The Impact of Complete Memorization on Student Performance in a High School String Orchestra

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ABSTRACT

The Impact of Complete Memorization on Student Performance in a High School String Orchestra
(February 2016)

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Statement of Purpose

The purpose of this study is to investigate the impact of complete memorization on student performance in a heterogeneous high school orchestra class. *Complete memorization* shall be defined as each individual student's ability to play his or her part of a given piece of repertoire in its entirety without the use of musical notation. A variety of techniques for teaching memorization will be utilized over the course of 6 weeks with one ensemble. Students will be assessed on their memorization progress both formally (with a rubric) and informally as individuals and as a whole ensemble. This empirical study will culminate in a qualitative and comparative assessment of two performances of the same piece of repertoire: one performance *with* musical notation and the other *without* any musical notation.

Rationale

While complete memorization has been the status quo for solo performers for over a century, it is rarely used as a performance practice for large ensembles. In recent years however, there have been instances of professional orchestral ensembles breaking with tradition and presenting critically acclaimed programs entirely from memory. These trailblazing musicians are the inspiration for this study, which seeks to answer the questions: 1) Can this be done with high school students? 2) Will it affect their performance in any significant or meaningful way?

Over the course of six weeks, the Herricks High School Chamber Orchestra students will learn multiple techniques for memorizing their parts to the first movement of Mozart's *Divertimento for Strings, K. 136*. Student progress will be monitored and assessed informally during rehearsals, and formally by weekly video recordings with graded rubrics. At the end of six weeks the orchestra will give two performances of the piece, one with music notation and one without. This empirical study strives to discover if there is a correlation between complete memorization and dynamic musical performance.

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Chapter 1

Introduction

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two performances of the piece, one with music notation and one without. This empirical study strives to discover if there is a correlation between complete memorization and dynamic musical performance.

Expected Findings

As aforementioned, there are two essential questions that this study seeks to answer. With regard to the first question, "can this be done with high school students?" the expected outcome is a resounding "yes" answer. I hope to prove, through empirical evidence, that students are not only capable of achieving complete memorization, but also that they can excel at it. I expect to challenge the notion that complete memorization is a daunting, tremendously complex task reserved only for professional musicians in the highest echelon of the performance industry. With a thoroughly researched pedagogical sequence in the teacher's arsenal, I believe it is possible to teach complete memorization of music to students at the high school level with relative ease.

The second essential question of this study is: "Will [complete memorization] affect their performance in any significant or meaningful way?" The answer to this question is less apparent than the first at the onset of this study. I have no firmly held conviction that there will be tangible results to demonstrate the meaningfulness of this experiment. Meaningfulness is a rather abstract and difficult to define concept. However, I do hope to discover that to endeavor complete memorization is inherently valuable to students as process learning, product learning, or ideally, both. By this I mean that if students are successful at the memorization task, they will either benefit from having learned the various techniques of memorization, gaining a deeper understanding of the musical elements of the piece through it (process learning), or they will be able to give a more polished, musically subtle performance of the piece (product learning). A combination of process learning and product learning will be the comprehensive ideal, even though this study seeks only to discover a means by which to determine if a change in performance has occurred due to complete memorization.

If the study is completely successful, students will be able to memorize their individual parts to the first movement of Mozart's *Divertimento for Strings, K. 136.* They will then also be able to give a performance of this piece, from memory that differs significantly in a positive way from a performance given with the aid of musical notation. If the study is partially successful, students will be able to memorize their individual parts, but the comparative performances will either not differ significantly, or they will differ significantly in a negative way. If the study is not successful, and the students prove unable to achieve complete memorization as an ensemble, I hope to at least be able to conclude that the learning process itself was of value, and added to the students' body of knowledge about the musical elements of the piece and even music learning in general.

Chapter 2

Everything You Ever Wanted to Know about Memorization

The History of Memorization as a Performance Practice

To explain how memorization of musical notation came to be a ubiquitous performance practice, it is first important to understand that in the grander scheme of things, use of musical notation is still but a blip on the radar of music history. Ancient peoples communicated and passed on stories orally long before the advent of the written word, and it is just the same with music. Staff notation is described as having "its roots in the neumatic notations of plainchant and secular song of the 9th–12th century. Neumes were graphic signs indicating essentially the rise and fall of the voice. Their origin lies probably 1,000 years earlier in signs devised by Greek and Roman grammarians to guide declamation" ("Musical Notation"). Simply put, the rudimentary origin of the musical notation we are so accustomed to today can be traced all the way back to the 700s AD, a time of conquest by such illustrious historical figures as Charlemagne and Harun Al Rashid.

However, even though neumes were technically notation, they served as "only a memory aid to singers who knew words and melody by heart" ("Musical Notation"). For the sake of this study, I am therefore going to define the innovation of true music notation as occurring "between the 10th and 12th centuries" when the Encyclopedia Britannica states the developments were made in the neumatic system that actually allowed for sight-reading. Now, in the year 2016, we can estimate that this sight-readable form of music notation is only about one thousand years old, which is still very young when accounting for the entire history of humanity!

Once sight-reading was a possibility, reliance on pure memorization dwindled over time until it became standard procedure to always perform *with* the aid of music notation. Beethoven himself considered it "arrogant to perform without the score" and "explicitly disapproved of one of his pupils,

who could play the composer's entire set of works from memory, as he was concerned that important details in the score could be missed" (Grahn). In another amusing anecdote, "Mendelssohn had an amazing musical memory, but would not let on - before one performance when his score was unavailable, he had a page-turner place a random book in front of him and pretend it was the score" (Grahn). Of course, this study is about the prolific practice of memorization, so the reader can logically guess that at some point musicians reverted back to their non-notational roots. So when did this philosophical shift in music performance happen? Not until the 19th century, when piano virtuosi such as Clara Schumann and Franz Liszt "sparked the trend" in an effort to appear more prodigious at their solo performances (Grahn).

This new trend gained popularity instantly in the performing community, as musicians sought to increase their own popularity (read: monetary gain) by using complete memorization as an ostentatious performance gimmick. It spread from piano recitals to other instrumental performers. Today, "memorization is ingrained in the protocol of classical music performance. Singers, solo pianists and concerto soloists are usually expected to play 'by heart'" (Tomes). In the span of just a few centuries, musicians went from complete reliance on the invention of musical notation to the complete eschewing of it. The reason the memorization trend stuck around though is not quite as simplistic as its flashy origins might lead us to believe. There are many valuable, artistically meritorious benefits of complete memorization that contribute to its enduring acceptance as performance practice.

The Pros and Cons: Why Memorize?

When I decided to begin this study, which entails teaching high school orchestra students to memorize music completely, one of my first thoughts was "my students are going to hate this." I was confident that they viewed memorization of music as a negative stressor, and an unnecessary one at that. I was, unfortunately, correct. To attempt to quantify this, I put a very informal, non-scientific poll in the

field, asking for a show of hands in response to my prompts in my Chamber Orchestra class of 35 students. The breakdown was as follows:

Figure 1	Informal Opinion Poll on 35 students
"How many of you would say that you memorize music easily?"	4 students
"How many of you would say that you have difficulty memorizing music?"	28 students
"How many of would say that you are unable to memorize music?"	3 students

Of course I am aware of how little empirical data this poll actually provides. For one, the sample size is too small, and for another, my questions were not thoughtfully worded, and did not allow for any "grey area" categories into which the students would actually fall. However, it served as an interesting starting point for my study, and it immediately made me eager to change their minds and allay their fears. I wanted to prove that the "Pros" outnumbered the "Cons."

In her article "All in the Mind," concert pianist and writer Susan Tomes outlines a few of the "cons," or reasons why memorization can be more trouble than it's worth. She writes: "The growing taste for watching soloists play from memory has actually narrowed the breadth of the repertoire. Vladimir Horowitz, for example, played a huge number of works at home from the score, but only performed a small repertoire from memory in public. Today many soloists won't commit themselves to more than a handful of works each season, no doubt partly because of the burden of memorization.". Aside from her contention that the practice of memorization is, in essence, shrinking the body of works that an audience will get to hear, she also brings up a very interesting point about a fear of the permanency of flaws: "the pressures are much worse today than they were in Clara Schumann's day. After a century of recording, the record-buying public has been trained to expect perfection, whereas earlier audiences didn't mind if things went occasionally awry" (Tomes). I can personally attest to the fact that I find it incredibly painful to listen to a recording I made in college of Saint-Saen's *Violin Concerto No. 3* that contains a slight

memory slip in the first movement. Knowing that if you do make a slight error it will live on in recorded perpetuity is certainly an added stressor when considering performing completely from memory.

When I think about the negative aspects of memorization listed above however, I remember that my high school students are neither recording artists nor professional recitalists with a breadth of repertoire. What then, is their reason for dreading memorization? Stephen Hough, writer and concert pianist, has created a list of potential reasons performers prefer to not memorize. Below are the ones I think are most relevant to my students:

> **Some arguments for using the score**
> 1) It takes away the fear of forgetting, liberating the mind to concentrate on the music itself.
> 2) It enables the player to play what's really there – constantly to discover (to uncover) anew the message left in code by the composer.
> 4) It makes the act of playing totally focused on the music being produced, not on the skill (or not) of remembering. In certain works we have to find tricks to distinguish slight differences of phrasing or note patterns – these are often abstract issues having nothing to do with the content of the music (Hough).

Of all of the reasons listed, “fear of forgetting” seems to me to be the most compelling, and probably the likeliest culprit for my students’ reluctance to memorize. Rational or not, it is difficult to argue against a feeling.

On the opposite end of the feelings spectrum, famous pianist Clara Schumann “felt that playing by heart gave her wings power to soar” (Tomes). Clearly, something about playing without musical notation is liberating for many musicians, or it would not have become so popular. In her article on memorization, Sarah Freiberg interviewed a number of professional musicians who echoed this sentiment:

> "I feel it makes a more direct connection between me and the audience, and it allows me to be a better medium between the music (or the spirit of the music) and the audience."
>
> "Memorizing frees you up from what is on the page. It can heighten your improvisatory nature. Maybe it just frees the imagination."
>
> “The audience interacts more with the players when there are no music stands between them. The audience loves it.”
>
> "Playing from memory is a guarantee that the music is prepared at a certain level. It's a way of not letting myself get away with anything in preparation” (1).

That last reason, guaranteed preparation, is my personal favorite and the most convincing argument I have read for memorizing music in a school setting. To learn a piece of music so well that you have not only every note memorized, but also every articulation, dynamic marking, and stylistic subtlety of phrasing is to truly know and understand the work of the composer on a profound level. This level of memorization is discovery, not simply regurgitation. Mark Rush, a violinist and professor at the University of Arizona "believes that memorization is valuable for musical reasons, too…'When you play from memory, you're liberated from the printed music, so you can pay more attention to the sound and expression'" (qtd. in Reel).

While it's not undoubtedly clear that the pros of memorization outweigh the cons, I can only hope that this study will encourage my students to discover the heightened level of musical understanding described by Freiberg and Rush, and help them to pay more attention to their level of artistry, the final product that they are presenting in performance.

Memorization Techniques

There are numerous ways to teach memorization of music that range from repetition and basic rote learning to complex harmonic and structural analysis. In this section I will outline some of the tried-and-true pedagogical methods, and my interpretations of them. Ultimately, I expect to find that a combination of multiple techniques will work the best with my own students, since they each have different learning styles, prior knowledge, and comfort zones.

"Brute Force" is the amusing title Martha Beth Lewis, Ph.D., gives to the repetition method. She writes, "this is probably the most common method. The piece is repeated over and over, usually in the course of learning it, so that one day the student finds that it is memorized. She did nothing in particular to memorize. It just happened" (Lewis). This definition might be a bit simplistic. There is a great deal of music learning that goes into performing a piece entirely and successfully *with* music notation before one

can even arrive at this step. “Brute Force” assumes that the student has already arrived at a point of competent performance and from there, enough bombastic repetition can result in kinesthetic memorization that is reliable enough to result in a perfectly memorized performance. Prior to beginning this study, my only experience with teaching memorization was through brute force. I remember vividly spending an entire class period one week on the opening twelve measures of Copland’s *Hoedown* with my Chamber Orchestra. They could play it, but were not totally consistent with their rhythmic precision. We played it over and over until I felt that they were “programmed.” Looking back at the *Hoedown* experience and knowing what I know now, I might have taught them memorization a bit differently. Stefanie Dickinson writes, “students too often overly rely on kinesthetic memory. This often involves entering into a mesmerized state, shutting off the logical-rational part of the brain…While there is a general consensus that kinesthetic memory is essential, it is, by itself, unreliable. All memory types must be involved in the memory process”(271). In short, brute force can work, but why stop there when there are more ways to offer memory insurance?

If a piece is not memorized through sheer repetition, “at this stage segmentation of the piece appears common…Segments of a piece of music are repeated until remembered and linked to form a whole or increased in length during the rehearsal period” (Mishra). For the purpose of this study, I will refer to this method as “Segmentation & Linking.” While still based very much in the practice of repetition, Segmentation & Linking delves deeper into music learning and requires more planning and sequencing. It is essentially strategic repetition. The musician chooses a small section to work on, and then decides the most effective way to connect it to previously learned sections. Chaffin and Imreh write, “Segmentation varies with the formal structure and difficulty of the piece. Larger formal segments may be fragmented into smaller sections when technically challenging” (qtd. in Mishra). To put it more simply, segmentation is like triage. Each individual will determine what their own needs are and segment and link in their own way. In Chapter 3, I describe specifically how I chose to segment the Mozart piece into larger

sections, for example, choosing to first work on the Exposition only, and then smaller sections within the larger to best facilitate memorization in my students.

Both memorization techniques described thus far have been repetition-based. The next strategy, which I will call Visual Reduction, gets the musician away from this grind of repetition and utilizes analytical vs. kinesthetic ability. In her article, "A Multi-Level Approach to More Secure Memorization," Dickinson describes in great detail how she makes a reduction of a piano score by reducing "melodic lines…to progressions of harmonic intervals" (275). She then goes further into the realm of music theory by adjusting "the rhythmic value of each note in the reduction so that it extends until the next note." All of this starts to seem sophistic and complicated rather quickly! What I chose to take away from Dickinson's model is a more user-friendly method of reduction based on what my students already know. For example, as part of teaching aural training, I use my fingers to hold up numbers that correspond to scale degrees/pitch integers, and the students must either sing or play the correct pitch that I am signaling. I consider this a form of visual reduction. Thus, if a student is having trouble remembering that the progression of notes is sol-do-re and I hold up my fingers in order, 5-1-2, they now have an extra visual to help them perform the correct pitches. With regard to form, my students will be able to create basic phrase diagrams to help them remember the overall structure of the piece, and which sections go in what order.

The final memorization technique to appear frequently during my research was Literal Transcribing. I did not see the value in forcing my students to be able to exactly copy down the piece in written notation, as that is a huge time consumer, and also requires penmanship skills that I have not taught. I made the decision to focus more on the aural theory strategies and less on the written theory strategies because they seemed more easily achievable and more pedagogically relevant to my purpose. Thus, when I began to design the sequence of teaching for this study, I chose to use the following

techniques, in the following order (basically, macro to micro) and ultimately simultaneously: “Brute Force” repetition; Segmentation & Linking; Visual Reduction.

Chapter 3

The Process and Product

Herricks Chamber Orchestra Background Information

For this study I chose to work with my most advanced pupils, the students in the Chamber Orchestra, an audition-only ensemble. I made this decision because I wanted to set a consistent base level of prior theoretical musical knowledge that I knew these students all possessed. The Chamber Orchestra students range in age from the 10^{th}-12^{th} grades and this is my second year teaching them. There are 35 students total; the instrument breakdown is as follows: 2 bassists, 6 cellists, 8 violists, and 19 violinists. All but a few of the students currently take private lessons on their instruments outside of school, and many also participate in youth orchestra programs. Due to the fact that they have all had one year of instruction with me, I could be certain that they knew relevant music terminology and had a certain degree of aural theory training for the purposes of this short, six-week experiment. Had I chosen one of my other classes, I would have spent about that much time teaching them aural theory basics before we even talked about memorization. Another consideration was that the Chamber Orchestra students would show up to the very first day of school already able to perform their repertoire *with* musical notation at a high level, because I require summer practice assignments from this class. Over the course of the first six weeks of school, the Herricks Chamber Orchestra participated in the study, outlined in detail in the following section.

Sequence of Procedures and Events

During the first week of school (September 2-4, 2015), the Chamber Orchestra students were tested on their summer assignment, which included the most technically challenging excerpts from Mozart's Divertimento K. 136, Movement 1. I chose to use this piece for this study due to its relatively simple structure (Exposition, Development, Recapitulation), and tuneful melodic content. I tested them on

their parts right away because I wanted to make sure each of my students was already capable of performing the piece *with* musical notation before we started the intensive memorization process. The test was out of 40 points, and no student scored below a 35, which enabled me to feel comfortable moving forward with the study.

In the second week of school (September 8-11, 2015), we rehearsed the piece extensively, using music notation the entire time. I wanted to ensure their comfort with their part not only individually, but also as a whole ensemble. I recorded in my conductor's score that we played the piece through from the beginning to the end thirteen times (this number does not include instances where we only rehearsed partial sections). Also during this second week, I explained the details of the study to the students. We discussed their apprehensions and I tried to dissuade them from any negative preconceived notions about their own ability to memorize music (see Figure 1). While the students expressed doubt in their own individual memorization abilities, they were all eager to participate and at least try!

In the third week, the memorization portion of the study could finally commence. I outlined my intended pedagogical sequence very specifically (Appendix A, Table 1), using the basic form of the piece- Exposition, Development, Recapitulation- as a larger framework. Then, I further divided each of these larger segments into smaller, more manageable sections music by logical phrasing, but also by scanning for "trouble spots" that I thought the students might find challenging. While these goals seem lofty in retrospect, the basic plan was for the students to have the entire Exposition memorized by the end of the third week, the Development by the fourth week, and the Recapitulation by the fifth week. In the sixth week I planned on only reviewing and polishing spots as necessary, spending more time preparing the rest of the repertoire for our culminating performances.

Aside from laying out a basic schedule of what sections to complete by what day, I also included in this chart (Table 1) an outline of which memorization method(s) I intended to utilize during teaching. You can see that from the beginning I put the most emphasis on the "Brute Force" method, with a

Segmentation & Linking follow-up. This was because during the second week I had observed my students carefully, and I could already tell that the constant repetition was having an effect and some students were unintentionally playing from memory! I didn't think I was going to need to draw them diagrams or create symbols on paper to help them remember the Exposition. Later on, in the Development I anticipated a few sections that were more intricate harmonically, and for these sections I planned on using Visual Representation with the students as well.

Table 2 in Appendix A shows my "Field Notes" for the third week on the Exposition Section. I chose to use this simple system of tracking data because it's quick and efficient; stopping a rehearsal class to take notes about what is happening and what needs to happen next just wasn't plausible. For my field notes, I chose to keep track of the measure numbers, the memorization method I used, any measures where the method proved insufficient, and a plan to follow up on such spots in the future. As you can see in Table 2, there are a number of sections where it was strikingly easy for the students to simply recall their parts and perform from memory with complete ease, but there are also quite a few sections that I flagged for follow-up with a different method.

The basic formula was to work on the first of the four sections of the Exposition with the "Brute Force" repetition method, then link it to the second, and so on. I alternated between letting students use their music and asking them to play without the music. I started out having the entire orchestra play together, and then divided the orchestra into smaller groups for informal evaluations of individuals, by having only the inside partner of each stand play, and then switching with the outside partners. I further narrowed it down until there was only one on each part, always alternating with the full ensemble playing to reinforce and review. Although it sounds like a long, tedious process, to do this with one twelve-bar section of music only took about ten minutes of class time. By then, I had a basic idea of which students were succeeding and which were having difficulty. For the first section, measures 1-12, there was a near perfect success rate. They all seemed to know the beginning of the piece very well! I only flagged

measures 11-12 for follow-up in the first violin section, due to some incorrect pitches in the 16th note run (see Appendix B to view the score).

In measures 13-20, I used the exact same procedure, flagging the whole section for follow-up with the lower strings since they were not all clear on when exactly their notes changed. I had expected this issue to occur here since their parts are repetitive, but not at all melodic. It is infinitely more difficult to memorize harmonic chord changes than a tuneful melody. The first and second violins did a commendable job on their runs in measures 17-20, but I flagged these for future work as well due to a few incorrect pitches.

The third section, measures 21-22, is very short and was easy to accomplish. I specifically chose to isolate these measures because they are canonical in form, and I wanted the students to fully understand the pattern that was being passed from section to section. They demonstrated an excellent grasp of this section as an ensemble, so I heard individual players perform it from memory to ascertain for certain if any students were faking, or being pulled along by stronger players. The final section of the Exposition, measures 23-36, was mostly memorized already, except for a few slight mistakes in the lower strings from 31-36. This was another instance of harmonic structure that I flagged for follow-up with a different method.

The entire procedure outlined above occurred in one forty-four minute class period and gave me a very clear idea of what was already memorized in the Exposition section and what sections needed additional work with a different memorization technique. Sections that were flagged for follow-up were either addressed on the next day of class in rehearsal, or addressed in a scheduled sectional. Occasionally, if it was not possible to schedule a group pullout lesson with a particular section, I required the students to submit video recordings, playing the excerpt a certain number of times from memory. From September 16-18, the class was focused on working out any sections that were not completely memorized, and then

linking them together until the Exposition was complete. For the Development and Recapitulation sections, I used the same process over the next two weeks, outlined in Tables 3 and 4, respectively.

In general, with this group of high achieving young musicians, pure repetition with Segmentation & Linking was enough to enable them to perform accurately from memory. However, as you can see in the Field Notes, there were five separate instances where I chose to use a Visual Representation method as well. In measures 13-20, for example, when the cello and bass sections were having trouble changing their pitches at exactly the right time, we took pencil to paper and drew a very basic diagram of the pitch movement within each measure (refer to Appendix B to see the actual score). Since the piece is in the key of D Major, the pitch integers are as follows:

Figure 2 Pitch Integers

D	E	F#	G	A	B	C#
1	2	3	4	5	6	7

The diagram below uses boxes to represent full measures. The numbers within each box represent the pitches (as listed above), with dashes to indicate repeated eighth notes.

Figure 3 Visual Representation of Pitch Integers

Measures 12 - 20:

1-------	1-------	2-------	2------4	
5---7---	6---4---	5---7---	6---2---	5

Once the students had this basic diagram in front of them, they played the excerpt while looking only at this Visual Representation. After a few repetitions with the diagram, we removed it and tried again from memory. The act of simplifying the music notation into a different kind of symbolic notation served very well to help solidify the excerpt in their memories. The final step in the Visual Representation process for

this section was for me to act as the visual and give them the symbols as they played. I had them watch me, and used both hands to hold up fingers to correspond to the correct pitch integer. For fun, we took turns having the students be the "leader" who got to hold up the integers. Their ability to do this with ease made it very clear to me that the students had a strong understanding of the correct sequence of notes.

In the sixth and final week, I used rehearsal time to review all of the follow-up spots in isolation, and then linked them within their larger section. We performed the piece in its entirety, from memory, approximately 12 times. The Chamber Orchestra gave its first public performance of Mozart's Divertimento K. 136, Movement 1, on Wednesday, October 14th, 2015. For this performance, the orchestra utilized sheet music and did *not* perform from memory. One week later, on Wednesday, October 21st, 2015, the Chamber Orchestra gave its second public performance of the same piece, without the aid of sheet music, and utilizing complete memorization.

Comparative/Qualitative Performance Assessment Data

By the evening of the first Chamber Orchestra performance, I was completely confident that my students had all been successful in their complete memorization of the first movement of the Mozart Divertimento. We had gone through an intense but thorough process of learning to memorize each section, and then combining them to form the whole. I had seen videos of the students performing from memory at home, watched them do it in class and group lessons, and even heard them singing their parts in the school hallways. I knew they could do it, and I was so proud of their achievement already. Even so, at the urging of a few of my colleagues (advice which I almost regret taking now!), we performed the piece *with* sheet music at our first public performance of the year- the Tri-M Honors Ensemble Concert.

I was very pleased with the performance, and the students, parents and community, gave a lot of positive feedback to the orchestra. I was pleased to note the audience seemed particularly receptive to the Mozart. Perhaps even with the music, studying a piece at such a detailed level creates a more refined

performance? I certainly believe this to be true. I recorded audio of the concert performance as data to analyze later and use as part of the comparative study.

One week later, the Chamber Orchestra gave a second performance of the Mozart; this time *without* the sheet music, relying completely on the students' newly minted memorization skills. Unfortunately, we were unable to replicate the same situational pressure of the first evening concert. This performance had to be given during the school day, and our audience was made up of the students' peers from the Band and Chorus classes, who came into the auditorium to listen and partake in the grand experiment, rather than parents and administrators. While this is intangible, unempirical evidence, my impression of this second performance was infinitely more positive. I could sense the students' excitement, and I remember feeling, while on the podium conducting, that this performance was so much more energized and so full of passion! I recorded audio of this concert as well to analyze and compare against the audio from first performance.

To compare and contrast the two audio recordings, I created a rubric (see Table 5) and enlisted the help of my colleague and Assistant Teacher, Alan Kunins, to be my second rater since he was not involved in this project with this class. I felt that if I were the only rater, the study would show too much bias and I wanted an unbiased, but informed opinion to ultimately average with mine. Alan and I each took the rubric and rated both recordings on the following criteria: notes/intonation; rhythm/pulse; bowing/articulation; and musicality (phrasing, dynamics, etc.). For each of these categories we ranked the performances on a scale from 1 – 10 (1 being unacceptable and 10 being exceptional). In Table 5, you can see from the generally high ratings that both Alan and myself were obviously pleased with both recordings and thought them of high quality. Ultimately, when our ratings in each category were averaged together and added up, the second performance came out one point ahead of the first performance. This result did not surprise me. I expected to like the memorized performance better, but I also expected that the margin would be slim and that it would be rather hard to rate subtle differences in musical

performances with only a rubric and two-rater system. Even with this basic system, however, I was pleased to see the data confirm what I expected to find.

Results

The first performance, *with* musical notation, had points deducted in two categories: Rhythm/Pulse and Musicality. There were no actual rhythmical errors in either recording, so I postulate that when students are staring at their sheet music, they get bogged down in it and the overall pulse slows down. Even though the students knew this music intimately, I contend that there is still something psychologically daunting about visually seeing 16th note runs, with shifting, on the page and so the students unconsciously slow down slightly to accommodate the "difficult" part. While the slowing of the pulse was not drastic, both raters noticed it and deducted points. With regard to the deductions for Musicality, I believe that when students are looking at their sheet music more, they are watching the conductor less, and thus missing some of the subtle phrasing that can only be achieved when an entire ensemble takes in the same information simultaneously in a live setting. I am on the podium clearly indicating that a note should be gently tapered off, but some of the students are focused on their sheet music, only some of the orchestra will do it, and this will greatly affect the musical outcome that the audience hears.

The second performance, *without* musical notation, also had points deducted in two categories: Notes/Intonation and Bowing/Articulation. Again, I am not surprised by these results. The likelihood of getting 35 high school students to completely memorize a complex piece of music with zero note errors was always incredibly low! Listening to the recording, you would have to know the piece well to pick up on incorrect notes, but both Alan and myself admit that we heard a few very minor note errors in the recording, and thus both deducted one point. Only one rater deducted one point for Bowing/Articulation. One possible explanation for such an error is that a student or multiple students did not perform a bowing

correctly (ex: a double up-bow) because they could not remember it and one of the raters was able to perceive that in the audio recording. Or, perhaps an articulation that they did remember simply sounded sloppier than it should have because the students were hyper-focused on so many other things.

Whether or not we are able to accurately explain the reasons for each point deduction is a rather moot point in the grand scheme of this experiment. What the Comparative Performance Rubric tells me is that this experiment was successful, by an empirical margin of one point, but also by a much greater margin of positive feelings on the part of my students and myself. I am less interested in the fact that one point was deducted from the "Notes/Intonation" category of the second performance recording and more interested in the fact that both raters agreed on the fact that the second recording was musically strong, and enjoyable. No points were deducted for "Musicality" during the memorized performance, and to me as the teacher that means everything. It confirms my conviction on the podium, that the memorized performance was energized, subtle, and passionate. This was a huge achievement for my students.

Chapter 4

Conclusion

In 2012, the University of Maryland Symphony Orchestra attempted a high profile memorization experiment "in a fully choreographed and critically-acclaimed performance of Debussy's *Prelude to the Afternoon of the Faun*…They discovered that playing from memory while moving onstage, while challenging, actually improved their ability to communicate with and listen to each other" ("Appalachian Spring"). Classical music critic Anne Midgette of the Washington Post called the performance "one of the standout performances of my many years in Washington." In 2014 the UMSO repeated this incredible feat of memorization in a similar project with Copland's *Appalachian Spring.* I read articles on and have watched video from both of these performances. It stuck with me. I wondered why professional orchestras don't try an experiment like this. Midgette writes that "few professional orchestras are willing or able to devote the kind of time it takes to present the kind of fully integrated performance the University of Maryland will present… 'Innovation requires time,' Lerman says. 'I don't know that the [players] would love memorizing.' For the record, the Maryland students committed the 23-minute piece to heart eagerly, and have been coming up with all kinds of suggestions on their own" (Midgette). Upon reading this quote, I immediately thought: "my students could do this too."

My own study set out to prove that *complete memorization* of a piece of music by high school students in a string orchestra is not only possible, but also creates a meaningful outcome in performance. I had every hope that the meaningful difference was dynamism, that a memorized performance would energize the musicians and the audience, and connect the musicians more to the music being played. Of course, before we could get to a place where it was possible to compare and contrast musical details in performance, it was necessary to first achieve *complete memorization.*

Is it possible? Yes, absolutely. In fact, throughout this entire study I marveled at how stress-free the process was. The students, many of whom had been ambivalent at best about this endeavor when they first learned of it, took to the memorization methods quickly and easily. It did not require Herculean efforts, or even much out-of-the-box thinking to help them memorize an entire movement to a Mozart Divertimento. It simply required a specific, detailed sequence of events that included follow-up plans, and a good dose of patience. Not every day was one of amazing day of memorization discovery, but every day was another clear step toward a clear goal that the students obviously didn't feel was beyond their reach. Of course, the specific population of students I worked with for this experiment had a wonderful arsenal of prerequisite skills that enabled complete memorization to happen in six weeks. I would never have even attempted this study with my Freshman Orchestra or less advanced Concert Orchestra, because my essential goal for them is simply to have the notes on the page learned with no glaring mistakes in six weeks!

Looking forward though, I absolutely do intend to replicate this study with my other students, and I would encourage all teachers to at least attempt it in a limited way. I have learned so much from teaching in such a sequenced, detailed way, and I feel confident that with some adjustments and a longer timeframe, *all* of my students could accomplishment a version of this goal. For example, in my Freshman Orchestra class the first violin section had a particularly difficult technical passage in one piece, and we simply memorized just that small part. It gave them such ownership of their own playing. They understood that not only could they play that hard part, but that the part was in them and they could produce it any time and anywhere. For my part, I loved the feeling of conducting and having my students' eyes all looking up, and not just watching, but actually taking in the information that was being fed to them in real time from my baton and gestures. The students in Chamber Orchestra are asking to do it again. They are going into their Solo Evaluation Festivals feeling confident, and many have told me they plan on memorizing their piece, when they wouldn't have before. Why? Of course, it looks more

impressive, but interestingly, many of my high school students echoed Clara Schumann's sentiments: it freed them from merely playing notes and rhythms and allowed them to truly make music. I always expected that my students could do this, I always expected that it would be good for them musically, but the delightfully unexpected result was how empowering it was for all of us.

Appendix A

Tables and Charts

Table 1 Planned Teaching Sequence

Overall Form	Sections by Measure Numbers	Planned Technique to Use	Planned Date of Completion (2015)
Exposition	1 – 12	BF	Week 3: Sep. 16-18
	13 – 20	BF; S&L	Week 3: Sep. 16-18
	21 – 22	BF	Week 3: Sep. 16-18
	23 – 36	BF; S&L	Week 3: Sep. 16-18
Development	37 – 47	BF	Week 4: Sep. 21-22 and 24-25
	48 – 51	BF; S&L; VR	Week 4: Sep. 21-22 and 24-25
	52 – 63	BF; VR	Week 4: Sep. 21-22 and 24-25
	63 – 64	BF; S&L	Week 4: Sep. 21-22 and 24-25
Recapitulation	65 – 77	Identical to 1-12	Week 5: Sep. 28- Oct. 2
	77 – 86	BF; S&L; VR	Week 5: Sep. 28- Oct. 2
	87 - 88	BF	Week 5: Sep. 28- Oct. 2
	89 - End	BF; S&L	Week 5: Sep. 28- Oct. 2

Key:

BF "Brute Force" method

S&L Segmentation & Linking method

VR Visual Reduction method

Table 2 Exposition: Field Notes

Measures	Method Used	Follow-Up Flags	Follow-Up Plan
1 – 12	BF	11-12: Vln 1 notes	Vln 1 Sectional, more BF
13 – 20	BF; S&L	13-20: Vla, Cello, Bass notes 17-20: Vln 1 and 2 notes	VR Vln 1 and 2 Sectional, more BF
21 – 22	BF	None	None
23 – 36	BF; S&L	31-36: Vla, Cello, Bass notes	VR

Table 3 Development: Field Notes

Measures	Method Used	Follow-Up Flags	Follow-Up Plan
37 – 47	BF	None	None
48 – 51	BF; S&L	48-51: Vla notes 48-51: Vln 1 notes	More BF, S&L Vln 1 Sectional, BF
52 – 63	BF; S&L; VR	52-63: Vln 2 notes	Vln 2 Sectional and Video Assignment
63 – 64	BF	None	None

Table 4 Recapitulation: Field Notes

Measures	Method Used	Follow-Up Flags	Follow-Up Plan
65 – 77	None (Identical to 1-12)	None	None
77 - 86	BF; S&L	81-86: Vlns 1 and 2 notes 81-86: Cello, Bass notes	Vln 1 and 2 Sectional, BF VR
87 – 88	BF	None	None
89 - End	BF; S&L	97-101: Vla notes	VR

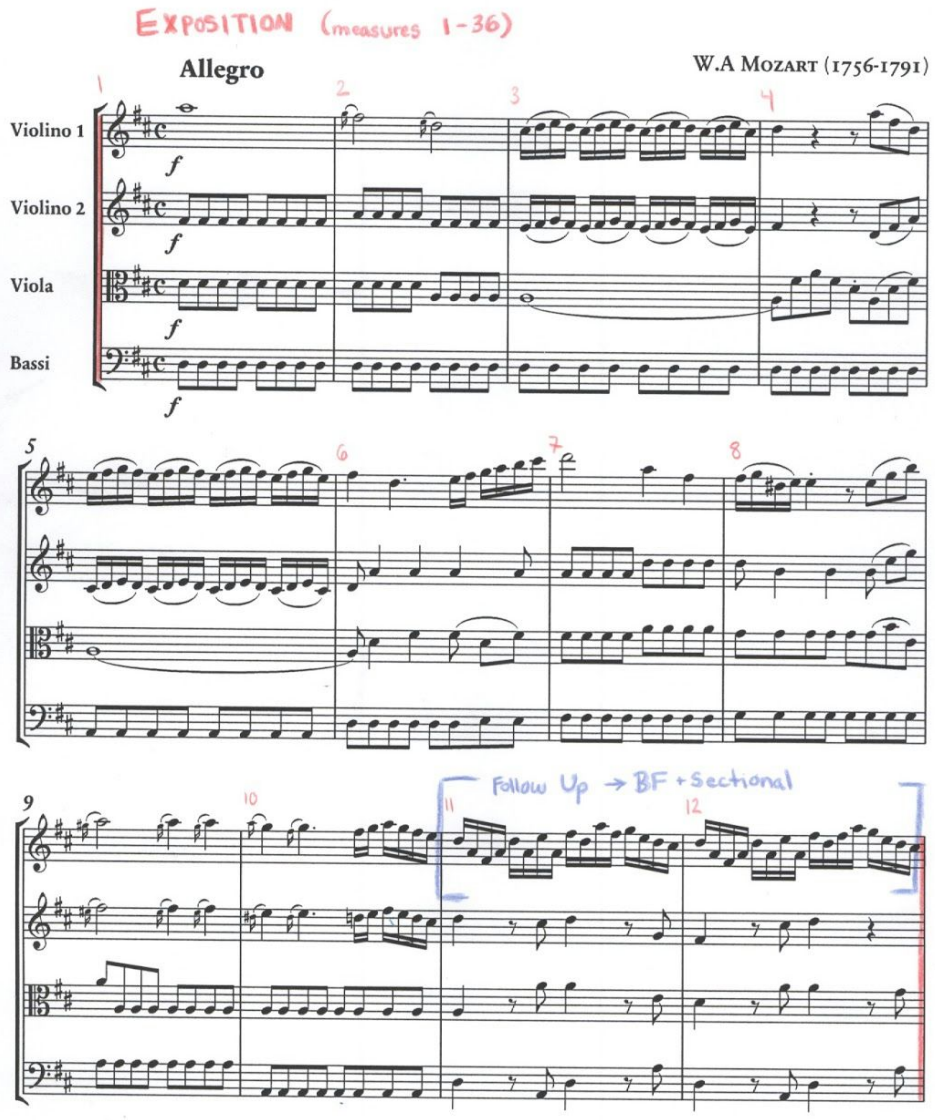
Table 5 Comparative Performance Rubric

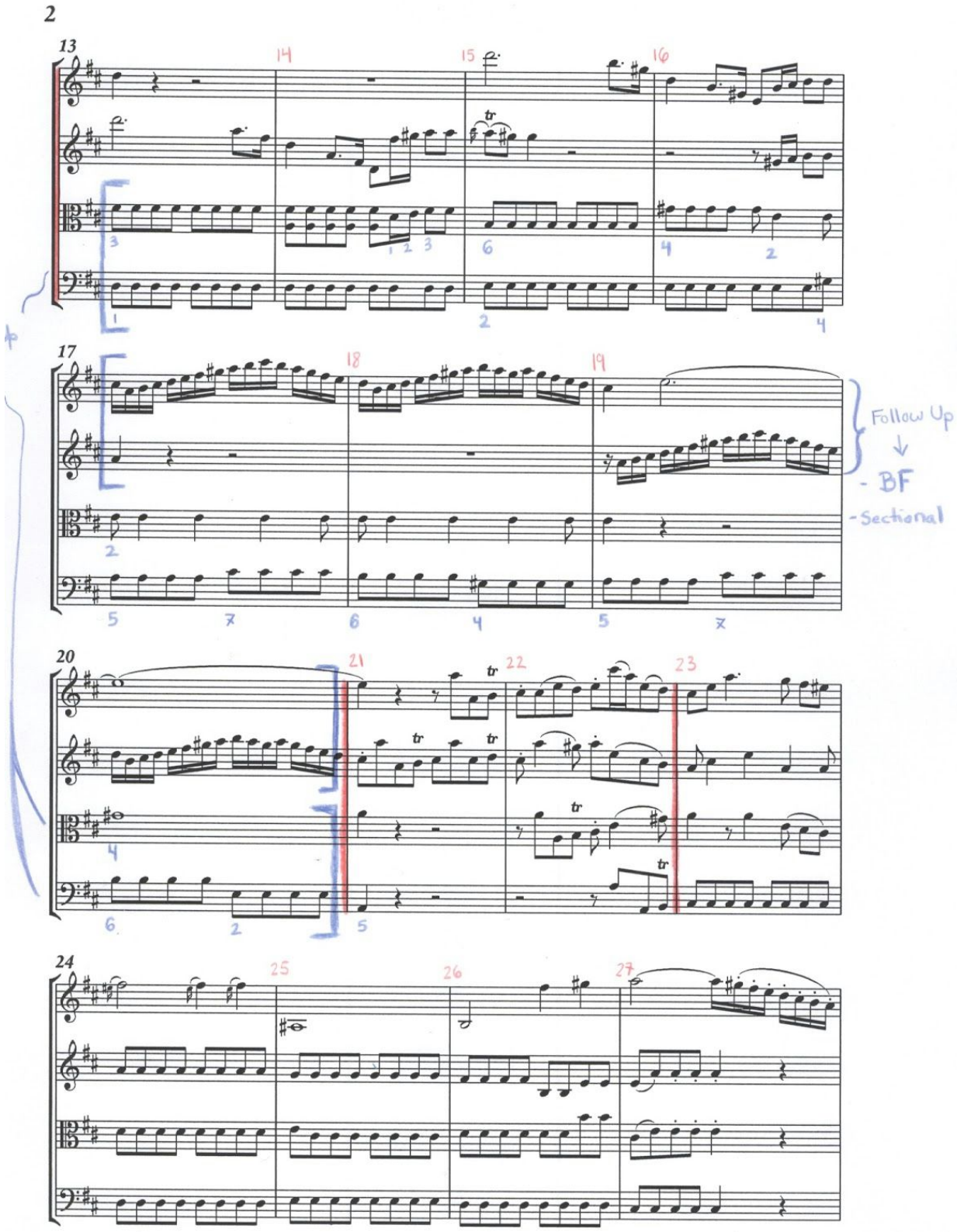
10: Exceptional----------1: Unacceptable

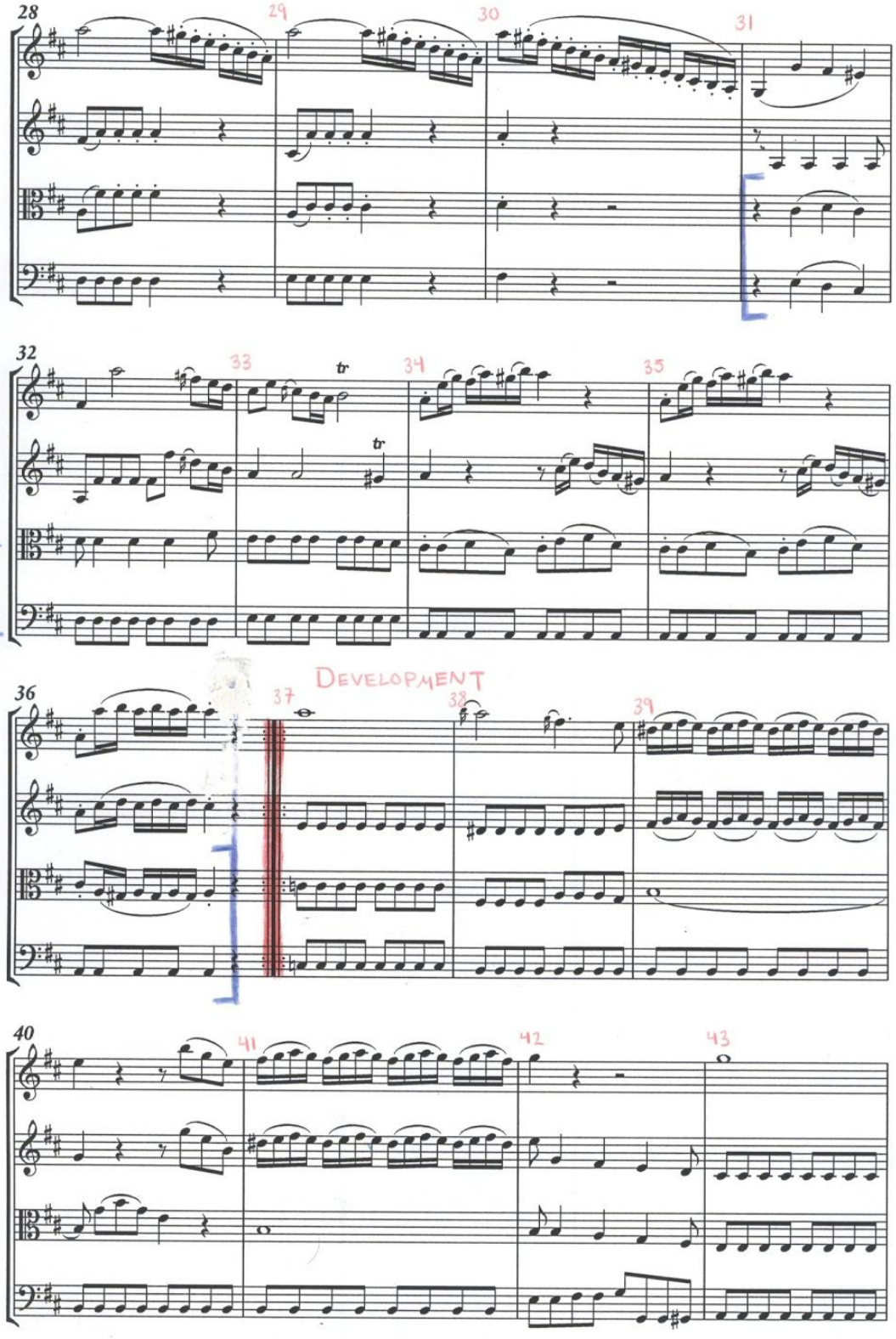
Point Categories	**Performance #1** *With sheet music*	**Performance #2** *Without sheet music*
Tone	**Rater 1: 10** / **Rater 2: 10** / **Average: 10**	**Rater 1: 10** / **Rater 2: 10** / **Average: 10**
Notes/Intonation	**10** / **10** / **10**	**9** / **9** / **9**
Rhythm/Pulse	**9** / **8** / **8.5**	**10** / **10** / **10**
Bowing/Articulation	**10** / **10** / **10**	**9** / **10** / **9.5**
Musicality (phrasing, dynamics)	**9** / **9** / **9**	**10** / **10** / **10**
Average TOTAL	**37.5/40**	**38.5/40**
Percent	**94%**	**96%**

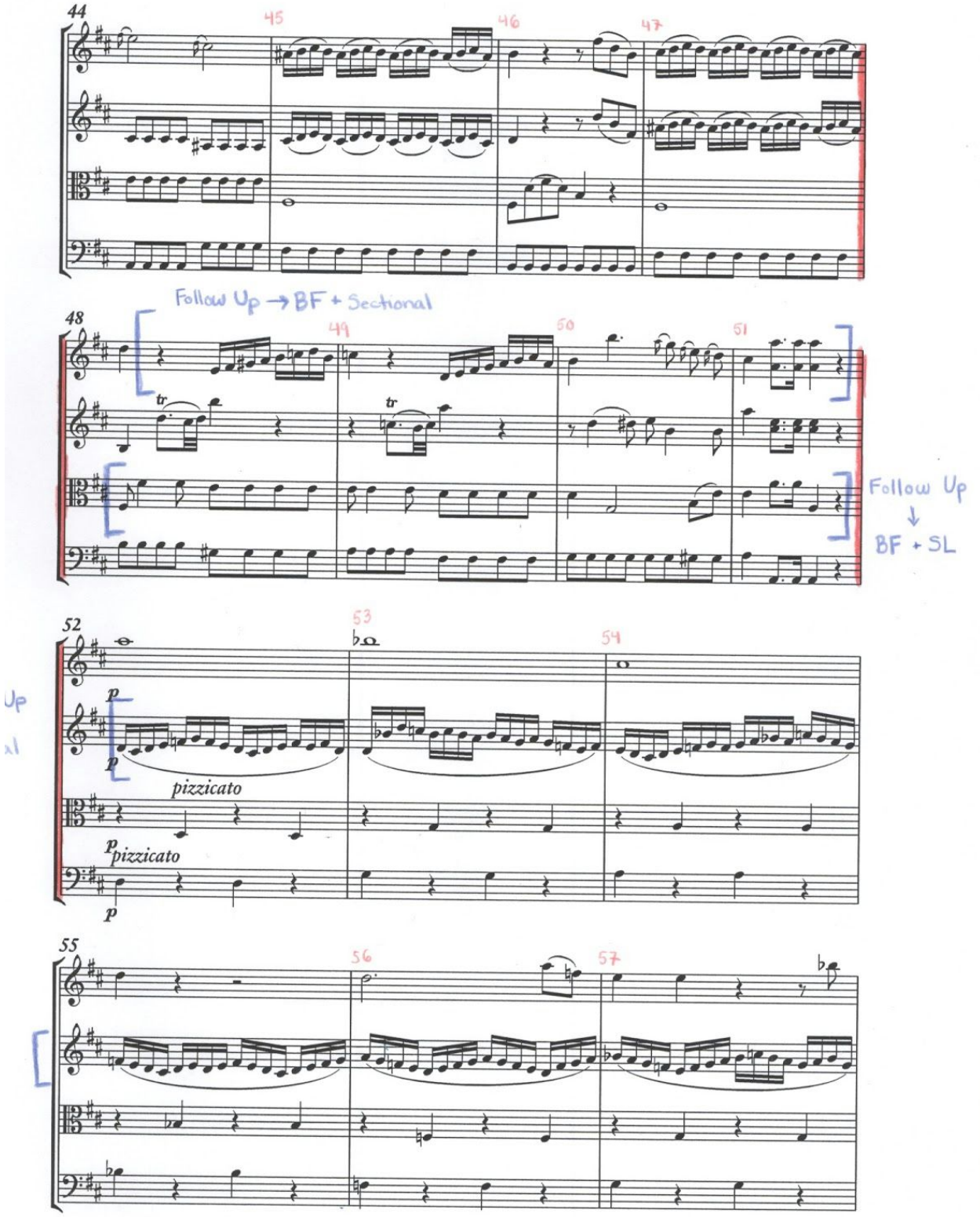
Appendix B

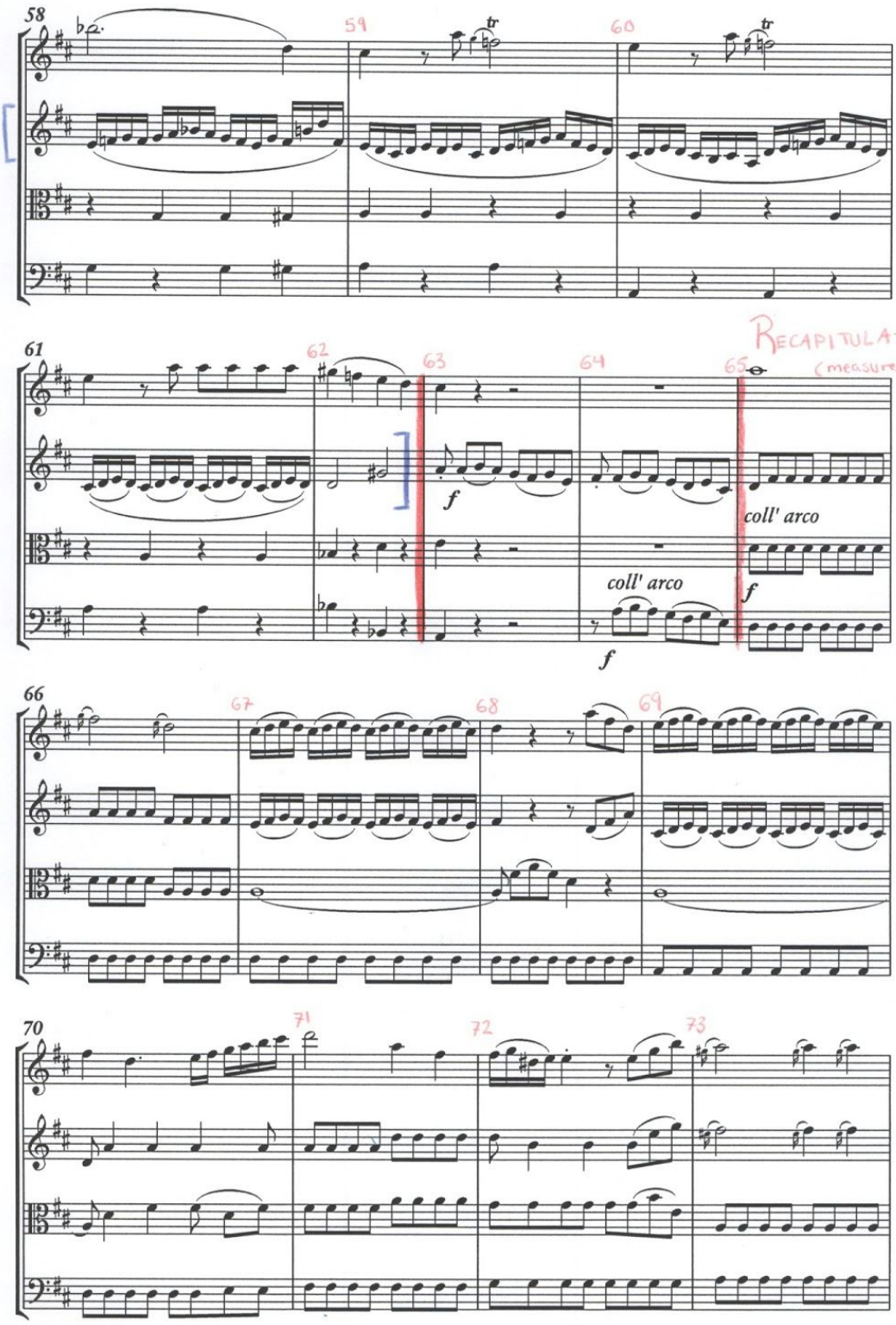
Annotated Score

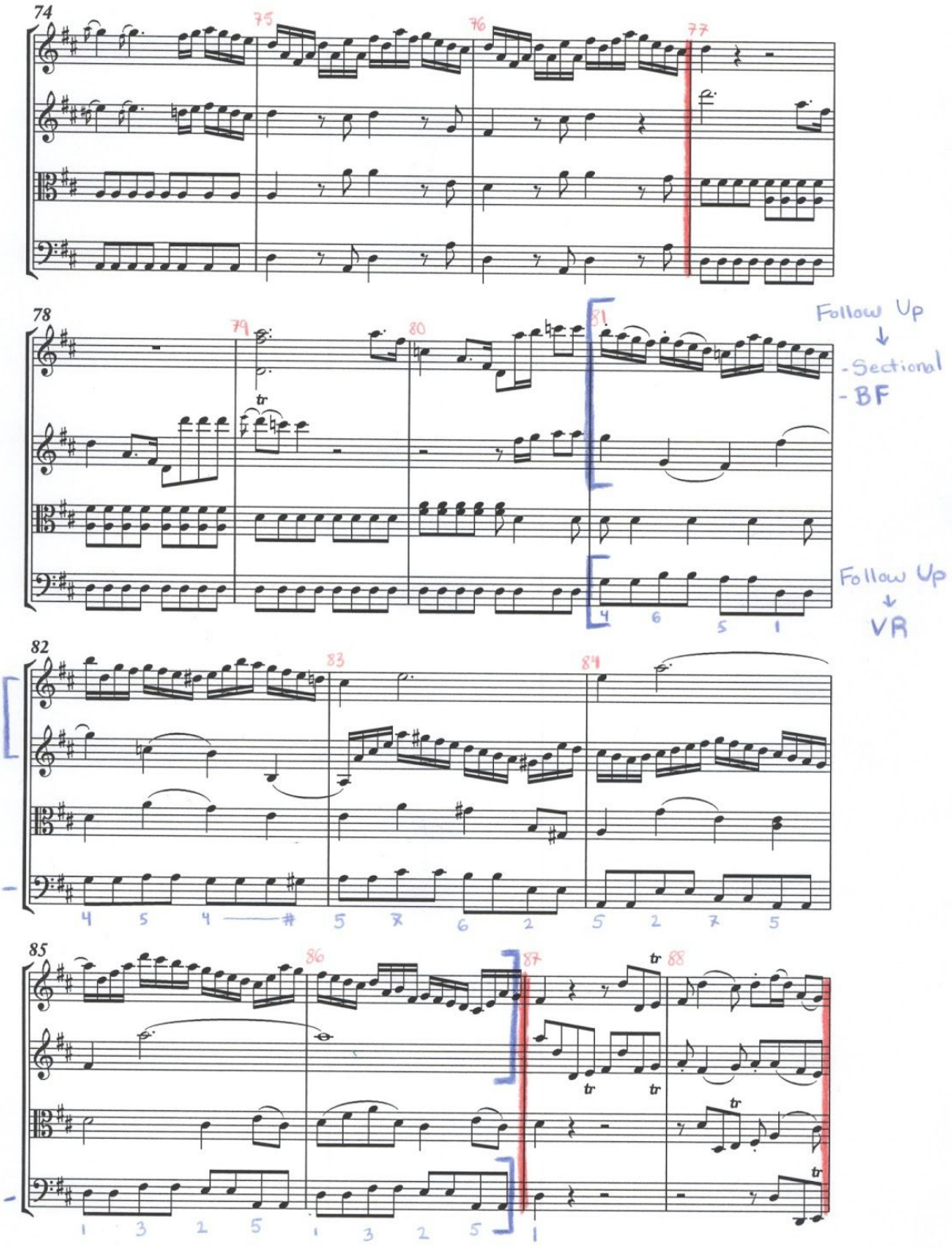


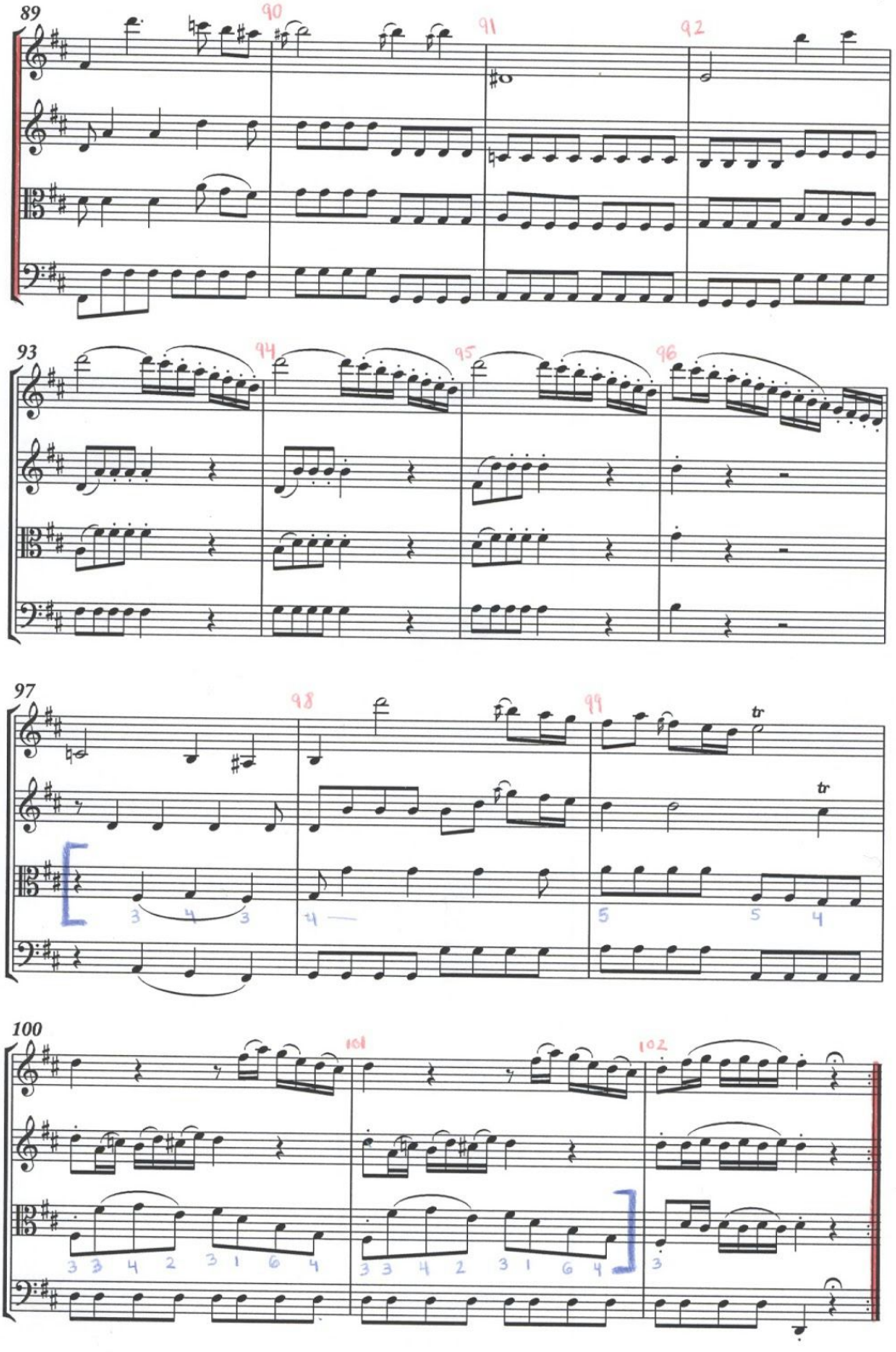

2
13
14
15
16
17
18
19
Follow Up
↓
- BF
- Sectional
20
21
22
23
24
25
26
27


28
29
30
31
32
33
tr
tr
34
35
Follow Up
↓
VR
36
DEVELOPMENT
37
38
39
40
41
42
43


44
45
46
47
Follow Up → BF + Sectional
48
49
50
51
tr
tr
Follow Up
↓
BF + SL
52
53
54
Up
x1
p
p
pizzicato
p pizzicato
p
55
56
57


58
59
60
61
62
63
64
65
RECAPITULATION
(measures 65-102)
f
coll' arco
f
coll' arco
f
66
67
68
69
70
71
72
73


74
75
76
77
78
79
80
81
Follow Up
↓
- Sectional
- BF
Follow Up
↓
VR
82
83
84
85
86
87
88


89
90
91
92
93
94
95
96
97
98
99
tr
tr
Follow Up
↓
VR
100
101
102

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