Learning to play this page took extra time. Page nine presented a technical challenge of allowing my foot and hands to consistently play together. (Figure 18) My approach was to learn it slow to fast, trying one hand at a time, and then one hand at a time with the foot. Table 3 shows the problem each page presented, my solution to the problem, and approximately, how long it took to learn. My first run through of *Psappha* was on February 10.

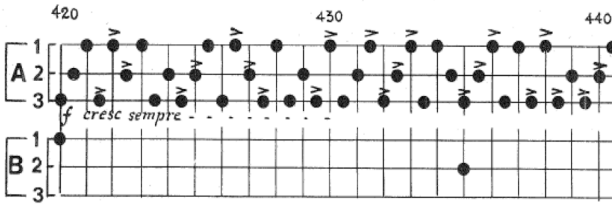
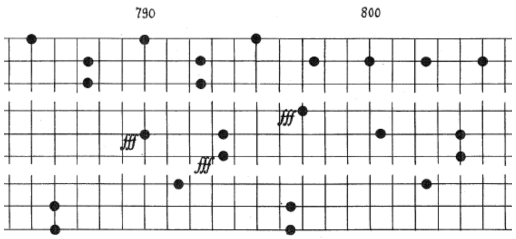
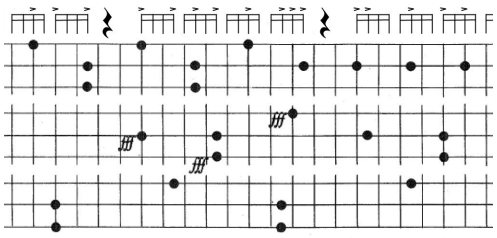


Figure 12: *Psappha* page 2 excerpt. The issue here was losing my location in the notes.



A: *Psappha* page 3 excerpt. The issue here was reading the rhythms because of the distances between notes.



B: Figure A with sixteenth note rhythms written above the system.

Figure 13: *Psappha* page 3 excerpt.

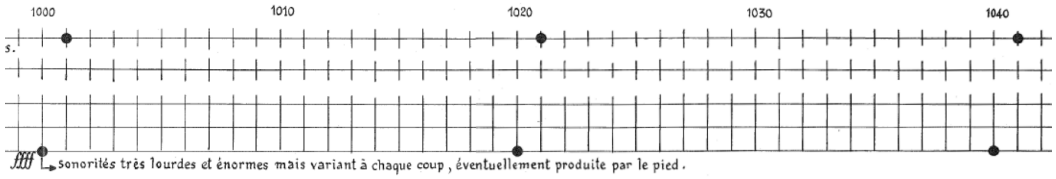


Figure 14: *Psappha* page 4 excerpt. The issue here was not being able to read the number of rests between attacks.

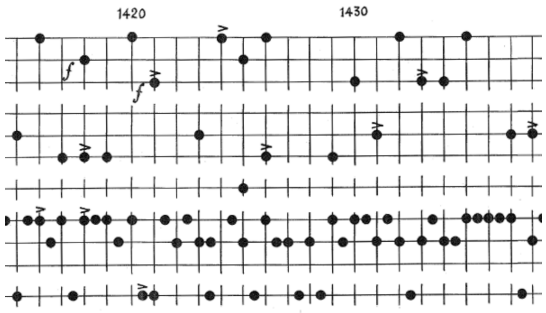


Figure 15: *Psappha* page 5 excerpt. The issue was processing a lot of information over a large distance.

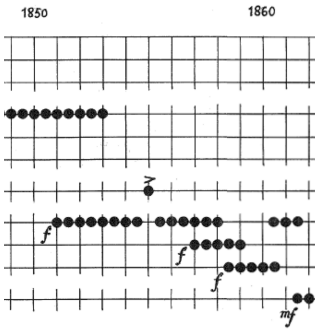
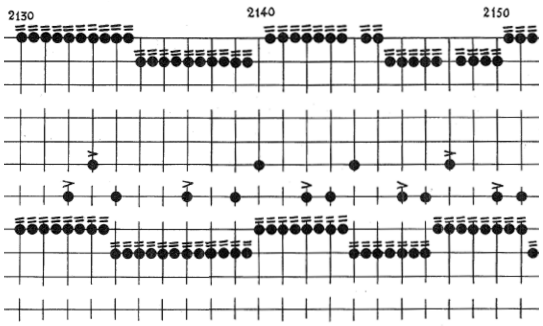
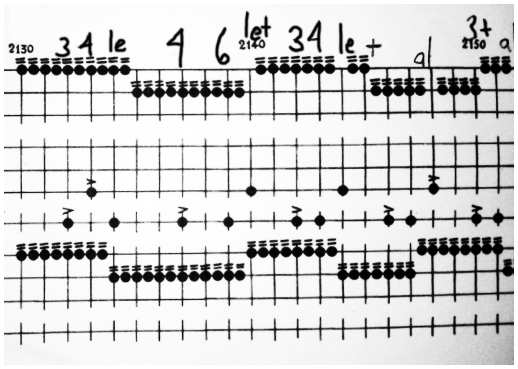


Figure 16: *Psappha* page 7 excerpt. The issue was in reading the correct number of repetitions.



A: *Psappha* page 8 excerpt. The issue was knowing when to move to another instrument.



B: Figure A with rhythms written in that let me know when to switch instruments.

Figure 17: Psappha page 8 excerpt.

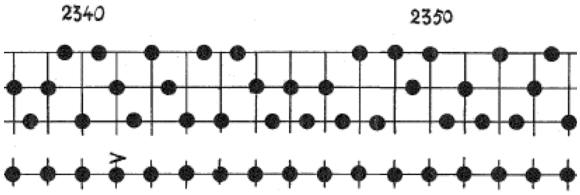


Figure 18: *Psappha* page 9 excerpt. Issues playing hands and foot together.

Table 3: *Psappha* Phase 1 summary. Issues and solutions by page, and time needed to learn the page.

Page	Issue	Solution	Weeks
1	-	-	1
2	Reading – getting lost	slow to fast	1.5/2
3	Reading – rests & distances	re-notate	2
4	Reading – Rests	write in numbers	1
5	Technical & Reading	slow to fast	2+
6	Technical Reading	slow to fast write in rests	1
7	Technical & Reading – Dyads	slow to fast	1.5
8	Technical (Artistic decision) Reading	play 16th notes – slow to fast write in rhythms	2
9	Technical – hand/foot coordination	slow to fast, and one hand at a time	1

As discussed earlier, *Toucher* presented multiple issues in the preparation stage. Learning to speak the French required by the piece was more difficult than I anticipated, and I was only able to learn the first few scenes. The small font size of the music was an additional issue that would need to be resolved. On May 12, I finally conceded that I would not be able to learn *Toucher* in time for the recital and that I needed to replace it with another work.

My goal with *Lullaby* was to learn two pages a week from beginning to end. I started Phase 1 on March 28. *Lullaby* presented both technical and reading issues. Technical issues included physical issues when learning the piece, which included playing polyrhythms (Figure 19) and figuring out "stickings" (Figure 20). Reading issues were visual issues that needed extra clarification before being able to deal with playing, and any additional technical issues. The reading issues encountered were polyrhythms (Figure 21), font sizes (Figure 22), and font clarity (Figure 23).

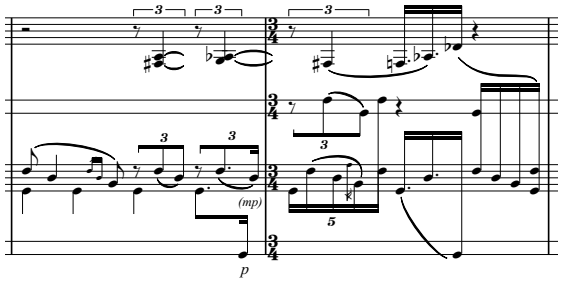


Figure 19: *Lullaby* polyrhythm technical issue

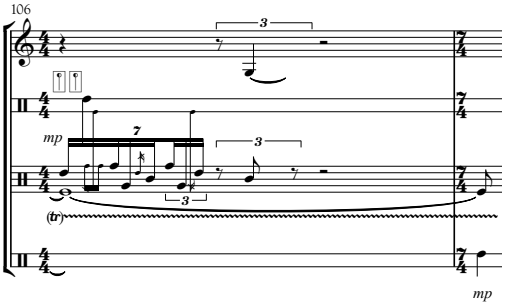


Figure 20: *Lullaby* sticking issue

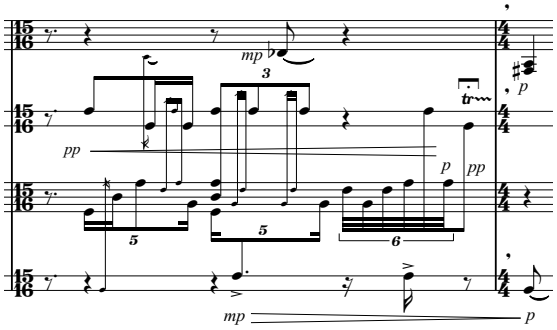


Figure 21: *Lullaby* polyrhythm reading issue

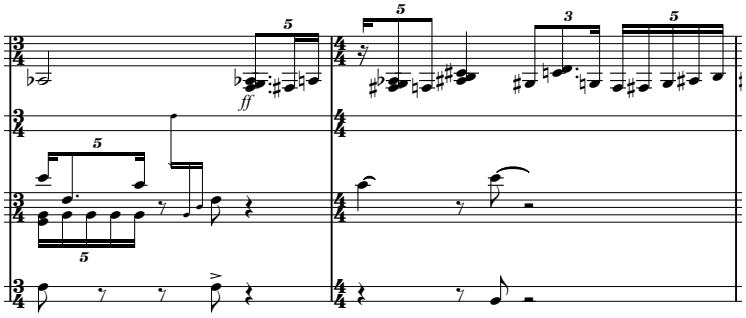


Figure 22: *Lullaby* font size issue. When similar measures are farther away, they become difficult to read

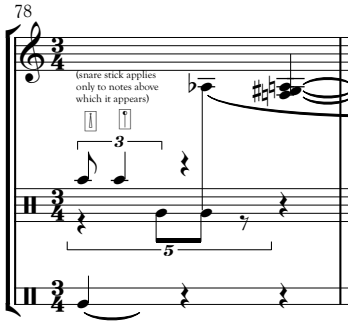


Figure 23: *Lullaby* font clarity reading issue. Distinguishing stick verses mallet was an issue when the music is farther away.

An additive process solved technical issues with polyrhythms and stickings. The additive process I used was learning the music beat-by-beat and/or starting at a slow tempo and speeding it up to the correct tempo. Graphing the music solved reading clarity with polyrhythms. Issues with the font's size was handled by an additive process, learning lines separately where appropriate, and physically getting closer to the music to be able to read it when necessary. Font clarity issues required me to enlarge sections of the music. Table 4 shows the issues and the solution I used. Table 5 shows each page, measure/beat, the issue, and the solution.

Table 4: *Lullaby* Issues and Solutions

Issues		Solution
Technical	Polyrhythms	Additive
	Sticking	Additive
Reading	Polyrhythms	Graph
	Font Size	Additive, Learning lines separately, Bring music closer
	Font Clarity	Enlarge Notation

Table 5: *Lullaby* Phase 1 summary. Issues and solutions.

Page	Measure.Beat	Issue	Solution
5*	12.3 – 13	Technical (Polyrhythms)	Slow to fast
6	16	Technical (Polyrhythms)	Slow to fast
	19.3 – 20^	Technical (Polyrhythms)	Learned later, Slow to fast
	22^	Reading & Technical	Learned later, Graph, slow to fast
	30	Technical (Sticking)	Slow to fast
8^	-	Technical & Reading	Learned later, Separated into section
	47 – 50	Technical (Polyrhythms & Sticking)	Beat/Measure at a time, slow to fast
	51 – 55	Technical & Reading	Separate parts, put back together, graph
	56 – 60	Technical (Polyrhythms)	slow to fast
9	61.3 – 61.4^	Reading (Polyrhythms)	Learned later, Graph
	72^	Reading (Polyrhythms)	Learned later, Graph
	76	Reading (Font clarity - Symbol)	Enlarge "stick" notation
10	-	Reading (Font clarity - Symbol)	Enlarge "stick" notation
12	106	Technical (Sticking)	Slow to fast
	108^	Technical (Polyrhythms)	Learned later, Additive process
	110^	Technical (Polyrhythms)	Learned later, Additive process
	110.3^	Reading (Polyrhythms)	Learned later, Graph
	111 – 117	Reading (Font size - Bells)	Slow to fast
13	-	Reading (Font size - Bells)	Slow to fast
14	-	Reading (Font size - Bells)	Additive process (One beat at a time)

* = The music begins on page five. ^ = Learned at a later date.

Due to both technical and reading issues, I was not able to learn the music from the beginning to the end, and stay on schedule. Because I did not initially acknowledge the necessity to jump past difficult measures, the second week took longer than expected. After that point, when I came across a part that was giving me more than moderate difficulty I decided to come back to it, either when it was properly prepared for me to read or at the end of the learning process. Table 5 shows which measures I delayed learning. My choice to pass over challenging measures dealt with past experiences of getting stuck on difficult sections of music and losing momentum when learning a piece. The difficult measures and my delay in recognizing the need to jump ahead added a week to my plan of two pages a week. My first run through of *Lullaby* was on May 10.

My original goal for *Plot* was to learn two pages of the original score per week. When I started on May 17, my new plan was to learn two of my re-notated pages per day. Each re-notated page was equivalent to either one or two original pages.

There were technical, reading, and focus issues that occurred when learning *Plot*. Technical issues dealt with transitions and mallet switches. Reading issues dealt with transitions and mallet switches. Due to time constraints, I compromised my artistic interpretation in a way that would not have occurred if I had more time for Phase 1. On day one, I realized I had not made an official decision on how to interpret transitions, and had not considered what mallets to use. Before day two, I came up with a detailed plan for transitions and mallets. To deal with transitions technically, I approached them with an additive approach. Mallet changes had to be simplified from the initial plan, due to logistics. To solve the problem of reading the transitions, I altered two aspects of the music: how I read the word transitions and how I read the notes. I altered the word transitions by underlining the word, changing the font, changing the size, and sometimes changing the location. To help read the notes, I wrote the note I was transitioning to at the same point of the previous note, either above or below the note. To make the mallet switches more readable they were re-notated to be in isolated boxes and highlighted in the music. To solve focus issues I removed excess information, clarified existing information, and limited my time between breaks. I have found that I generally have trouble focusing for more than twenty minutes at a time when learning music, so I use a stopwatch as an outside motivational tool to remind me when to stop. While

learning *Plot* twenty minutes was too long, and I had to limit the time between breaks to five minutes.

Table 6 shows the issues and solutions. Figures 24 through 28 are a chronological progression my development of the score through re-notation. The issues of focus and readability of the score added additional days to learning the music. My first run-through was on May 28.

Table 6: *Plot* Issues and Solutions

Issues		Solutions
Technical	Transitions	Additive
	Mallet Switches	Simplified
Reading	Transitions	Re-engraved (Wrote in the technique to be used and wrote in the transition note above/below the starting note.)
	Mallet Switches	Highlighted
Focus		Remove excess information
		Limit amount of time (5 minutes using a stopwatch)
Artistic	Mallets	-
	Transitions	-

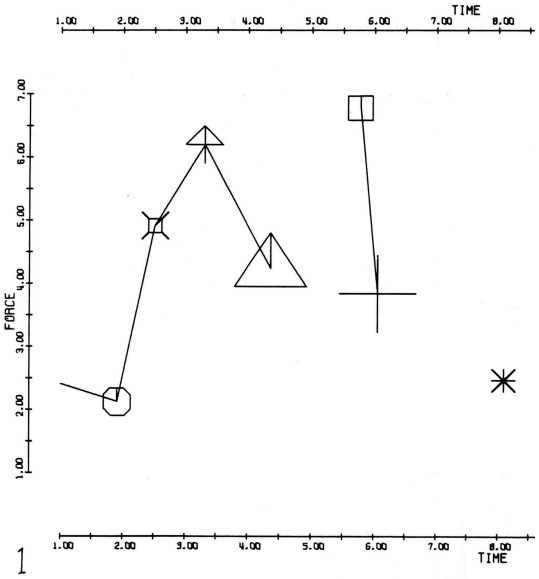


Figure 24: Excerpt of original *Plot* score. Page 1.

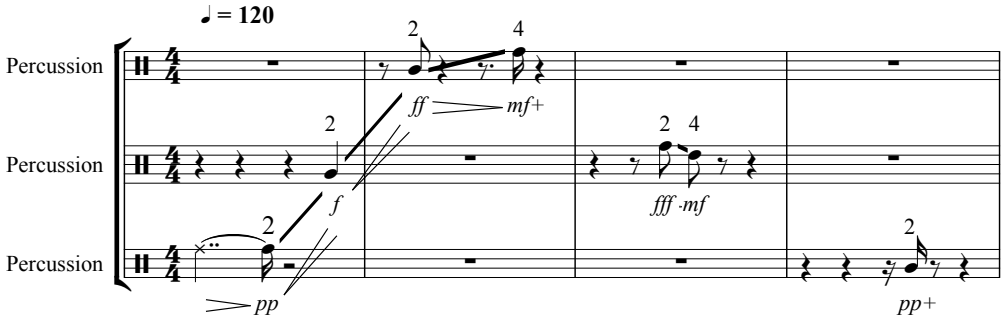


Figure 25: *Plot* score re-notated day 1. Page 1.

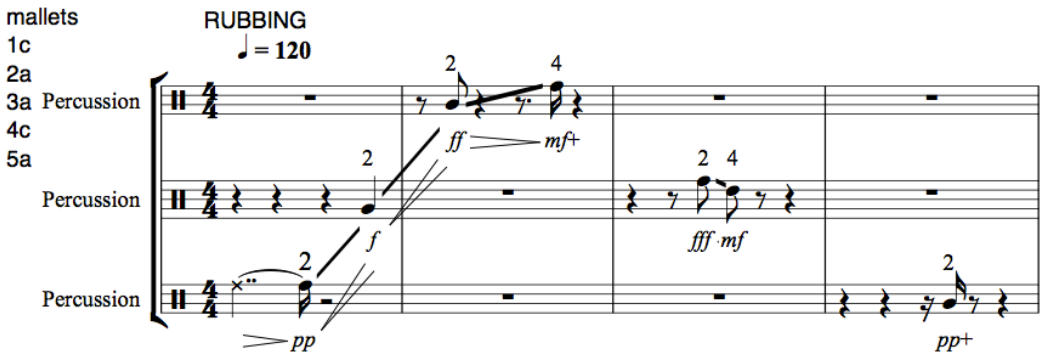


Figure 26: *Plot* re-notated day 2. Added techniques and mallets.

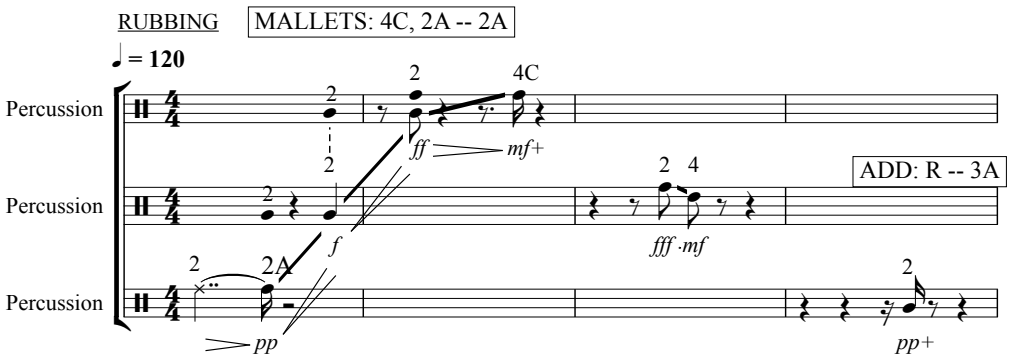


Figure 27: *Plot* re-notated third version. Altered roll and mallet selection presentation.

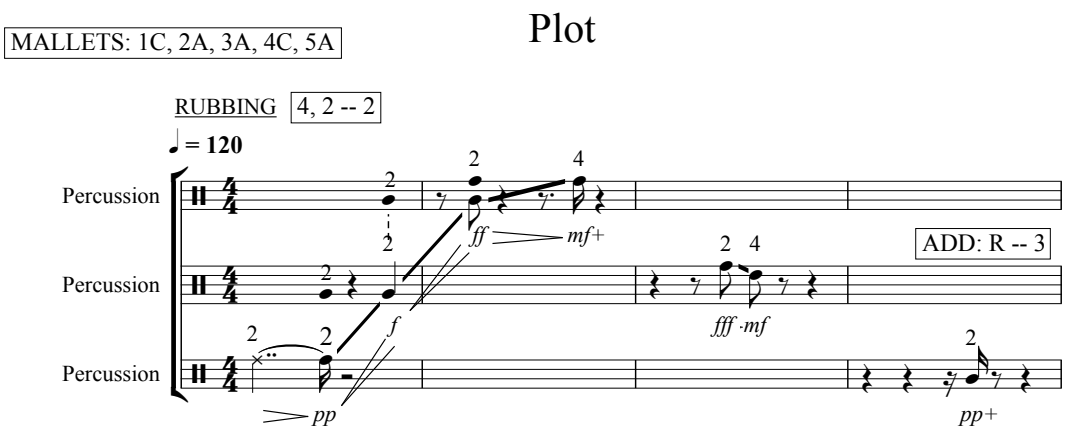


Figure 28: *Plot* re-notated performance version. Altered roll and mallet selection presentation.

John Cage – *Three*^{2}

On May 12, when I accepted that I could not learn *Toucher* in time for the recital, I needed another piece in place of it. A little more than a month before, I had recorded John Cage's *Three*^{2}. I felt that it related to the theme of the recital by relating simultaneous sustained percussion lines to vocal production, and it might provide additional information when reading a graphic score. I related the overlapping of the sounds in *Three*^{2} to phonemes overlapping to become letters or syllables.

Three^2 is a graphic score; originally for three players playing three sounds each, it has minimal direction, and is eight minutes long. Each player has nine sets of times; all but one of these times has a variable starting and ending point. Within these time brackets the player chooses when to start and end his sound. Each time bracket has a different number above it, which tells the performer which instrument to play. (Figure 29) The performer selects the instruments. Dynamics are free for short sounds and soft for long ones.[5] Because of the rules and how technically easy the piece is, I felt it would be possible to combine all the parts together, and play the piece as a solo.

[5] Cage, John – *Three*^{2} score

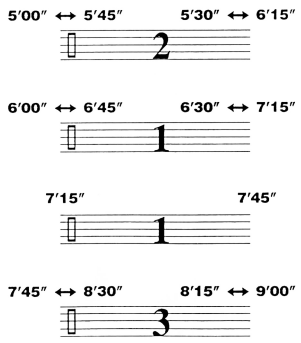


Figure 29: Excerpt from original *Three*^{2} score

I began preparing *Three*^{2} on March 25. In order to make sure it was possible to play this piece by one person, I created a score, decided on instruments, and came up with a setup. I created a score by making a time line and noting when each instrument plays within the given timeline. I chose general starting and stopping points for the times that were variable, but during the fixed time I decided to play a short soft sound during the central moment of the period. (Figure 30) I used soft granular rubbing sounds. I selected the following instruments: purple heart Wood Simantra, Woodblock, Noah bell, metal napkin rings, stone tiles, tissue paper, sandpaper, brake drum, guiro. The metal napkin rings, tissue paper, and stone tiles were rubbed against themselves. A soft shoe brush rubbed the other instruments. With this information, I could then determine which instruments needed to be setup next to each other but also allow one hand to play two instruments simultaneously where necessary. (Figure 31) After figuring out these preparations, I was convinced that the score was playable by one person.

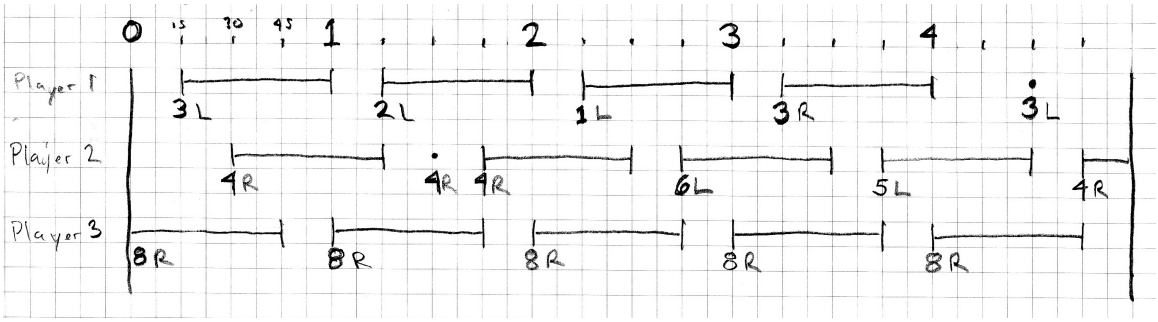
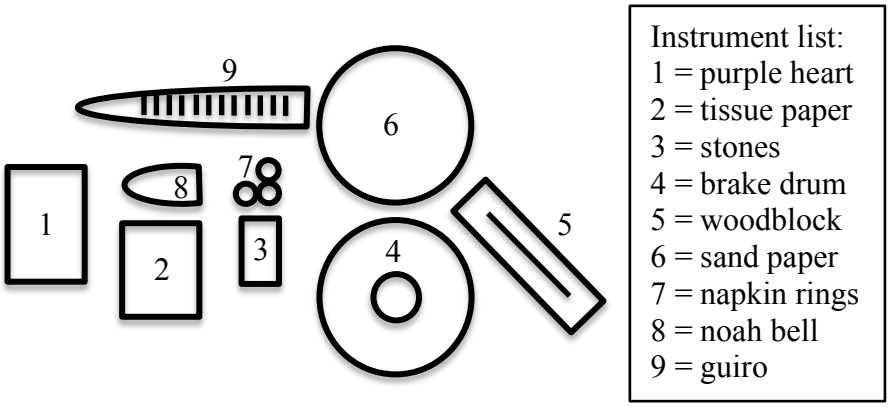


Figure 30: Re-notated excerpt of *Three*^{2}



Example 31: My initial *Three*^{2} setup

Phase 1 started March 28. The re-notated score was three systems long, and my plan was to learn one system a day. During this time, I only made slight adjustments to the setup. Phase 1 ended on March 30.

Phase Two Strategies

Phase 2 for *Psappha* started February 11. The parts of the music that were challenging during Phase 1 continued to be the focal spots during Phase 2. As the music became more familiar, I started to change instruments to meet my musical needs. The musical direction I decided to take dictated that I would need to switch mallets throughout the piece. I decided not memorize music for the recital, because this was an experiment in how I read music. Due to this decision, I still needed to decide how I wanted to read the music in performance.

As a reminder, Groups A, B, and C are wood instruments or drums and grouped high to low in range. Groups D, E, and F are metal instruments. Group D is an average register. Group E is a neutral or middle-of-the-road register. Group F is very sharp. Here is a list of the instruments I started with:

Group A – medium high simantras
Group B – bongos
Group C – toms and kick drum
Group D – high pitched sixxen
Group E – high hats
Group F – spring coils

As the music developed, so did my desires for specific instrumental sounds. For the B Group, I wanted more power than the bongos, so I switched them to congas. To separate the ranges between Groups A, B and C, I switched to higher pitched simantras for Group A and larger drums for Group C. For Group D, the sixxen were piercing and not as melodic or "neutral" as I was expecting, so I switched them to long aluminum tubing. Group E went through a number of changes. I wanted it to be lower in pitch than Group D and the complexity of the timbre to lie between Group D and F. After starting with hi-hats, I wanted a more

"trashy" sound, so I first tried a pair of stacked chinese cymbals. Next, I switched to a frying pan. At first the frying pan was aluminum, and then later I switched it to cast iron. The frying pan had too much pitch, so I switched to a large serving tray, which was trashy, partially pitched, and was mostly consistent in sound. The spring coils stayed the same throughout this process.

Switching the instruments gave me some difficulty. Regardless of how I felt about the sounds of the instruments initially, I did not want to swap instruments when learning notes because it would slow down the learning process. When I did start switching instruments, some changes gave more trouble than others did. Switching Groups B and D gave me the most trouble adjusting to new spacing between instruments. My setup for *Psappha* for the recital was as follows: (Figure 32)

Group A – high simantras
Group B – congas
Group C – low toms and bass drum
Group D – aluminum tubes
Group E – serving tray
Group F – spring coils

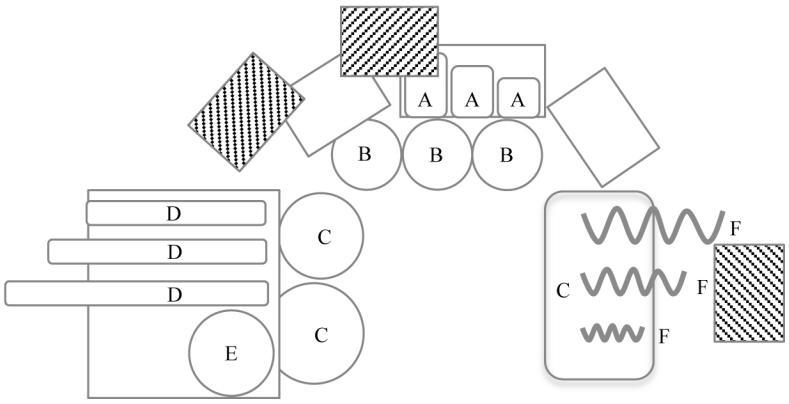


Figure 32: My performance *Psappha* setup

I needed mallet changes to make sections more distinctive, to help instruments display different characters, assist dynamic embellishments, and aid the overall flow of the music.

I view *Psappha* as a mosaic of musical ideas. Table 7 shows my interpretation, page by page. These different interpretations helped define mallet switches.

Table 7: *Psappha* interpretation by page

Page	Interpretation
Page 1	Separate musical lines occurring simultaneously at related speeds.
Page 2	
System 1-3	Elaboration on initial A Group entrance (Figure 33)
System 5	Three voices/Groups creating a single line. (Figure 34)
Page 3	Separate lines occurring simultaneously at different speeds (Figure 35)
Page 4	Representation of how much poetry has been lost, and only partial parts of poems remain. (Figure 36)
Page 5	Complex lines, and several lines occurring at the same time. (Figure 37)
Page 6	Two-note theme. (accent, non-accent) (Figure 38)
Page 7	Soft long flowing sung legato lines, along with two-note themes. (Figure 39)
Page 8	Elaboration on the long lines, but told aggressively. (Figure 40)
Page 9	Elaboration of initial A Group (page 2 reference), but with more focus, uniqueness, and aggression. (Figure 41)

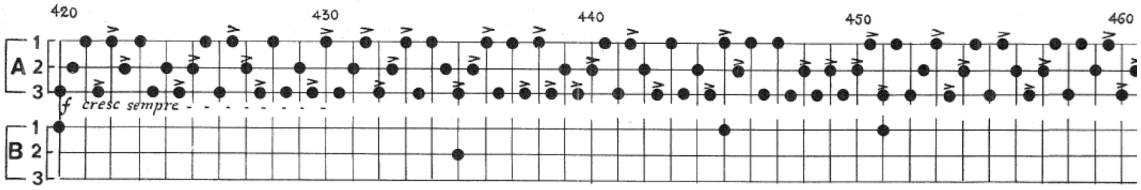


Figure 33: *Psappha* page 2, system 2 excerpt. Elaboration on initial A Group entrance.

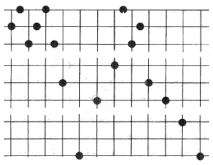


Figure 34: *Psappha* page 2, system 5 excerpt. Three voices/groups creating a single line.

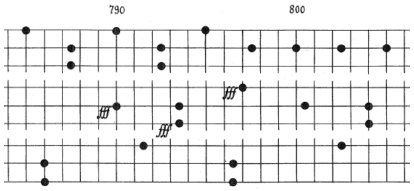


Figure 35: *Psappha* page 3 excerpt. Simultaneous lines at different speeds.

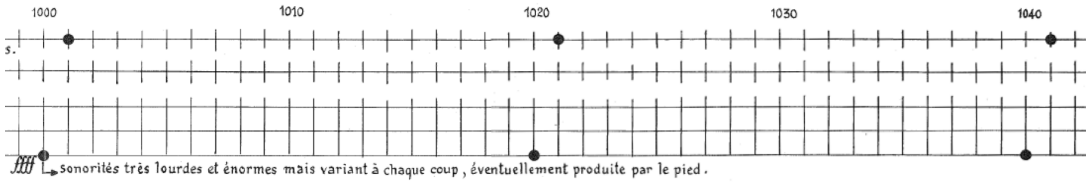


Figure 36: *Psappha* page 4 excerpt. Example of the sparse remains of Sappho's poetry.

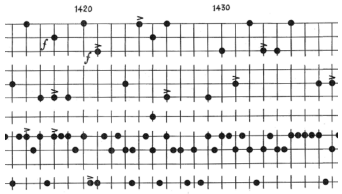


Figure 37: *Psappha* page 5 excerpt. Complex lines, and several lines occurring at the same time.

Figure 38: *Psappha* two-note theme

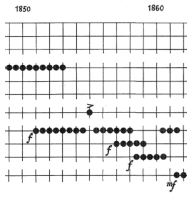


Figure 39: *Psappha* page 7 excerpt. Longer lines example.

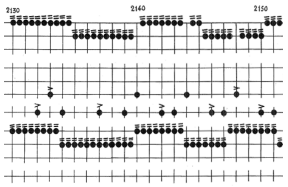


Figure 40: *Psappha* page 8 excerpt. Elaboration on the long lines, but told aggressively.

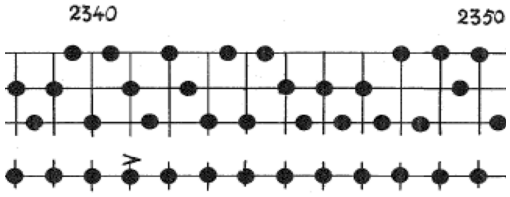


Figure 41: *Psappha* page 9 excerpt. Elaboration of initial A Group (page 2 reference).

Ideally, all percussionists would learn music in a way that allows for variation with mallets and interpretation after the initial stage. However, because of the way I learned page one, I was not able to use a different set of mallets on the congas and simantras. On page three, I initially switched to a soft mallet in the left hand for the drums to help separate the drums from the congas. (Figure 35) I did this to help clarify that each Group was in a different speed. Because the change did not offer a large audible difference, I abandoned this effort. At the end of page three, I switched to one rubber mallet in the right hand for the upcoming page four for the simantras. I interpret page four as a visual representation of what was lost verses what remains with some of Sappho's poetry.

(Figure 36) At the end of page four, I switched out all mallets for a medium set of mallets for page five. (Figure 37) This helps show how many ideas can be happening simultaneously all equally important. On page six, I replaced two medium mallets with two rubber mallets, so I could use a rubber mallet on the accents. This helped clarify a two-note theme that repeatedly occurs. (Figure 38) At the end of page six, I replace the medium mallets with soft mallets for page seven. Page seven presents long repeated notes on the same instrument for varying amounts. These long lines at a soft dynamic I interpret as legato fluid lines. (Figure 39) On page seven, when the dynamics become loud, I decided to play everything from there through page eight with the rubber mallets. This is the same idea as on page seven, but then presented in an aggressive way. (Figure 40) On page nine, I initially used metal triangle beaters on the spring coils, but they were not powerful enough so I changed to large hard bell mallets. Each of the switches took some time to adjust to, but they were all doable for the recital.

Knowing how to manage the physical music and page turns presented its own issues. In order to learn the music it was easier to read when the music was in its original size, which is 13.5 x 19.7 inches. As it became more familiar, I was able to reduce the size of the music. After Phase 1, I reduced the size of the music to 11x14 inches. As the recital approached, I knew I did not want to worry about page turns in the performance. I was able to shrink the music down to 8.5 x 11 inches and place four pages grouped together on two pieces of cardboard. By doing this, I did not have any page turns in performance. Page nine was on a separate stand, by the spring coils.

Phase 2 for *Lullaby* started May 11. The parts of the music that were challenging during Phase 1 were still focus points during Phase 2. Instruments stayed the same, but tunings on the instruments changed. The mallet selection needed adjustments to help enhance the tone on some instruments. My ability to navigate page turns presented difficulty.

Isolated measures that were initially challenging became something I had to learn to make flow within the given phrase. I started to take apart the music phrase-by-phrase rather than measure-by-measure. After I started to get a better handle on the phrases, I focused on the characteristics of the piece: still-time (Figure 42), steady-time (Figure 43), poly-time (Figure 44). The *Lullaby* Time Graph shows a measure-by-measure analysis of my approach. (Figure 45)

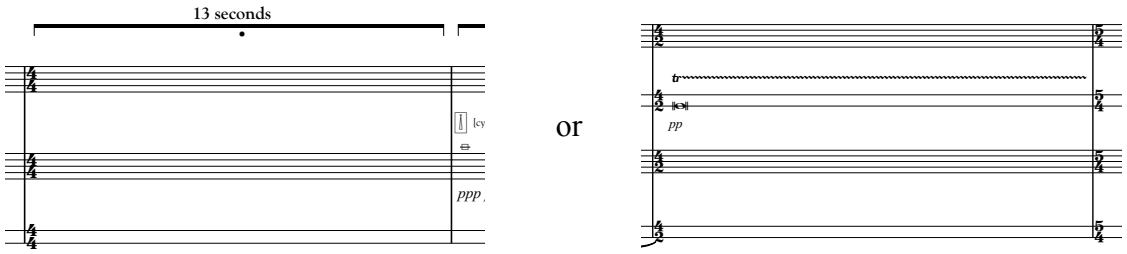


Figure 42: *Lullaby* examples of still-time. Definition: A silence or single timbre that occurs for a several seconds.

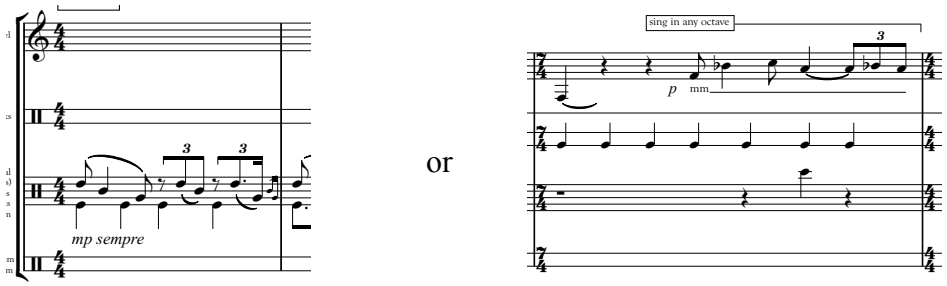


Figure 43: *Lullaby* examples of steady-time. Definition: One or several lines of music that are heard at the same tempo.

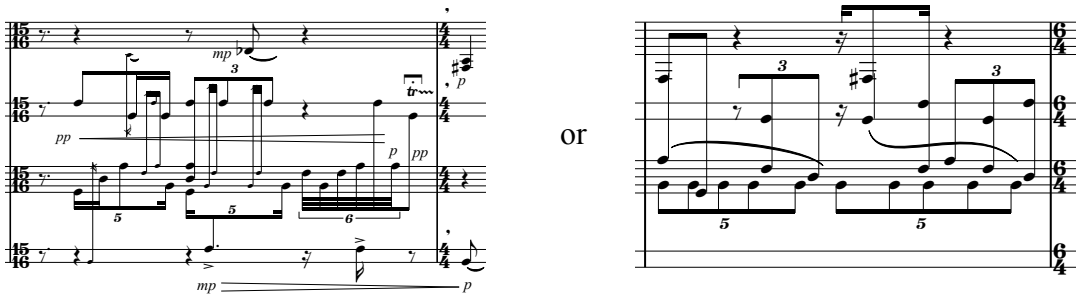


Figure 44: *Lullaby* examples of poly-time. Definition: Several lines of music that occur simultaneously. Each line can be heard individually or the combination will sound as a cluster of sound

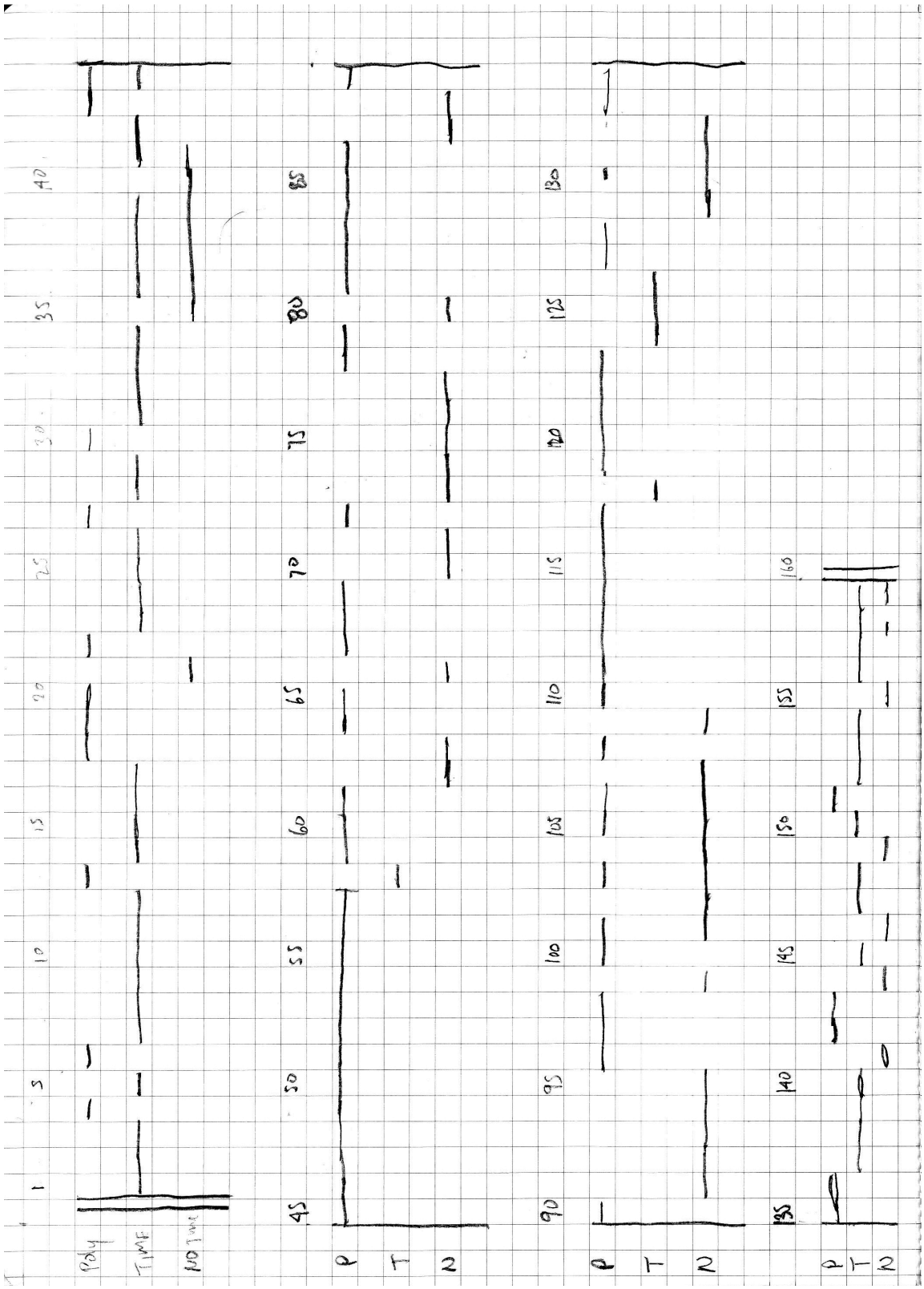


Figure 45: *Lullaby* Time Graph. No time equals still time.

Because the selection of instruments was predetermined, I focused on the tuning and muffling of the instruments. The tuning of the drums became another integral aspect of the piece, because of the pitches that occurred while singing or playing the bells. The kick drum needed to be non-resonant to separate the sound worlds between the two bass drums. I also added muffling to the tom, so it did not ring too long.

The composer indicates mallet changes throughout *Lullaby*, with specific mallet suggestions given in the beginning of the score. Generally, my mallet selection moved up a single hardness gradation compared to the directions, to help facilitate a clearer tone and aid the overall presentation.

The physical size of the music became an issue. The font size of the music would not allow me to reduce the physical size of the page, because the music would be too small to read. There are many places in the music where there are silences, but turning the page in those locations made noise and was visually disruptive to the performance. After working with the composer, we identified locations that could work as page turns.

My initial Phase 2 for *Three*^{2} started March 31, in preparation for a recording session on April 8. I restarted *Three*^{2} on May 12 in preparation for my recital. My preparation in Phase 1 continued in Phase 2, which dealt with the most consistent ways to start, sustain, and end sounds. To accommodate sound combinations and facility between instruments, I had to adjust instrument locations and numbering. Instruments did not change in my initial Phase 2, but did when I restarted the work in May.

The locations and numbering of my instruments changed a few times during Phase 1. After being able to play through the music, I adjusted the numbering system of the instruments to be able to hear more complementary and audible differences. The instruments required relocation for these changes. (Figure 46)

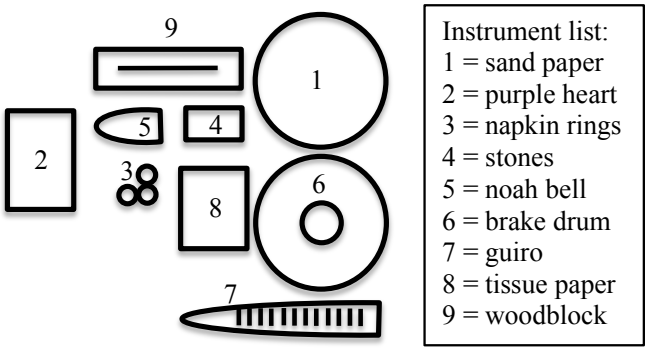


Figure 46: My second *Three*^{2} setup.

Because my initial work on *Three*^{2} was for a recording session, I did not consider how to present it on stage. I initially drew the score onto a single 11x14 inch page of graph paper. I wanted the piece to be presented as simply as possible, so I reduced the music to 7x10 inches and was able to place it on the same table as the instruments.

While listening to the recording session, I recognized that I wanted to change the sound of the brush on the purple heart simantra. I decided to change it to a group of three triangles rubbed with a threaded rod.

Phase 2 for *Plot* started May 29. The same amount of effort learning the music in Phase 1 could not continue in Phase 2, because of the limited amount of time remaining before the concert. Instrument selection changed minimally to allow for a larger pitch range. The music continued to present reading difficulty, and I still needed to address the issue of turning pages.

I compromised improving notes and rhythms, because of the limited time before the performance. In the few days leading up to the performance I focused on the different types of transitions utilized and how to maximize the characteristics of each mallet.

Because of my familiarity with the score, I could not reduce the size of the music, which is an 8.5x11 inch page. Dyslexia affects one's ability to read and interpret symbols, so as symbols get smaller it becomes harder to see the differences between similar shapes. There were no obvious places in the music for page turns, so I turned pages at appropriate structural points in the piece. I grouped the pages in sets of two or three on cardstock to quickly facilitate larger page turns. As a reminder, my technical approach to the transitions was to gradually shift from a sustained tone to individual strokes. Figure 47 shows what transition type I used on each page.

Techniques:
R = Rubbing
A = Alternate hands
F/S = Alternate hands starting at fast speed gradually getting slower
U (open) = Open flams
U (closed) = Closed flams
U = Hands attack together

Page	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Technique	R	A	R	A	R	A	R	A	F/S	A	F/S	A	F/S	A	F/S	U (open)	F/S	U (closed)	F/S	U

Figure 47: *Plot* technique approach (page-by-page)

Focus continued to be an issue while reading the score. After Phase 1, the score had a few more visual adjustments. I relocated some details. Information was highlighted yellow anytime a mallet switch, fermata, or volti subito (V.S.) (turn immediately) occurred. To let me know that the music was at the end of the card

stock, after the last system a red line was drawn. The combination of notational clarification and using a stopwatch improved my focus and reading ability.

Impression of the recital

My recital was on May 31, 2014 at 5pm. The order was: *Plot*, *Three*^{2}, *Psappha*, and *Lullaby*. I had two motivations for this recital: the first was to explore my learning disabilities, and the second was to explore the relationship between percussion and voice. *Plot* and *Three*^{2} relate to the vocal production of phonemes, letters, and syllables. I relate *Psappha* to speaking music, and *Lullaby* relates to singing lullabies.

My goal was to present these pieces starting with the building blocks of vocal production and then move to larger vocal ideas. In addition to this consideration, I also wanted to begin with pieces I felt less comfortable with and then progress to pieces that felt more comfortable. *Plot* started the program because I was the least comfortable with it, and it presents the ideas of timbres and transitions between sounds. *Three*^{2} was next because it relates to similar ideas as *Plot*, but I was much more comfortable with it. *Psappha* occurred third because it is difficult and I imagine myself vocalizing the music while playing. *Lullaby* was last because I was the most comfortable with it, and I relate it to the idea of sung words.

I was moderately satisfied with my performance of *Plot*, but felt I represented the general ideas of the piece well. I was happy with my performance of *Three*^{2}. I was moderately satisfied with my performance of *Psappha*. I played

faster tempos than I was comfortable with so I could have the type of relationship between instruments that I was seeking to present, which made my performance uncomfortable. I was satisfied with my presentation of *Lullaby*, but adjusted tempos during the performance compromised my presentation.

Reading the music was an issue I had not anticipated affecting my performance. During *Plot,* I lost my place in the music a few times in locations that had not occurred during practice. In *Three*^{2}, I momentarily lost my place reading the score. Fortunately, changes happen slowly, and I was able to recover. During *Psappha,* the second page slightly disoriented me, and for a split-second, I lost my place on the ninth page. (See previous Figures 12 and 18) In *Lullaby*, I was briefly lost while reading the music on the last two pages, while playing the bells.

Reflections on my process

To understand my process, looking at an overview of the information already presented will give a foundation to discuss what aspects worked and what processes need adjustments. (Table 8: Timeline information visualized)

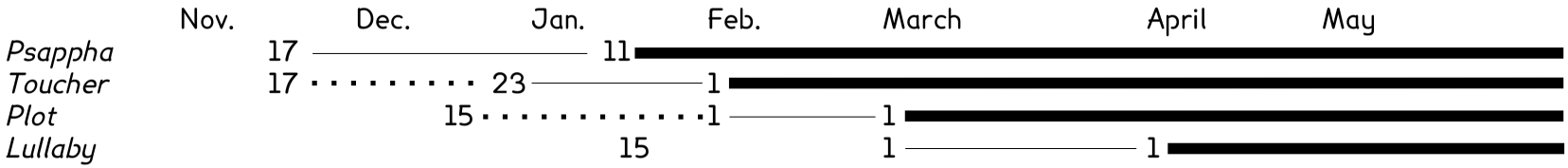
Table 8: Timeline information visualized

Piece	Prep began	Amount of Prep	Phase 1	Phase 2	Overall	Performance
Psappha	Nov. (a few days)	Some	Nov. 17 (~3 months)	Feb. 11 (3.5 months)	6.5 months	Moderately Satisfied
Toucher	Nov. 17 (6 months)	A lot	-	-	6 months	-
Plot	Dec. (4.5 months)	A lot	May 17 (12 days)	May 29 (2 days)	5 months	Moderately Satisfied
Lullaby	Jan. (A few days)	Minimal	March 28 (6 weeks)	May 11 (20 days)	9 weeks	Satisfied
Three[2]	March 25 (2 days)	Some	March 28 (3 days)	March31/May12 (4wks)	4.5 weeks	Happy

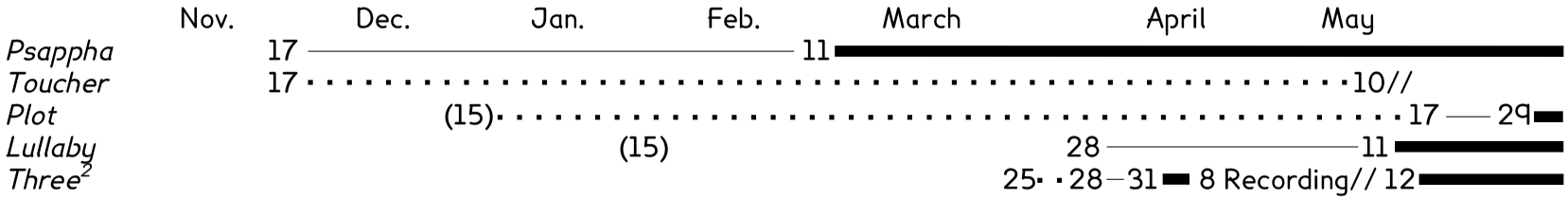
Visualization of the timeline:

- Preparation
- Phase 1
- Phase 2

Planned timeline (not to scale)



Executed timeline (not to scale)



Here are some of the initial questions I asked myself:

1) What were my predictions as to what would be the hardest? Why?
2) Does a handwritten versus type-set score make a difference in learning a piece?
3) Were there specific types of musical structures that gave me more trouble or more ease? For the measures that gave me issues, what steps could I take to learn them?
4) Did the amount of preparation time affect my performance?
5) Were my predictions correct? What did I learn from this process?

By comparing Table 8 to my initial questions, we can start to come up with answers. My prediction was that *Psappha* would be the hardest followed closely by *Toucher*, next would be *Plot*, and lastly *Lullaby*. Based on how I felt about my performance and the amount of time spent learning each piece we can determine that *Toucher* was the hardest, followed by *Psappha*, *Plot*, *Lullaby*, and then *Three*^{2}.

Table 9:

Table 9: Difficulty results from this experiment.
(1 = hardest)

Initial	Results
1) *Psappha*	1) *Toucher*
2) *Toucher*	2/3) *Psappha* or *Plot*
3) *Lullaby*	4) *Lullaby*
4) *Plot*	5) *Three*^{2}

By looking at Table 9, we see that my predictions were not correct. We cannot fully determine the correlation between the difficulties of reading typeset verses handwritten scores, partially because I did not entirely learn *Toucher*.

Some reading issues occurred in several pieces:

1) Distances between notes & systems
2) Clarity of music
3) Font sizes

Each of these issues had potential solutions. When there is a problem reading distances between notes and systems, allow for extra time, and possibly add a color line or another notational device that helps keep your place. Fonts need to be clear and the note heads should not be too small. If the music is not clear, consider re-notation when it is appropriate or learning the music in an alternative way, such as taking it apart in sections or separating the voices. One example could be, during highly polyrhythmic measures determining the mathematical relationships between the rhythms and re-notating the music onto graph paper. When font sizes are too small to read easily, two possible solutions are to enlarge the music or bring the music physically closer to you, so it is easier to read.

The amount of preparation time influenced my performance of each work. My first observation from Table 8 was that when a work needed less preparation, I felt better about it in performance. Another observation from Table 7 leads me to believe that I should not give pieces that need more preparation a deadline, because it will take an undetermined amount of time to prepare the music.

Many factors determine the amount of time needed to prepare a piece. Graphic scores could take more time. The amount of simultaneous polyrhythms is another aspect to consider. It is also important for me to make sure the font and size of the music are large enough to read comfortably. This is the beginning of a life long experiment and I hope to be able to identify characteristics more quickly in the future.

Each piece had reading and technical issues that taught me about my learning process. *Psappha* taught me the necessity to re-notate music sooner

rather than later. I also realized that during a technically challenging passage the most efficient way to learn it is using an additive technique. *Toucher* taught me that when I need to speak a foreign language, I should allow for a considerable amount of time to learn how to pronounce it. *Lullaby* showed me four important points. First, I should pass over a tricky section and come back to it when the measure is adequately prepared or at the end of the learning process. Graphing music is an effective way to learn complex rhythmic passages. The difference between music that can be read and played easily versus read easily and played with some work needs to be recognized. Lastly, if the score is too small, enlarge the printed size or bring the page closer to eye level, otherwise allow for additional learning time. *Three*^{2} showed me that a graphic score does not necessarily mean it will take more time, because technical and rhythmic challenges are not obvious using an abstract notation. *Plot* showed me that when re-notating something, I need additional time to make sure the score is clear, and to start with less detail and add information as the music becomes more comfortable.

Because Phase 1 was so short while learning *Plot*, I was not able to self-edit the score as fully as I would have liked. For example, I could have used three five line staves, and then put the note heads in the top and bottom staves on spaces not lines. By doing this, the middle system would have its own visual identity. (Figure 48)

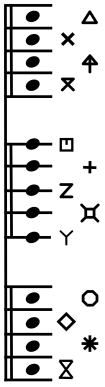


Figure 48: *Plot* alternative staff notation

Table 10 shows a complete list of issues and solutions during this process.

Table 10: Complete list of issues and solutions learned in this process

Reading

Issue	Solution
Getting lost	Additive (slow to fast)
Rests & distances	Re-notate
Dyads	Additive (slow to fast)
General reading issues	Write in rhythms or rests
Polyrhythms	Graph
Font size	Additive, Learning lines separately, bring music physically closer to face
Font clarity	Enlarge notation
Transitions	Re-notate Wrote in the technique used
Mallet Switches	Highlighted

Technical

Issue	Solution
Hand/foot coordination	Slow to fast & one hand at a time
Polyrhythm	Additive (Delay Learning, Slow to Fast, Isolate Hands/Lines/Beats)
Sticking	Additive (Delay Learning, Slow to Fast, Isolate Hands/Lines/Beats)
Transitions	Additive (Slow to Fast, Isolate Hands/Lines/Beats)
Mallet Switches	Simplified

Focus

Issue	Solution
-	Remove excess information
-	Use a timer Limit amount of work time

Artistic

Issue	Solution
Mallets	-
Transitions	-

All of the solutions that worked for me can be summed up as re-notation, additive learning techniques, outside motivators such as using a stopwatch, logistical simplifications, and allowing enough time. This is not supposed to be an exhaustive list, but rather a starting point for additional research. Furthermore, what works for me may not necessarily work for another person.

It is important to note that all techniques listed in this document could be helpful for all musicians, and that these are tools to efficiently learn music. After this process was complete, I recognized that this process was a necessity for me and that it has changed my way of preparing music. Furthermore, it is important to understand that the process that I selected was based on how I chose to interpret the music, and that another interpretation of each piece may yield different results.

Tools that may help others with dyslexia and dysgraphia

This is the beginning of a process in which I, as a dyslexic person, explore alternative learning techniques in music. It has taken place over the course of a year. Throughout this process, I have researched these disabilities and have come up with a list of tools and processes that may be helpful for others. I developed some of these techniques when I was learning the music for my third Doctoral recital, and also while thinking about and discovering others afterwards. It is important to recognize that these techniques may also be helpful for someone without either disability. Re-notation, thorough self-editing, and outside motivators were among the most effective tools in helping my learning process for this recital.

After the recital, I started to consider the techniques of grouping notes together, outside editing, and dyslexic music fonts.

Re-notation was the single most helpful technique I used. It had a wide range of forms during this process and included enlarging music, graphing scores, and separating simultaneous voices in the music. Graphing rhythms proved to be the most time and energy efficient technique when learning difficult rhythms. Regardless of the viewer's knowledge of music, graph paper has a built in measuring and relationship system that is instantly recognizable to the viewer.

Thorough self-editing is something that all people need to do when re-notating music. Where information is physically located on the page can make a difference. If a detail is consistently missed, while reading, it is important to acknowledge that specific information may need to be adjusted in the score. The amount of information listed at a specific point may also be a detriment to learning. If there are multiple directions, the engraver should consider ways to visually separate the information. Examples of separation could be moving the information to a different location, having some information with different font characteristics, and using colors to highlight certain information.

Processing a lot of information can be tiring, and using outside motivators can be a valuable tool. Using a stopwatch to limit the amount of time needed to focus before taking a break is a useful tool for me.

Grouping notes together is a visual practice that I began to experiment with after the recital was over. Processing a passage with similar rhythms creates the opportune situation for a dyslexic, or others, to lose their place in the music. (Figure 49 & 50)

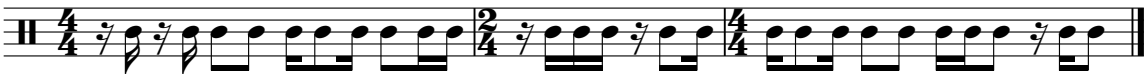


Figure 49: Reading difficulty situation 1. A brief situation where someone may misread rhythms.

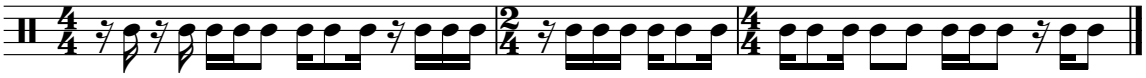


Figure 50: Reading difficulty situation 2. A brief situation where someone may misread rhythms.

By using slurs (or another visual cue) to group notes together, it was easier for me to keep my place in the music. Grouping notes together gives a predetermined quantity of notes an individual identity. When there is more than one group of notes that will be labeled (or slurred), it will be more beneficial not to group the next consecutive amount. Meaning, if you slur groups of three notes the next amount to slur would be five notes, not four notes. Two Figures:

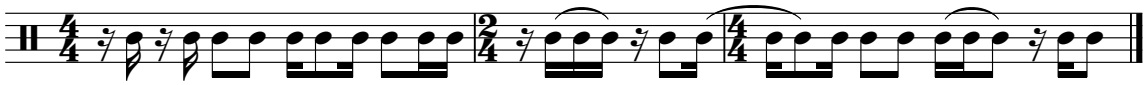


Figure 51: Figure 49 with three note slurs.

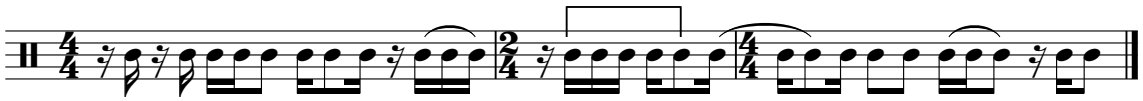


Figure 52: Figure 50 with three and five note labeling.

By grouping notes together, it will be easier to notice the differences of rhythms. This process can simplify the amount of information visually processed. It is important not to over-mark the score, which may present additional reading difficulties.

Using an outside editor can be a useful technique to help notice additional issues that the performer may have, but may not yet be aware of yet. Additionally, people without dyslexia or dysgraphia viewing a re-notated score, may identify clerical issues that the performer is not aware of. After there are reviews of multiple scores, the engraver may start to anticipate consistent issues.

Dyslexic music fonts have had little or no development. There are text fonts for dyslexics that give each letter its own identity.[6] I believe there are possibilities to create a dyslexic music font. For example, several aspects of rhythm that are visually variable, but still readable are: the shape of the note head, angle of the note head, width of the stem, and beaming possibilities. By considering these differences, we can start to come up with a font that could give each rhythmic value their own identity. This system is alterable for pitch as well. Figure 53 is one possibility of a dyslexic font for rhythms.

Figure 53: Dyslexic music font, rhythmic possibilities.

[6] This paper has been written with the dyslexic text font *Lexia Readable*, using font size 11.

Figure 54 is a simple rhythm notated with a common music notation program.

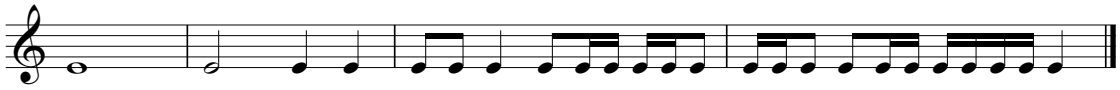


Figure 54: Simple rhythm notated using a common music notation program.

Figure 55 is the same example as Figure 54 with the new note heads.

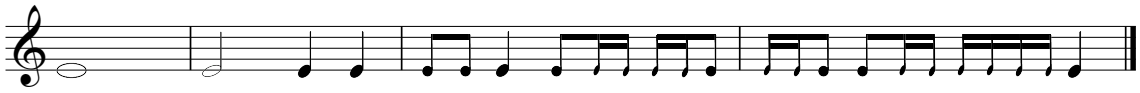


Figure 55: Figure 54 with alternative note heads.

The next step is to combine the notation techniques mentioned above. Using a dyslexic music font, graph paper for spacing, and grouping notes together we have a rhythmic language that is the first step in my exploration for clearer musical notation for people with dyslexia. (Figure 56)

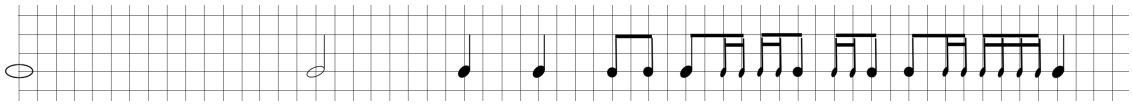


Figure 56: Combined notational techniques notated on graph paper.

Figure 57 is a variation on Figure 56. It shows how thirty-seconds notes could appear, and is notated on a traditional staff.

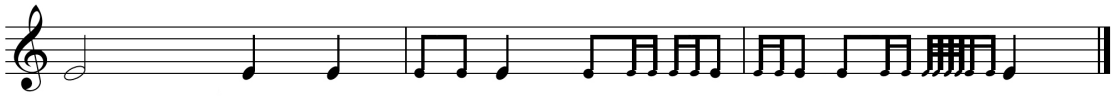


Figure 57: Variation on Figure 56

This research has been my beginning into learning how people with dyslexia and dysgraphia process musical notation. It is my hope that some of the processes I have documented can help others. By exploring these notational issues, I hope other researchers may start to consider these and other aspects, and help other people with these disabilities.

Appendix

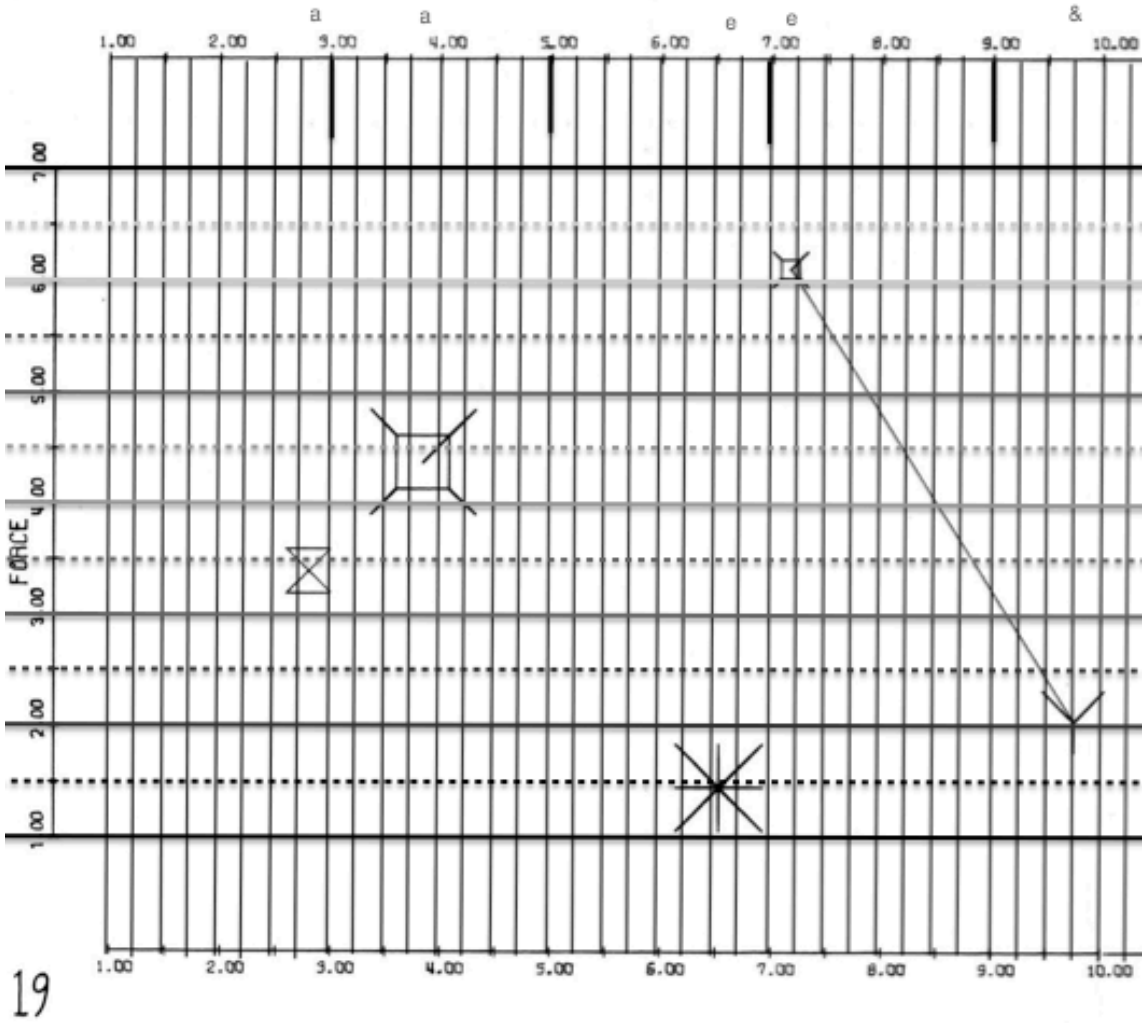


Figure 14: Enlarged version of an excerpt from *Plot*

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