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# Connecting Dots: Exploring Processes Behind Sound Production Through Mind and Movement

THESIS

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by

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## GLOSSARY OF ABBREVIATIONS

AGP – Auditory Gist Perception

CG – Conceptual Gist

PG – Perceptual Gist

SP – Sound Producer(s)

SR – Sound Receiver(s)

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**ABSTRACT OF THE THESIS**

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Master of Fine Arts in Musicology

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The ability to articulate and express emotion through musical performance is a powerful tool for musicians to communicate with an audience, therefore understanding the technique needed to execute those emotions is paramount. I seek a better understanding of how performing musicians comprehend direct relationships between movement and sound, and how to concretize emotional expression through tangible motions. This study will investigate movement and sound through two different lenses: sound receivers and sound producers. Information collected from interviewing these individuals will hopefully provide those same individuals with more tools towards developing or evolving teaching methods for future professional cellists and other performing musicians in training, as well as tools to attain their sound ideal. The purpose of this research is to provide tools to these music professionals in attaining their ideal sound. These tools will be specific data collected from interviews where I ask participants specifically tailored questions that force them to address vague topics with precise, specific, and technical terms that will help clarify their own process of sound producing (music making).

# INTRODUCTION

Professional musicians require a specific degree of command over their body to produce the specific sounds they desire. However, what musicians have in mind is not always what is perceived, and likewise what desired sound the musician strives for is not always attained. In this case, musicians benefit from not only structured critique, but also a deeper understanding of how to attain an expected sound. Vague comments such as, "the flow from the exposition to the development was a little too choppy and would have benefitted with a better flow," or "I perceived this passage to be filled with passionate anger, but your performance lacked just that," may confuse a musician even more because of the various interpretations of words like "flow" and "passionate anger." The ability to articulate and express emotion through musical performance is a powerful tool for musicians to communicate with an audience, therefore understanding the technique needed to execute those emotions is paramount.

I seek a better understanding of how performing musicians comprehend direct relationships between movement and sound, and how to concretize emotional expression through tangible motions. This study will investigate movement and sound through two different lenses: sound receivers and sound producers. The term sound receiver I reserve for trained music professionals, but it is not limited to professional musicians, who typically have had some sort of aural training. These could include choreographers, sound designers, composers, and other musical professionals. In this study, the term sound producers will apply primarily to cellists and other professional musicians of classical training. Information collected from interviewing these individuals will hopefully provide those same individuals with more tools towards developing or evolving teaching methods for future professional cellists and other performing musicians in training, as well as tools to attain their sound ideal.

Terms used to shape my study include: *auditory gist perception, sound-accompanying action, sound-related action, sound-producing action, ancillary movement, modulatory movement, iterative movement*, and others of a similar nature. These are terms coined by Sue Harding, Martin Cooke, Peter König, and Rolf Inge Godøy who have been studying the interrelationships between movement, perception, and sound.[1] What separates their work from that of Arnie Cox and other music embodiment theorists is its omission of references to cognitive, emotional, and other neuroscience research that one would commonly associate with an attempt to understand this concept. It is also the reason that I choose not to include works similar to Cox's book *Music and Embodied Cognition.*[2] Trying to explain "the science" behind sounds produced with reference to affective science, cognition research and neuropsychology would hinder professional musicians from gaining a better grasp on tools to producing the ideal sound. This study is designed to aid musicians in attaining that sound.

[1] Harding, Sue, Cooke, Martin, König, Peter, Paletta, Lucas, and Rome, Erich. "Auditory Gist Perception: An Alternative to Attentional Selection of Auditory Streams?" In *Attention in Cognitive Systems. Theories and Systems from an Interdisciplinary Viewpoint: 4th International Workshop on Attention in Cognitive Systems*, WAPCV 2007 Hyderabad, India, January 8, 2007 Revised Selected Papers, 4840:399–416. Berlin, Heidelberg: Springer Berlin Heidelberg, 2008. p. 403; Clarke, David , and Clarke, Eric F. *Music and Consciousness : Philosophical, Psychological, and Cultural Perspectives* (Oxford ;: Oxford University Press, 2011).

[2] Cox, Arnie. Music and Embodied Cognition : Listening, Moving, Feeling, and Thinking. Musical Meaning and Interpretation. Bloomington ; Indianapolis: Indiana University Press, 2016.

# PART ONE: THEORIES AND TERMS

## CHAPTER ONE: AUDITORY GIST PERCEPTION

The following quotation provides readers with a basic understanding of auditory gist perception (from Harding, Cooke, and König's article "Auditory Gist Perception: An Alternative to Attentional Selection of Auditory Streams").[3] "The idea that the gist of a visual scene is perceived before attention is focused on the details of a particular object" encompasses the concept of visual gist perception. When "visual" is replaced with "audio" and similarly "object" with "sound," the reader can understand gist perception in the audio sense. "Auditory Gist Perception" proceeds to explain the chronological significance behind understanding AGP, such as the rapid processing from gist to attention to detail. My use of AGP theory will focus on the subjects' thoughts during perception rather than the chronology of events that happen during perception. The theory serves as a methodology for my sound receivers to communicate with me as I collect data. From their responses based on their AGP, details of how they perceive sound and music are more important than the chronological process of their perception.

A professionally trained musician or music professional with an aurally-trained ear would—even in gist mode—most likely be attuned to music upon entering a room. An explanation of gist mode is commonly referred by musicians as letting sounds "wash over," before analysis mode takes over. Gist mode is only a general and fraction of the chronological process that "Auditory Gist Perception" seems to break down. Moreover, the order of gist processing will not be necessary when my focus is strictly on auditory scenarios. I actively seek specific attention to details the sound receiver and producer perceive, and utilize elements that

[3] Harding, Sue, Cooke, Martin, König, Peter, Paletta, Lucas, and Rome, Erich. "Auditory Gist Perception: An Alternative to Attentional Selection of Auditory Streams?" In Attention in Cognitive Systems. Theories and Systems from an Interdisciplinary Viewpoint: 4th International Workshop on Attention in Cognitive Systems, WAPCV 2007 Hyderabad, India, January 8, 2007 Revised Selected Papers, 4840:399–416. Berlin, Heidelberg: Springer Berlin Heidelberg, 2008. p. 400.

pertain to the necessities of sound production for professionally trained musicians. Listed below are a few theories that can explain gist processing.

1. Memory as a combination of perceptual gist and conceptual gist can be one way to parse gist mode.
    a. Perceptual gist can be explained as the initial gist or understanding of an occurrence or event that the individual has not experienced. An example in audition would be listening to a concert underwater without knowing or having any experience doing so, and an individual responding with what they seem to hear at the moment.
    b. Conceptual gist in the context of audition would be analogous to using information from memory based on past experiences. A simple example would be listening to Dvorak's cello concerto and being able to immediately describe the gist of sounds heard, in this case, a cello and an orchestra.

A combination of the two is always at play in this model, as an individual uses CG as part of the gist as well as in explaining and describing their PG. Going back to the example of an underwater concert, once the receiver has that information, the PG then becomes the CG for future references.

2. Reverse hierarchy theory is essentially "high-level awareness without detail." If applied to audio experiences, the subject is able identify single instruments within a symphony and the melody played, but does not focus on a special harmonic moment, hence is simply "aware."

3. Initial rapid processing is when the brain categorizes a large amount of data absorbed from a visual, or in our case, audio, scene. The next step is to form "object files" once properties of objects are paired together based on how they are consciously experienced. All of the

previously mentioned items happen before any specific attention is bestowed on these "objects."[4] The following sub-list explains the step-by-step process.

a. Only the gist of the scene or object is initially processed;

b. The processing of the gist is rapid

c. The focus of attention is deployed according to prior knowledge and perception of gist.

d. Conscious detailed analysis is possible within the scene as the focus of attention.

e. Only limited processing of the unattended parts of the scene occurs.

A combination of these theories will be used as a research tool to study sound receivers' perceptions. My study focuses on detailed aspects of movement and sound relations and therefore is not dependent on the chronological events of sound processing. I am also aware the temporal aspect of audition for AGP makes it even more difficult to parse in comparison to a classic visual gist perception. In order for a performer to turn AGP into something useful for their pedagogical or performance practice, it must be something that they need to practice. This temporal aspect will prove non-problematic in future chapters discussing the interview process for my study.

**Clarifying 'objects' of gist perception in audition**

In "Auditory Gist Perception," Harding mentions that "In audition, 'objects' (corresponding to auditory sources) are generally not static and instead there is the concept of the *auditory stream* which is the perceptual representation of an acoustic source determined during *auditory scene analysis*. Such a stream, or the source from which it is assumed to emanate, may be the focus of attention."[5] The term "objects" in my study refers to the sounds itself rather than

[4] Harding et. al., "Auditory Gist Perception," 403.
[5] Harding et. al., "Auditory Gist Perception," 400.

the sources so that during *auditory scene analysis* sound receivers are performing a reverse hierarchy in focusing their attention of the source of that sound, that is, on the sound producers.

Later parts of the article portray the use of auditory gist perception in a more general way as in speech identification and basic musical happenings. One example that explains a basic musical happening is walking into a room full of people and perhaps noticing music playing in the background. However, if auditory gist perception is applied to sound producers with a focus on their movement, they will find more useful information towards their performance practices. Their added capabilities can be considered as an additional branch to Harding's "training" that would be required and necessary in order to hear details. This is assuming that our sound receivers are professionally trained and can already detect these details in rapid gist perception for audition. Therefore, the driving factor of the details of the sound is movement perceived. In this study, we will be focusing on solo repertoire which already narrows down the need to differentiate instruments or other factors that attend to some repertoire. The representation of auditory gist perception will not be pursued in my study as it is primarily an exploration of how sound receivers and sound producers can utilize auditory gist perception as a tool to connect movement with sound.

## CHAPTER TWO: SOUND-RELATED ACTIONS (PART ONE)

S*ound-producing* actions, a category within *sound-related* actions, aid sound producers with their understanding of the relationship between sound and movement. These are concepts derived from Rolf Inge Godøy's chapter "Sound-action awareness in music" in the book *Music and Consciousness: Philosophical, psychological, and cultural perspectives*.[6] Some of the actions within the *sound-producing* category provide some of the main terms used to shape my study: *excitatory actions, modulatory actions, ancillary movements,* and an interchangeable combination of *impulsive/ sustained/ iterative actions*.

According to Godøy, *excitatory actions* include actions such as hitting, stroking, scraping, bowing, kicking, blowing—actions that basically consist of transferring energy from our bodies to resonating objects such as strings, plates, tubes, and membranes. *Modulatory actions* are actions that modify the sound, such as vibrato and opening and closing a brass mute. For a cellist, *excitatory actions* have the possibility of having either one or two energy transfers during any action as the right-hand passes energy from the body to the bow, and then the bow to the string before any sound is created. In this light, it can be inferred that all deliberate motions involved in the production of sound for a cellist, or any acoustic musician is an *excitatory action.* To have a better sense of *modulatory actions,* not only would a vibrato in the left-hand have the ability to modify sound, but various bow techniques that require different angles, moments of pressure, and complete control of a bow pulled across the string would qualify as such from the right hand.

[6] Clarke, David, and Clarke, Eric F. *Music and Consciousness: Philosophical, Psychological, and Cultural Perspectives* (Oxford ;: Oxford University Press, 2011).

Godøy's initial explanation for *ancillary movements* are movements that may not be strictly necessary for sound productions, which is a general but self-serving definition. Later in the article he also defines *ancillary movements* as movements those that "variously help to avoid fatigue, to position the effectors (fingers, hands) in ergonomically optimal positions, or even as helping in the articulation or expressive shaping of the music."[7] The first half of the previous statement provides readers the impression that "ergonomically optimal positions" are indirect helpers of articulation and expressiveness in a performance. Godøy's final statement on *ancillary movements* causes more confusion as he describes "such actions are associated with sound production, and seem to be learned and reproduced by listeners who may have little or no training on the instruments in questions."[8] The confusion is that "ergonomically optimal positions" are typically movements that someone with "little or no training" cannot pickup. These movements are subtle to the eye, but only something that the performer can identify, and for a trained ear to be able to notice. In order to possible redefine or clarify *ancillary movements* for the purpose of this paper and study, the following paragraph will analyze such movements through a cellist's lens.

Through the tutelage of various cello instructors as well as conversations with cellists, obtaining the necessary technique for the desired sound is not just about the bow or the left-hand fingers running over a fingerboard. Often times, it starts with these "ergonomically optimal positions," (despite not using that same term), whether grounded feet, adjusting the height of the cello, angling the cello a certain way so it nests comfortably to the body, and having a set-up that allows the left-hand to have full range of the cello strings without straining any body part. It is only under these circumstances that the quality of sound can reach its full potential. For purposes

[7] Clarke and Clarke, *Music and Consciousness*, p. 236
[8] Clarke and Clarke, *Music and Consciousness*, p. 237.

of this study, I will take the liberty of redefining ***ancillary motions*** **as preparatory motions as a foundation of sound production**.

Some of Godøy's other terms are derived from Pierre Schaffer's classification (so-called *typology*) of sonic objects which may be indirectly referred in my study.[9] These terms of varying movements include *impulsive, sustained, and iterative. Impulsive* actions that could be applicable to cello technique include fast and short movements followed by relaxation, such as creating an accent at the front end of a note, from a fast to slower vibrato, or making a rapid glissando. On the other hand, *sustained* action, indicate a consistent energy transfer like the calm pulling of the bow over the string, or even the use of string crossings to produce an even long tone on the cello. Lastly, *iterative actions* refer to rapidly repeated movements such as a tremolo on the string or *soutille*, which is essentially an exponentially sped up spiccato that still remains slightly off the string. Furthermore, the generality and transferability of action images as action schemata, or patterns of movement and perception, is important. Familiar action schemata may also be applied pedagogically, like listening to a recording of music and being able to recreate the sounds with the correct, or nearly correct, techniques on the cello. This generality and transferability of action schemata are some of the key elements in the embodied paradigm, in the sense that we tend to perceive sounds in relation to previously learned action schemata.[10]

*Auditory gist perception* is incorporated organically into my study through the interview questions (Appendix A) and responses (Appendix B). Questions where subjects are asked or encouraged to demonstrate a passage on their cello, are also asked for immediate reflection on their performance. It will be evident through their responses that some subjects are more in

[9] Schaeffer, Pierre, Christine North, and John Dack. Treatise on Musical Objects : Essays across Disciplines. California Studies in 20th-century Music ; 20. Oakland, California: University of California Press, 2017.
[10] Clarke and Clarke, *Music and Consciousness*, p. 235. Citation is for terminology and basic definition but my examples, analogies, and application are all original.

touch with their emotions and able to vocalize and concretize their thought process than others. Any patterns within responses will be acknowledged and revisited in Chapter Six.

## CHAPTER THREE: SOUND-RELATED ACTIONS (PART TWO)

In Godøy's chapter, there is a second group of *sound-related* actions called s*ound-accompanying* actions. These are actions that typically correspond to those of the sound-receiver while listening to music and normally are not associated with the production of sound. While this may sound similar to the previously mentioned *ancillary-motions* in the *sound-producing action* category, these can differ as a response to the sound being heard. Actions included are dancing, walking, marching, or gesticulating, as opposed to the torso swaying or head bobbing that might accompany a performing musician. These are actions that are invoked by the sound producer's sound to allow the sound receiver to gesticulate.

### ***Sound-accompanying actions*** **for the sound-receiver**

The importance of *sound-accompanying actions*, as told by Godøy "is not so much the exact functionality of the actions as their shape, or geometry, and the sense of effort that they convey, i.e. how these actions are perceived in relation to basic motor images."[11] Basic motor images in this context can be understood as mental images of body parts in movement and their relative placement on the instrument. An example of that would be listening to the Bach cello suites recording and envisioning where the cellist's hand and fingers are positioned on the fingerboard or where their bow is moving on the string and its proximity from the bridge. This imagery is the basis for the sound-receiver's *sound-accompanying actions* where the sound-receiver may gesticulate a basic motor image.

*Sound-accompanying actions* can function as the result of perceiving a *sound-producing action*, created by the sound-producer. Later in Godøy's chapter, he makes a reference to "the

[11] Clarke and Clarke, *Music and Consciousness*, p. 237.

idea that images of sound-producing actions are essential for the perception of sound."[12] The foundation for this idea is supported by a theory founded by American psychologist Alvin Liberman and American linguist and speech scientist Ignatius Mattingly, the *motor theory of perception*. This theory supports the "link between motor images and perception, with perception in general seen as a process of mentally simulating whatever it is that we are trying to understand."[13] Although Liberman and Mattingly's research is confined within the realm of speech, the theory can still be applied to the perception of a musical sound.

### *Sound-accompanying actions* for the sound-producer

Building on the notion that *sound-accompanying actions* and *motor theory of perception* are indirect products of responding to *sound-producing actions*, there is another possibility that the sound-producer is simultaneously making *sound-producing* and *sound-accompanying actions*. A performer may command their body to make a *sound-producing action*, but also as they perceive their sound, they also become the sound-receiver and respond physically to the sound they have produced. This constant back and forth as both performer and perceiver portray an interesting case of identity. At what point does an action fall under the *sound-producing* category or the *sound-accompanying* category, according to the sound-producer? Consequently, nearly all motions that a sound producer makes when performing are almost always related to the sound quality.

In my study, I am interested in the overlap of perception of actions between the role of a sound receiver who is simultaneously a sound producer. *Sound-accompanying actions* is a gray area for sound producers due to its fundamental nature as an accompaniment to sound, rather

[12] Clarke and Clarke, *Music and Consciousness*, p. 235.
[13] Liberman, and Mattingly. "The Motor Theory of Speech Perception Revised." Cognition 21, no. 1 (1985): 1-36.

than a direct cause and effect to producing sound, noted previously. SP *sound-accompanying actions* would vary from that of just a SR because too much swaying of the torso or bobbing of the head while playing becomes counterproductive in a performance mode as well as in the effort expended while attaining an ideal sound.

# PART TWO: METHODOLOGY AND DATA

## CHAPTER FOUR: BODY AWARENESS

This chapter is dedicated to an analysis of thought processes that happen during performance, and the level of body awareness among sound producers. The main focus of this chapter is analyzing data collected from interviews to understand the specific thought processes of both SP and SR when they interact with sounds and music. There is no concrete hypothesis for the expectation of answers from the subjects, but I anticipate the opportunity to perceive patterns in similar responses to certain interview questions. Subsections in the paper are categorized by subsets of questions, such as questions for sound receiving, sound production, and questions relating to performance practices. Questions for sound receiving are formulated around terminology introduced in the first few chapters of this paper. The absence of certain answers from subjects who primarily fall under the category of 'Sound Producers' is purposeful. These subjects have their own separate set of questions, with the intention of understanding their thought process with regards to sound and movement during performance, which overlap mildly with general sound receiving questions.

All my subjects are both professional contacts who are mostly active performers and cellists affiliated with the same university. Names that appear in this paper have been coded to mask both the actual name and gender of all subjects, including myself. The subject's musical and aural training range from at least a decade's worth to at least forty years. Kelly and Madison are both professors at a university; the latter is a cellist by profession. Harper is an active performing cellist by profession. Sam, Morgan, Cleo, Andy, Ash, and Devin are all graduate students and cellists, apart from Sam being a flautist. The remaining subjects, Taylor, Adrian, Bailey, Billie, and Cameron are all cellists at the undergraduate level. Despite the varying levels of musicianship experience, this study provides a platform for everyone to make a substantial

contribution to my research, as the years of musical performing experience does not necessarily correlate to the level of sophistication or detailedness of responses. Again, as both a cellist and the researcher, I can attest that more years of musical experience does not equate to being frequently and actively being in-tune with bodily awareness and the ability to concretize emotions during practice and performance. The questions asked (refer to Appendix A) will allow me to explore possible categorizations of these subjects.

**Images and Music[14]**

Originally this question was formulated to refer to a specific piece, but in the spirit of the study, I wanted to provide an open environment for both SP and SR to talk about their general aural thought process. The general consensus, as noted in Figure 1 (see Appendix B), is that subjects experience few to no mental image(s) appearing during an aural experience. The exceptions were SP Bailey, Cameron, Cleo, Harper and Ash (who made it clear that it depended on the piece). General "yes" and "no" answers also have notable category subsets, as depicted in Figure 2 (see Appendix B). In an indirect way, subject Kelly's answer to the "Understanding New Sounds" category provided an explanation for the majority vote of "Typically No" in images to music while listening. SP interviewed have specialized framework training in Western Art music. This conditioned approach to interacting with music that they may or may not be performing involves an "intellect before emotion" approach, which is a combination of structural and theoretical analysis before any intellectual interpretation musically.

If we buy the explanation that advanced musical and aural training conditions SP and SR to naturally connect with music on a strictly musical level, we can infer subjects to have musical imagery if they possess little to no musical or aural training. Through the course of official aural

[14] Question #1 from Appendix A and responses from Figure 1 in Appendix B

training, such as the identification of harmonic progressions, structure, and other musically-related listening activities, the thought has merit in that professionally trained classical musicians mostly think about music in terms of music. However, rather than adhering to a strict "yes" or "no" answer, there are exceptions to this belief, as shown in Figure 2. These exceptions include operas and programmatic music, like *Pictures at an Exhibition*. Both types of music typically have strong associations with certain contextual and historical information that would make it difficult for any SP to not have a visual image appear when listening. There are also pieces that hold significant importance to certain musicians because of the memories invoked, and therefore visualization of personal memories is possible. Deviations of these personal memories also split between a memory of a performance of a piece or a memory of a personal life event. It is also important to note that while there are exceptions mentioned by subjects (who gave an initial "no image" answer), were referring to pieces they have performed or are familiar with.

**Bodily Awareness**[15]

The second part of exploring sound-related movements are questions that revolve around various components of bodily awareness during a performance. The questions are designed to probe the SP to gradually be more in tune with their performance habits and methodologies for any given setting. Questions cover topics on bodily movements used for projection and venue correlated techniques, bodily awareness in various settings, and the attempt to achieve their ideal sound. The question regarding adjustments made for projections in various venues has the most varying answers, and therefore trying to find a pattern is nearly impossible. On the other hand, questioning the SP on how often they are satisfied with their sound during a performance provides a better insight on how effective their performance practices and thought processes

[15] Questions #2-7 from Appendix A and Figures 1-3 from Appendix B.

have been. Most of the response towards this particular question can be generalized as "I could have been better." That response is no stranger to my ears as a performer. After every performance, there is a tendency to reflect with a critical eye. However, it can be expected that after decades of performing experience, responses from both Kelly and Madison include the observation that they are "generally satisfied" with their sound production, but neither really know nor know not to trust their own ears because what they hear will always differ from the audience's perspective.

**Execution of Emotions**[16]

This is perhaps one of the most difficult set of questions as SPs were asked to conceptualize emotions through a detailed description of techniques or combination of movements used during performance. One of the key aspects of this study is the exclusion of emotions as a baseline vocabulary in the discussion of performance practice and interpretations; this makes the discussion of emotion more difficult. Sound producers were asked to concretize how to achieve sounds from four general umbrellas of emotions: sad, happy, and angry, and nostalgic (if they did not already incorporate nostalgia under any of the previous emotions).

Most of the SP were able to harness anywhere from one or more variations of each emotion, but the request was also met with some resistance in favor of the argument that there are many types of sad and happy. The inferred conflict of interest is addressed via Kelly's response where, when asked to depict a somber, sad, or sorrowful tone, they made a point that "sorrow not as a baseline condition, but tone production with variations." To clarify Kelly's statement, the first half of that statement indicates their understanding that to produce a sorrowful tone or sound does not require one to be in a state of sorrow. The latter half of the

[16] Question #8 from Appendix A and Figure 4 from Appendix B.

statement acknowledges various interpretations of a sorrowful tone sounds like, but the SR is still able to identify a sorrowful tone.

Conflicts aside, a good number of subjects made a reference to the Bach D minor prelude as a piece that requires a depiction of somber and sad emotions. From there, it seemed to help the subjects to talk about right- and left-hand techniques necessary to produce the sound production of that emotion. On the other hand, the Haydn C major cello concerto was a popular reference piece when interviewees were asked how happiness could be expressed technically. Similar terms derived from that example include extra energy and brighter sounds as a result from more volume, articulate execution, and lifting motions. To clarify the previous statement, subjects mostly identified happy tones with an excess or abundance of abstract energy. Therefore, in order to achieve that level of energy and brightness, more volume, articulation, and lifted bow motions are often involved during this process. For the right hand, the length of the bow may vary, but the necessity of increased bow speed and vertical variations is unanimous among responses to this question.

**The "Prior" difference**

I would like to take this moment to address possible concerns regarding the similarity of my research with Helen Prior, a musicologist in the UK who is known for her "interests in musical performance, music and emotion, and music perception and familiarity."[17] In her study "Shape as understood by performing musicians," Prior's procedure model is less structured in the sense that there was more room for open-ended discussion. The purpose of Prior's is "to understand how performing musicians use the idea of musical shape or shaping," where subjects

[17] Leech-Wilkinson, Prior, Leech-Wilkinson, Daniel, and Prior, Helen M. Music and Shape. *Studies in Musical Performance as Creative Practice*; v. 3. New York: Oxford University Press, 2017. p. xiv.

were also a part in exploring what musical shape meant to them.[18] My study's purpose is solely focused on gathering data to formulate body movement and awareness practices, for practical application in pedagogy and performance. This specific need does not allow room for uncertainty in terms that have not been clearly defined by the researcher.

Another difference in Prior's study is her portrayal of data with "transparency" regarding the subjects she interviewed (with their consent).[19] In my study, I purposely did not include my subject's birthplace, place(s) of study, and gender. This decision was made to not leave room for clouded judgment from the readers of this study. Along with this decision is a key difference between Prior's study and my own: omitting non-concretized emotions as valid data.

Finally, a key element of my procedure that differs from Prior is the use of live performance integrated with the interview process. For Prior, "this task was used as a prompt for further discussion," whereas subjects' reflection of their live demonstrations, performance, and experimentation are essential to my study. A sub element that sets my study apart is my choice of using standard cello repertoire versus Prior's use of repertoire for "its probable unfamiliarity."[20] My decision is backed by my intention of attaining both robust and clear responses from subjects.

[18] Leech-Wilkinson and Prior. *Studies in Musical Performance as Creative Practice.* p. 217.
[19] Leech-Wilkinson and Prior. *Studies in Musical Performance as Creative Practice.* p. 218.
[20] Leech-Wilkinson and Prior. *Studies in Musical Performance as Creative Practice.* p. 219.

## CHAPTER FIVE: CASE STUDIES

The latter half of this study uses tools gathered from the previous chapter, and applies them to two pieces of standard cello repertoire. Subjects were asked questions that ranged from their intellectual interpretation of specific pieces to the specific exercises needed to help execute practice and performance. The two pieces from standard repertoire that had the most overlap in familiarity among subjects are the Bach Suite No. 3 in C major, BWV 1009: Prelude and Elgar Cello Concerto. Performers were asked about their intellectual interpretations of the pieces and how they translate those thought into performance practice. They were also asked about necessary exercises practiced before approaching the piece. After those questions, subjects were also asked to discuss their challenging and favorite passages within the piece, perform those sections, and reflect on their performance.

### Bach Suite No. 3 in C major, BWV 1009: Prelude

Suite No. 3 in C major is one out of the six iconic solo cello works composed by Bach. The six suites for solo cello are well known as a topic of debate on how to perform the pieces, as the only found manuscripts were non-clear handwritten copies by Bach's wife Anna Magdelena. The lack of specific direction and debatable bowing markings from the original manuscript, the absence of dynamic markings, and the malleability of a Prelude makes for intriguing discussions with any cellist. Because of this, I was able to collect the most robust data from this piece. As a prelude, rather than a dance movement, the performer's interpretation is more personalized, rather than dependent on historical or contextual information. At the same time, because it is a smaller scale piece, there is a higher likelihood that responses pertaining to exercises and challenging passages will be similar.

A near consensus of the interpretation responses include aspects of storytelling qualities, whether through an emotional, visual, or personal life event. Only Adrian, Andy, Billie, and Devin's interpretations were purely reliant on musical content and structure. Their similar responses are not surprising as there is frequent debate that music composed by Bach can stand on its own without a need for extramusical material for listeners and performers to relate to the piece. Overall responses from subjects were both interesting as well as in line with their previous answers that extramusical ideas would only surface for the music with which they are familiar or which they are preparing for performance.

Answers from subjects regarding preparatory exercises typically led to discussion about the most challenging passage. Other than typical scales and arpeggios, the most common exercises for cello focus on smooth string-crossing in the right hand, followed by left- and right-hand coordination and thumb positions. Nearly all subjects mention the "G pedal" section as the basis of creating a string-crossing study that involves varying bow patterns and rhythms. From Figure 5, only Madison provided more specific string-crossing studies such as the Duport Etude No. 7, Kummer, and Lee etudes. However, all subjects identified right-hand bow-string-crossing technique as either the main challenging event or the transition between regular low positions to low thumb positions in the left-hand. Exercises typically practiced before working through the Prelude refer to the general identification of the "G pedal" section as the most difficult passage.

**Elgar Cello Concerto**

The Elgar Cello Concerto interpretations are fairly similar due to two main factors: the composer's meticulous dynamic and bow markings and the inevitable historical association to the First World War. This was the last work Elgar composed, which happened during the aftermath of WWI. Every cellist's response referenced this historical association as a starting

point for interpretation of their performance practices. Also, because of the broad nature of a concerto, the question regarding specific exercises as preparation was not asked, although subjects naturally spoke about the ritual preparatory exercise for any piece: scales and arpeggios typically in the key of the piece to be practiced or performed.

Because there is already a strong historical and contextual affiliation with this concerto, it was interesting to see that reasons for challenging and favorite passages were mainly comprised of technical aspects such as how well a passage fit into the cellist's hands and how much the passage allowed a showcase of what the cello could accomplish as an instrument. The reasoning stayed similar despite some differences in passage choices (see Figure 6 in Appendix B).

## CHAPTER SIX: CONNECTING DOTS

Throughout the course of this study, interviewees were not given any insight into the terminology and theories of auditory gist perception and sound-related movements. However, through the lenses both as a performer and receiver, there have been retroactive connections between subjects' responses and material covered in the three preceding chapters of this study. I found it interesting that as long as questions were formulated with the intention of prodding SP and SR minds, the interviewees would naturally incorporate related material, despite not being predisposed to those exact terminologies.

There are patterns present from responses listed in Appendix B. From the imagery question (Figure 1), there were three general categories of cellists: those who had vivid images correlate with music, those who related to music by the purely musical, and those who said that "it depends on the piece." Later in the interview process, I noticed that those who were more prone to musical imagery, were also naturally in-tune with their bodily movements, as well as their ability to concretize their emotions. Despite there being a slight divide in subjects regarding this topic, it was noticeable that the time it took to concretize "sad/sorrowful/somber emotions," all subjects took significantly less time to answer the same questions for the remaining emotions. I believe the constant on-the-spot reflection that the subjects went through increased their efficiency in their responses as the interview progressed.

One thing that I could not incorporate into Appendix B of the responses was the actual time it took for subjects to come up with responses. As subjects passed through the difficult question on concretizing emotions and being able to experiment sounds on the spot with their cello, talking and playing through their favorite and most challenging passages in the pieces took less time as they were subconsciously armed with more tools and practice that helped speed up

the process of responding to later questions. This use of auditory gist perception as a pedagogical tool will aid cellists and other musicians during practice and performance by allowing them to pinpoint problems that are culprits of the "plateau" phase.[21]

The effective incorporation, use, and implementation of auditory gist perception during the process of the interview was key in helping one subject in particular to improving their own performance awareness: Bailey. According to their response in Appendix B regarding concretizing emotions, there was an extra note that they changed their mind about how they interpret and express a sorrowful/sad/somber tone on the cello. Bailey's change of heart with interpreting the general category of sorrow/somber/sad tones only occurred after we visited the other general categories of happy/lively/exuberant/joyful and nostalgic. On-the-spot experimentation of the other "emotions," helped them realize that what they described earlier for sorrow/somber/sad tones was not accurate. Once they were more in tune with their body and mind connections, they were able to articulate how each of the remaining categories of emotions could be expressed through technique and performance.

Bailey's response to the question regarding how they would improve their sound in the moment of a performance was that they would find moments of rests within the piece to regroup. When asked if there was no moment of rest, they struggled to find an answer. This spoke volumes to me that they did not frequent their AGP skills enough or were not as in-tune with their bodily movements during a performance. However, as the questions continued to flow, and they were constantly asked to reflect on their performance as well as emotional and intellectual concepts, they developed a better flow of responses.

[21]The "plateau" phase happens oftentimes when a cellist reaches a certain point in technical difficulty that they are not able to overcome. This results in either the inability play a difficult piece, or spending too much time on a piece to the point that the musician no longer feels the drive or excitement they first felt when tackling a new piece.

As a cellist and musician, I agree with many of the cellists when they mentioned that they strive for more than 100% in execution in the practice room in order to attain an ideal performance. I also believe that active practice of using audio gist perception in the studio as well as on stage will prove to be an effective combination. Professional musicians, through training and practice, have the means to dig deeper and become more efficient in their sound production but are not always in touch with the correlation between their mind, movements, and sound. While artists and musicians are still likely to be self-critical of their overall results, a more frequent practice of being in tune with emotions and being able to correlate them with bodily awareness and actions, will enhance their confidence in attaining the ideal sound and performance.

This study is the start of a sub-field of performance practice that can enrich pedagogical practices by harnessing correlations between expression and technique. My next goal within scope of research would involve a larger selection of cello repertoire from various genres. A further continuation of research in the use of audio gist perception for other acoustic musicians, electronic musicians, and actors would be the next step. I hope that through this study, the theories and terminologies introduced can bring a more focused awareness to the intricacies of sound production before and during a performance and help sound producers attain their ideal sound.

## APPENDIX A: List of Interview Questions

1. To what extent does an image appear in your mind while listening to music?

2. Do certain sounds correlate to certain movements?

3. How do you attempt to understand a sound you have never heard before? This could be a sound produced from an unfamiliar instrument or a sound you would not expect from a known instrument.

4. How do you adapt to various venues and how does that change the way you project during a performance?

5. How aware are you of your body when performing (whether in an orchestra, chamber ensemble, solo recital, or as a concert soloist)? Do you notice varying degrees of attention span towards your bodily states during those performances?

6. How often do you achieve the sound you envision in a performance?

7. When you don't achieve that sound, how do you shift your bodily focus to keep on moving and coming closer to your ideal sound?

8. In concrete technical terms, please demonstrate and describe how you would achieve a [somber or sorrowful/exuberant, happy, or lively/nostalgic/angry] tone on your instrument.

9. How do you translate your intellectual interpretation of [insert piece of music] into something more tangible?

10. What type of exercises and for what muscle area[s] do you do before tackling [insert piece]?

11. Choose the most challenging passage in [insert piece]. Describe what makes that passage difficult. Please demonstrate and explain what you have just executed. Did your performance align with how you would normally play the passage? What are additional things that you could have done to attain the desired sound?

12. Choose a favorite passage from [insert piece] and explain why this particular moment is your favorite passage.

13. To what extent do you find equilibrium between attention to body movements and attention to intellectual interpretation of a piece? Do you find this only comes after a certain amount of time performing the piece? Or is it always a quest to balancing both sides of the equation?

## APPENDIX B: List of Figures

The figures below consist of responses from subjects in the order that questions were asked (as listed in Appendix A).

### Figure 1. (Questions 1-3 from Appendix A)

| | *Q1: To what extent does an image appear in your mind while listening to music?* | *Q2:Sound & Movement Correlation* | *Q3: Understanding New Sounds* |
|---|---|---|---|
| *Kelly* | No.<br>Exceptions – sheet music appears with familiar music, programmatic music, opera | Able to visualize motions accompanying a specific pitch and timbre (for familiar instruments). Dynamic metaphors to formulate a depiction for others. | Difficult because of framework advanced training. Not sure how to respond without more information. |
| *Madison* | Less often than when the piece is for performance. Sometimes a whole life story appears. Familiar pieces also invoke personal memories. | Able to visualize bow strokes and motions. Visual is something light and ethereal. No association with other types of motions. | Run through mental catalog of sounds. Narrow down with familiar sounds. |
| *Sam* | Not much. Maybe a sense of color. More impressionistic. Exception – programmatic pieces like *Pictures at an Exhibition* | Although no perfect pitch, fingers play along certain passages (for familiar instruments). For post-tonal – correlation of jarring tones with a visceral reaction towards "gross sounds" probably as the composer intended. | Acoustic – timbre and instrument association. Synthetic – letting go with the piece, but also because of area of expertise, also able to identify synthetic sounds eg. Sawtooth |
| *Taylor* | Not really. Just thinking musically. | Maybe sometimes with familiar instrument able to visualize right-hand technique | |
| *Morgan* | Emotion over particular image. Exception – Image before starting to play a piece, but also must be able to connect piece with a personal event and/or story. | | |
| *Adrian* | Never images. Even with idea of a musical passage as a 'prairie' still no actual image of the prairie but only the idea of one. More typical is abstract emotional connection. | | |
| *Andy* | Never story or images. Not organic. Music is enough as a story eg. No soundtrack appears when reading a book. | | |
| *Bailey* | Familiar instrument – pictures performer playing. Unfamiliar – visualizes interpretations eg. River and tree. | | |
| *Billie* | Never happens. But maybe still have a story for phrasing and emotional shaping of characters relying on aural sensations like volume and timbre. | | |
| *Cameron* | Always. Some instances creating an entire story for measure by measure and drawing pictures in music. | | |
| *Ash* | Depends on piece. Sometimes emotion over image and sometimes stories | Sometimes physical movements associated with sound heard. | Keeping open-minded towards ethnic sounds but also trying to compare familiar sounds. |

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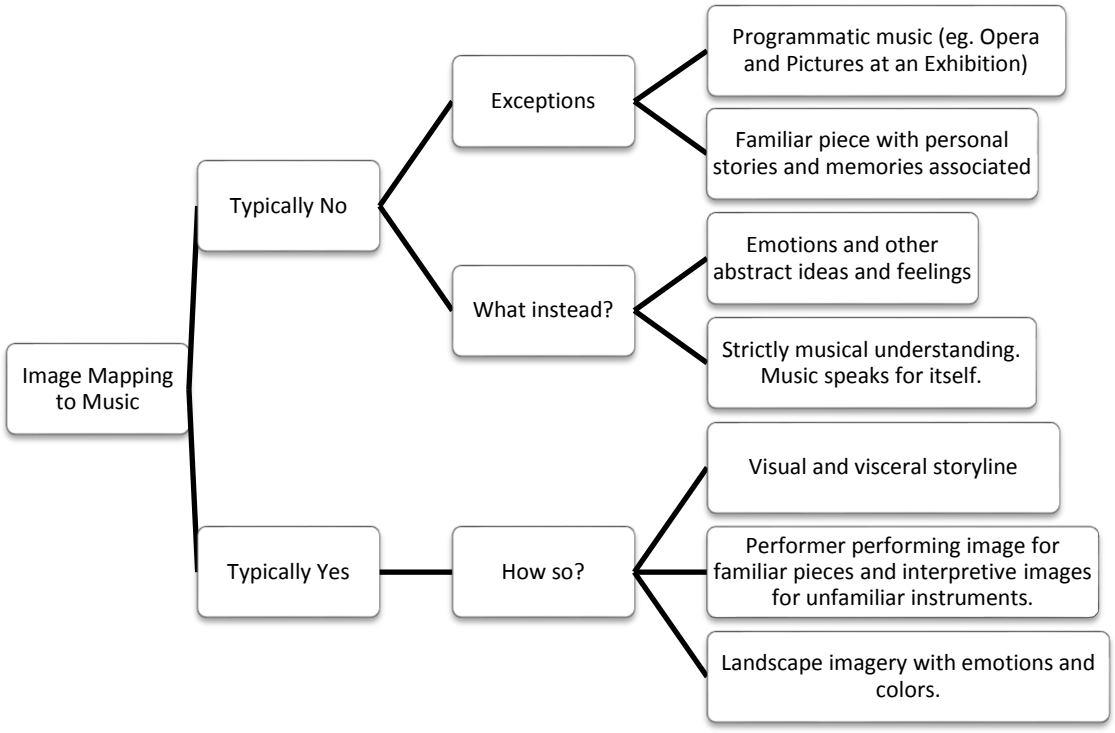
| *Devin* | Not very often. Occasional abstract visuals like color | General correlation like 'big and quick gestures' to a louder sound as if a conductor. | If trying to understand, that means that it is timbrally familiar. If completely unfamiliar, just enjoy the ride. |
| *Cleo* | Most of the time visualizing landscapes and scenery with music. Sometimes impressionistic colors and emotions. | With familiar instruments, able to mentally perceive performing gestures with certain passages. | Either being able to identify from sound bank or creating hybrids. |
| *Harper* | I picture places that I've visited in the world where I've performed or places that are close to me. I love combining travel and music. | An example would be recognizing Lynn Harrell, who has a vocal, buzzy, deep sound that sometimes I try to emulate. When I'm relaxed, I am very in tune with my body and feeling what "Lynn" does. Another answer would be imagining a spiccato and balancing certain tension and relaxation and angles of the right hand. | This is most applicable to modern pieces for orchestra. Contextualizing what the composer wants is a huge part of it as preliminary work. Feeling or sound that I've heard before like recognizing certain categories of sound that you would have in our world. I believe that technical approaches that are universal such as a violin and an *erhu*. Percussion instruments have the most variant universally speaking. |

**Figure 2. (Based on responses from Figure 1 for Question 1)**



## Figure 3. (Questions 4-7 from Appendix A)

| | *Q4: Bodily decisions for projection in various venues* | *Q5: Body awareness in Orchestra, Chamber, and Solo performance* | *Q6: How often desired sound achieved in performance* | *Q7: Process of adjusting sound during performance* |
|---|---|---|---|---|
| *Kelly* | Need a 2nd person to assess sound from the audience. It's less about effort and more about strategic approach to dancing around the physics of the venue | Orchestra - Avoiding visually disruptive behavior like cleaning instrument<br>Chamber – conscious of visual and performance components | Guesswork. Internally aware of intonation and sound quality. Most of the time satisfied but not trusting self-judgment. | Knowing music and engaging in group effort |
| *Madison* | Visualizing how sound travels in the space, but also needing a 2nd person's opinion. I ask myself "How loud do I need to be and how soft can I be?" If big hall, extend motions rather than exerting. Playing closer to the bridge allows least amount of exertion | All about body awareness and not letting emotions take over. Awareness allows self to dig deeper into music and distracts self from nerves and centering being with body. | I generally feel pleased but aware that it might not match with what the audience hears. | Checking in mentally with questions like "Did I rosin?" and "Are my feet grounded?" in addition to checking tension in back and arms. Knowing it is just a moment in time and allow body to work well. |
| *Taylor* | I try to play closer to the bridge if it's a larger hall. | It's more about the music than body awareness. | Maybe less than half the time | I try to check in with my bow hand and setup. |
| *Morgan* | If new place and big hall, imagine where last person is and visualize sound trajectory. | Orchestra and Chamber – Mainly listening to other people and less body awareness.<br>Solo – Much more aware of body | If prepared recital, generally satisfied. If it is something that cannot be prepared for, then generally not satisfied (eg. Not able to practice and prep in the venue at all or little time) | Bring back self to something more concrete. Finding the rhythm and finding the pulse as well as singing the melody in mind to focus on shape. |
| *Adrian* | Stressing on importance of soundcheck. Utilizing 3 components of sound projection: contact point, bow length and speed, arm weight | Orchestra – tied to difficulty of music and stress level. Generally, very aware<br>Chamber – less so<br>Solo – No attention to body and all focus on the music | Correlated to how many times performed piece. Most performed means most comfortable and confident in attaining desired sound. | The necessity to adjust means stemming from nerves. Try a lot of things but doesn't always work. Rarely use "breathe method" but sometimes works. If performing completely solo work, then taking extra time for shifts and character changes because tendency to rush in a performance. |
| *Andy* | Generally focused on performing well at the moment. Also attention to conquering nerves and move with music | Orchestra – most comfortable and familiar so able to divert attention to body<br>Chamber and Solo – less familiar so more concentration on music. | Not as often as desired. Aware that emotion is tied to tone so when internally freer, tone production increases. | Try to let go of unsatisfied moment and focusing on the next thing. Also focusing on musicality and love of piece performing. |

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|---|---|---|---|---|
| *Bailey* | Large & wet space – more freedom in RH<br>Opposite – more deliberate and strategic approach to RH but without more exertion | Orchestra – being able to communicate w/out being distracting<br>Chamber – focus on clarity of movements and attention to entrances.<br>Solo – even more so because "I am the subject" | 10:8 ratio of practice room sound to performance sound so tries to hold self to high standard in the practice room so knowing what to expect. But still a little less than 50% of the time satisfied w/performance sound | Take advantage of breaks in the music to regroup. Able to shift focus (eg. If unsatisfied with tone, focus on intonation and vice versa) |
| *Billie* | Try not to change usual playing in order to remain in comfort zone.<br>Occasional bow technical adjustments to help with projection | Orchestra – more difficult because of dependency on teamwork and conductor direction. Just mildly aware of natural body movements that accompany certain passages for tone production<br>Chamber – awareness of queuing and engagement with group and some bow use and placement awareness<br>Solo – a lot of awareness and communication to audience because sometimes audience "listen with their eyes rather than ears" | Depends on venue, but still generally tries to not change the way normally played in the practice room. | Checking in physically – breathing, bow angle, contact point, change in weight, exaggerate left hand to find pulse and tapping motion brings focus back. Feet pressing into the ground to feel more grounded. |
| *Cameron* | If louder, closer to bridge or tightening of bow | Tense in jaws and neck. Feared passages such as fast moments and trills involve little to no body awareness. Adrenaline instigates performance mode and brain easily adjusts for performance hiccups. | "I could have played better" mentality all the time | RH – angle and contact point<br>LH – if aware then tension is there but still try to play through |
| *Ash* | More automatic responses rather than decisions.<br>Wet/reverberant hall – shorter notes, create more tension on a note before the release. Actively engaging and responding to audience and constantly thinking and changing movement | Orchestra and Chamber – Always aware, but focus is typically on notes<br>Solo – focus on relaxation. Sometimes sacrifice tension from nerves and focus on finger placement and executing shifts. Sometimes focus on musicality instead to relax | 50% of the time. Already anticipating desired sound, but factoring in a performance curve ball | First relax. Second think technically and being bodily aware. Also thinking ahead instead of dwelling on "fix it" mode. |
| *Devin* | Very wet hall and dead spaces difficult and need more exertion. Good acoustics improve performance | Orchestra – least of nerves and attention on self so least aware of body<br>Chamber – more so<br>Solo – most | Can feel pleased but does not hear self so 30-50% of the time satisfied | Keep moving forward. Breathe. Balance. And trust body. |
| *Cleo* | Combination of right-hand adjustment and being aware of sound trajectory | Orchestra – avoiding distracting movements but letting natural body movements occur for sound production<br>Chamber – a little more self-conscious but mainly focusing on body movements as ways to connect with other players<br>Solo – extremely conscious but also trusting practice work | Half the time. Performance mindset is still a work in progress. | Grounding self and finding core to come back to the music. Breathing and relaxing body parts that are tense. |
| *Harper* | Whether I am on tour or at home, go to the hall an hour early, and warm up | I am a very tactical person. Very aware of my body and I tend to rely on what I feel but it doesn't | It is an ongoing process. I can't even quantify it. It is solely | It comes from observing the audience. If they are |

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| | and listen to my sound. I listen to what I hear and what the hall is giving back to me. Also, quick adaptation in the rehearsal, and needing a second person's judgment is common. If solo, different than orchestra, solo need to project personalities and musical ideas and thinking about how I want to project my thoughts. It takes a little more time. | necessarily translate into the best performance, so I need to shift my attention to the sound that is coming out of my instrument. | based on moment to moment. I want to create a sound that is a reflection of the music that is happening. There are so many different aspects of performance, and how does the audience react to the performance. Inspiring audiences to do better things with their life is important. Based on experience, even if I feel like I performed poorly, but audience disagrees, then I feel like I've accomplished something. I want to be as effective as possible by trying the best and from the heart. | not involved, then I will refocus my musical expression, or move in a certain way so that the audience is accessing the music. Moment to moment I am always checking in to see that I am relaxed, to see that the sound I envision is flowing from the cello. |

## Figure 4. (Question 8 from Appendix A)

| | *Somber/Sad/Sorrow* | *Exuberant/Happy/Lively* | *Nostalgic* | *Angry* |
|---|---|---|---|---|
| *Kelly* | Sorrow as baseline tone production w/variations. Reduced vib speed and bow pressure so not as comfortable or resonant as expected. Vocality approach through and instrument rather than thinking specifically about techniques | Articulations carefree and rambunctious. Excess energy that comes from happiness and joy into sound production. Having strong visual emotion eg. Doors closing instead of diminuendo or feeling and/or imagining a sliver of light | Same answer for angry. Overall all depictions of emotions happening in a more wholistic way. Instigated by "image in mind" | |
| *Madison* | Approach is to cue body and not loud kind of vibrato. | Joyful-definitely physical cue of general upward motion like intake of breath, shorter and lifted motions, elbows in the air. Not to be confused with triumphant which involves more motion and weight. Musical examples: Joyful – Haydn C, Triumphant – Dvorak cello concerto | Thought of being sad vs actually being sad. More into string. Right-hand pulls bow with more shaping. Like a memory, more pointed, crafting, and shaping (Mendelssohn D minor) | More verticality, sharper edge, but also with triumphant qualities but with a bite. Shostakovich cello concerto no. 1 used as reference. |
| *Taylor* | Maybe something like more vibrato and a calmer bow hand? | More verticality in the RH and lighter bow strokes | Could go either way depending on the piece | Sharper tones and more weight in the right hand |
| *Morgan* | More like needing to feel the emotion in order to execute it | Same answer as the previous but if asked to immediately improvise, Happy – faster bow speed, more energy, faster vib, louder volume, but still mindful of piece | Same answer as sorrow/sad | Creating more tension building and anxious tones |
| *Adrian* | Bach D min – somber, reserved, inward, over fingerboard, reflective | Immediate association of vibrato with happy tones. | Like somber/sorrow. More introspective. | Cassado sonata 1st mvt, quiet, but with energy coming forth |

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| | Elgar – Walking theme both fluid and somber, hopeless | | | menacingly, narrow and fast vib. Shostakovich – loud intense vibrato and verticality of bow. |
| *Andy* | More piano, lighter, prettier, even vib, less weight in arm. Bow length depends. Can be light and airy, and more slow and precise. | Forte, brighter, more weight, more articulate w/LH like happy Bach (3rd), less smooth, sharper, more vertical weight. | Distant sound. Airy bow, tender, narrow vib, slightly faster bow speed. | Weight of arm, closer to bridge, angular, sharper, more in string, or also heavy spiccato (Shostakovich) |
| *Bailey* | Soft, somber, closed. Contact point not as close to bridge but not quite sul tasto, darker sound, wider vib, verticality depends, changed mind about bow speed a few times before finalizing slow. | Brighter sound. Haydn C, quick, well-articulated RH. Extracting resonance and life of instrument | More introspective, not projected, less vertical but still depends. | More pressure, closer to bridge, quick vib leaning more towards the narrower side but still depends. Agitated is narrow vib. |
| *Billie* | Two types. Dolce, piano, narrow vib, lighter faster bow, inner hair, over fingerboard. Yearning, crying, mf-f volume, normal to wide vib, more verticality, pulling like taffy, stuck into string. Different types of sad include nostalgia, death induced, self-pity superficial) Used Bach third Sarabande repeats with contrasts | Beginning of Mendelssohn sonata. Made reference to Isserlis masterclass about needing a 'happy bow.' Accent notes for more lift and separation. Idea of character first step, accurate LH, more verticality and bounce. Also, different type of happy like a gigue. Aware of stereotypical happy as more range in verticality, angular sounds with an emphasis on pulse | Already categorized nostalgia as part of the sad/sorrow umbrella. | More verticality, angular, accented, added weight. Heaviness and weight mean slower bow speed but still depends on piece. Angry to gritty is closer to bridge, forte. Having a core to the sound you don't get from a superficial sound like from a gigue. More guttural and channeling emotion |
| *Cameron* | Not quite dead, windy but still emotional and passionate. Used Bach D minor to experiment with dynamics to mimic human crying. Somber – delicate sound with more bow speed but not much pressure. Also scooping and moving bow towards bridge. Playing around with how to create sound without vib. | Coming from thought eg. Sunny, joy, rainbow, etc. Used Haydn C as example. Having that image in mind will organically translate into technique. Projection like end of concerto, exciting, faster vibrato and bow. | More personal and finding what is nostalgia to self. Almost grouping with sad and mournful. Repetition of melodic lines allow for experimenting maybe with softer dynamics, difference in vib and slides between notes | Associated with double stops. Super wide and dramatic vibrato but with still relaxed and full bows |
| *Ash* | RH utilizing gravity, relaxed, and drawing sound rather than pushing | More verticality, happy, light association. More space between notes. Playing with tension and release, sharper tones. LH relaxed for more agility | Depends. Do what piece asks with the mentality of the composer. More portamento, gliss, like vocals using techniques like changing vib | Tension from more verticality from RH index finger applying more weight and increased vib speed. Can also be piano in dynamic. Brooding anger sounds heavier, longer, more bite at front end of note, marcato, darker tone, sometimes can be sul tasto |
| *Devin* | Not open string for warm tone, finding a good contact point, deeper tone, wide vibrato, portamento, more close to the heart | All about resonance, finding contact point for 'halo of sound', extroversion, faster vib, maybe open strings | Similar to sad, like times gone but those were happy times. Not superfast vibrato, | Close to bridge, crunchy scratchy sounds ok. Wider and faster vibratos with more verticality in RH |

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| | | | maybe portamento. Lifting of bow | |
| *Cleo* | Comes from prework of emotion and breathing. Can be subtle hints of sorrow with delicate and calm LH/RH with a slower and lighter bow technique and a narrower vibrato or medium bow speed with more depth. Reference to Bach D minor | Energetic RH but relaxed, lifted and versatile bow mostly quicker pulled notes. Articulate LH. Like Haydn C | Tender RH with more introspection and longing. Lighter bow verticality and medium bow speed. Can be stretched or breathy | More intention in RH. Can be faster bow speed with more edge and bite. Access to full gravity if necessary, like in Shostakovich. |
| *Harper* | General first answer to all emotions: In preparation for cd recordings and performances, I really try to dig deep with feelings ands emotions. Something Lynn Harrell talks about how to create emotional music is something I agree with. Feel the emotions, feel the music, and then play the cello, then expand the music even more. Feel it 100% to 200% to do. Has to feel sorrowful in a very big way. Timing harmonic progression, knowing where the music is going is important.<br><br>An example of depicting sorrow would be Rachmaninoff's Vocalise, with its need for expansive timing and direction direction. Slow and sticky bow, slow wider tragic vibrato would be used. Another example is Brahms 1st symphony first melody. Vibrato is a reflection of the music. Play what the composer has to say (based on your research) | An example would be Pezzo Cappricio with faster bow speed for spiccato, and Elgar's fast sections with lighter attacks and faster bow. Less pressure in the RH, using a little vibrato and fast spiccato passages to display exuberance, and playing with extreme dynamics.– | Identifying it in the music first, and it is pretty difficult for college students. The feeling hits faster when you're older. Exception would be Jacqueline du Pre. Another example is Mozart arias having to do with love or lost love have nostalgia, so it is already written in the music. Play nostalgic music well. | The articulation and length of notes that are written. Prokofiev sarcasm indicated by super short notes. Shostakovich Cello Concerto calls for making attacks more short and extreme as written in music and very compact, shorter bows, pretty close to the string, very sharp beginning to the notes, to give off a threatening feeling of maybe anger and fear. |

## Figure 5 (Bach)

| | *Q9: Intellectual Interpretation* | *Q10: Typical Prep Exercises* | *Q11: Challenging Passage* | *Q12: Favorite Passage* |
|---|---|---|---|---|
| *Madison* | All about the highs and lows. Travelling through mountains in a glorious way | Exercises like Duport 7, Kummer and Lee etudes that move from lower to upper string. Wrist, elbow, engaging whole arm slowly for fluidity and plan bow to shape phrase. | Same as favorite passage. Things to watch out for include intonation and physical response such as the "fetal position reaction." | The "Golden Section" like achievement of a climb to the top of a mountain and overlooking the valley. |
| *Taylor* | The piece is essentially a showcase of the instrument and as a standard tonal | Scales and arpeggios and practicing the piece slowly without vibrato | Thumb position section within the middle pedal tone passage. | Double stops at the end allow for a satisfying moment of breath within the piece |

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| | function because Bach is the composer. | | | |
| *Morgan* | Prelude as an intro to rest of the suite. Grand, extroverted, and more proud than all the other Preludes of the six suites. Not a dance but tells a story (no specification of what plot is) | LH-Scales, arpeggios, etc. RH – Bow strokes without LH. Working on bow control so not stuck at tip | Pedal tone section. Need to practice slowly so fingers know where to go. | Same as challenging passage. |
| *Adrian* | Thinking of in comparison to the other suite preludes. Lighter, nonstop 16th notes translate to a faster approach. Also taking into account how audience would feel and avoiding boredom typically created by a slower pace. Same taking in the moment at times like the grand entrance | A lot of scales and arpeggios in different rhythm and bow patterns | Pedal section. Tires out LH. RH – get even sound with chordal technique to increase fluidity in rhythm | Ten measures before the pedal tone section. |
| *Andy* | No emotional connection. Based more on music theoretical structure. Has to be perfect and make sense especially for Bach | Scales for a while. RH – alone practicing with Bach because of repetitions. Slow practice essential | Phrases before pedal section difficult in attaining clarity in performance. Organ part – smooth attainment, octave stretches, intonation, keeping steady pulse without "slurping notes" | Organ part because prettiest section |
| *Bailey* | A lot of elegance but full of joy. Different bowings allow for better portrayal of harmony and interesting note changes. Emotions plus pseudo music theory | C major scales and arpeggios. Grouping them in fours and twos. Separate bow patterns for LH and RH coordination | G pedal section. RH – tricky because crossing three strings. LH – quick and doublestop like making intonation difficult. Wide spacing and transition between first position to thumb position in same place on fingerboard for LH. Middle note of group of four is also hard to project | Same as challenging section because if attained, the sense of satisfaction triumphs |
| *Billie* | Breathing space within phrases. Listen for notes that need more weight. Musical theory support: Harmonic changes and leading tones on unexpected beats call for more attention and bring out unexpected phrasing and dynamics. | LH – Thumb position<br>RH – Even string crossing<br>LH/RH coordination etudes | Thumb position part within pedal section. Squeakiness on A string, catching of the string with RH, and even string crossing. | Arpeggiation section before pedal section because of dynamic contrast. |
| *Cameron* | Did not make a story initially, but made one right on the spot: Opening = waking up in the morning and feeding their cat to meeting someone on a morning stroll. Different parts of the Prelude equate to different moments in a story | RH – bowing patterns first and chordal exercises and experimentation of bow technique.<br>Going note by note through piece for intonation. | G pedal section. LH organization and spacing needs most attention | Section before pedal section. Transition and satisfaction of the open C string because of such a low and resonating note. |

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| *Ash* | Easy to translate to image and story. Notes and pitches add more drama. Requires a strong sense of phrase lengths and dynamic changes for shaping. Identifying key and tonality and being more in touch with emotions and inner feelings. | Make up own exercise to focus on RH and even string crossing for G pedal section. Working through harder spots slowly. | G pedal section | Spot before G pedal section. Pretty section when executed perfectly. Also opening because of an exuberance of character and possibilities of execution. Like a "romantic idea" of "I'm here, let's start the piece." |
| *Devin* | Bring out shape and harmonies. Listening to other interpretations and not afraid to copy some other performance to enhance one's own. | Scales, arpeggios, double stops. Always turning hard parts of piece into exercises | Thumb position within pedal section. Coordination of fingers. | Thumb pedal section |
| *Cleo* | Journey throughout the ocean, rolling waves, under sea exploration. Having dynamic range and creating currents through bow shaping | String crossing studies | Thumb pedal section | Opening provides initial momentum of the piece. Section before G pedal is a moment of calm and subtle deep emotions like a calm before the storm. |
| *Harper* | Do some work outside of the cello thinking what I want to portray through the music. Recording of myself to see if the expression is coming. Think where Bach was in life through the music and try to express it. Feel emotion as I'm working on it. Is a reflection of that expression? | Joint warmups before I play every day. Band work. Heifetz method, C major scales with different articulations and bowings and sounds that I want to use within the framework of the scale. | The chordal passage. Easy on an organ or a pianoforte. The expression has to be even and the pacing good, difficult on the cello. Intonation can get in the way. | 2nd part of the chordal section (thumb position) |

## Figure 6 (Elgar)

| | *Q9: Intellectual Interpretation* | *Q11: Challenging Passage* | *Q12: Favorite Passage* |
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| *Madison* | Overall, comment on the world as it was 100 years ago. Very personal and autobiographical piece. Devasted by the world. Last movement contains band music, but gets corrupted in some way, then back to the music of the 3rd movement. Prayer to human. Elgar is an elegant man, last piece he wrote. Wife died after he finished composing this piece. This is the pinnacle of his interpretation of his sadness. Opening theme long line through that theme was himself walking. Long smooth, slightly tinged with some serious sadness and regret. Look for long smooth bows, constant vibrato and attention to 9/8 rhythm and not making it into a sing songy lilting-like rhythm. Paying more attention to space between notes | Physically challenging passage – Intro in the 2nd movement. Going from pizz to arco and then orchestra leaves you alone. Is the sound projected and is the bow back in my hand? Then high and exposed weird chords, RH vs LH and position. How can we reset our body to shift from first double to second doublestop. How do I keep my shoulders down and now lean forward and keep everything in tune? | Towards the end, dialogue between cello and orchestra, higher and higher passage exchange with key changes. Deep humanity cries out with full license to emote at fortissimo and passionate as possible. Being free in the arms as you can be and open in the chest to make it sound glorious. |

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| *Taylor* | It's a piece about the wartime. So it has to be both dramatic and somber and mournful | Right before section 28 in the first movement there is a passage that requires more digging into the strings as well as expressiveness. | Opening of the 4th movement is grand and allows us to travel to a different part of the cello and is fun to play. |
| *Morgan* | So heavy the whole time and so emotional the whole time. Getting to a place to find a space to be happy, but still heavy. End is still very emotional and doesn't let loose. Also moments to slide a lot throughout concerto. | 3rd mvt hard to understand musically hard to phrase and understand. Challenging section is measure 21. Speed coordination of RH and LH. Learn to play part slowly for LH. Learn bow strokes separately. Play slow and legato for intonation when first played. Then add spiccato | 4th mvt but because spent more time so more connection. Scales up and then orchestra takes over. And opening. |
| *Adrian* | So tied to history so very clear interpretation of WWI. Clear markings so loyal to the score. | Parts in 4th mvt, all energetic, but one part is heartbreaking (same passage as Morgan's choice of favorite passage). Painful shifts, but also emotionally painful. People didn't think the war would drag as long. This passage is regret and at the end of the whole concerto. Because painful, gives more freedom to take more time because they want people to feel the tension of that shift. | Section 10 in frist movement. Falls really well on the hands. Really nice release part stringendo, finally able to ritard on the high notes. And great musicality. |
| *Bailey* | 1st mvt. Very sad and tragic deep music. Feels like they need more life experience to play the rest of the piece and understand. Needs life association to relate to. | Long tones for the 2nd theme in the beginning. Long slurs and having a nice sound over melodic lines played by orchestra is important. Also smooth transition of bow changes so not abrupt. | Right after 16 marked solsto sostenuto.This is unexpected and the way it changes first time heard is caught off guard. Dramatic effect of coming in and then how it dies away, and how it comes back hauntingly. |
| *Billie* | Limited because everything is notated. Timbre is dreamlike and airy for 2nd theme. Contrasting timbre, tone, and style and dynamics. Looking at things from musical perspective and respectful of what is listed in the music | 2nd mvt soutille portion. Bouncing bow. Awareness of RH, controlled and relaxed hand. Coordination LH and RH | 4th movement somewhere in the beginning (same as Taylor) |
| *Cameron* | Focusing on 1st mvt. Based off of what is written in the part. There is also a story. Measure to measure visually specific of a soldier on battle grounds in WWI | 1st line of the first movement. Phrasing issue. Rolling chords and placement of bow is challenging. | 3rd mvt So pretty and like a lullaby. Display of cello's capability of being pretty. |
| *Devin* | No image or story, but more like images here and there, like bombs in the first chords, sad love story, more romantic love scene. Really focused on emotion or picture I'm trying to paint in certain section. | The high scale run, the sextuplets and high position and getting them in tune. Mapping out where fingers are supposed to be. Repetition, deciding if I want to slide into the note or do a string crossing and thinking about whether to use the German shift. Lots of scales and Popper etudes are needed to prep for this. | Opening section from the first movement is satisfying being able to lead into it. Chords are awesome. Exemplifies what the cello can do. |
| *Cleo* | Representation of Elgar's darkest times as well as the war also bring out deeper feelings within myself. With that said, there is a necessity to both | In general the high scale passages for intonation and matching volume with the orchestra is difficult. | The opening section creates a great path for what is to come from the cello. It is both |

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| | being loyal to markings in the score as well as making a personal connection. | | exposed as well as intimate with listeners. |
| *Harper* | WWI, amazingly sad and profound piece on how people relate to tragedy. Unique voice that it gives the cello and the person playing the artist is at the whim of what is happening in the music. What the music is represent. The cellist is the protagonist. Generally the Elgar aside from the fast movement, the whole piece is tragedy. The ending is reminiscent of the beginning of the first movement where it basically is the same material so a reminder that you haven't gone anywhere as a reminder of tragedy. | C to E with orchestra going back forth with strange harmonic progressions. Sections with fast arpeggio moments are also challenging. | Chords at the beginning and end of the entire concerto. |

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