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FACULTAD DE MÚSICA

TESIS

"THE NECESSITY AND IMPORTANCE OF MEANINGFUL INTERPRETATION IN PERFORMING WRITTEN MUSIC."

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The Necessity and Importance of Meaningful Interpretation in Performing Written Music

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Abstract

Interpretation of written music is the ability to realize the notes on the pages into sounds. However, the process of making these sounds meaningful is unclear and without a systematic pedagogical approach. This paper begins by addressing the distinction between music as sound and written music, and explores the role of written music as a medium to translate musical ideas into tangible visual representation. Then, the cognitive processes of interpretation of written music and meaningful interpretation is explained within the framework of level of processing and expert memory. Furthermore, I explain why memorization of music is a necessary step in interpreting meaningfully and developing musical consciousness, and how it can be encouraged in academic and pedagogical contexts.

Keywords: Music, Performance, Interpretation, Memory, Cognition

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The Necessity and Importance of Meaningful Interpretation in Performing Written Music

The main focus of instrumental performance study is the development of technical proficiency on an instrument and musical literacy. In a traditional pedagogical sense, the teachers advise students on how to play the instrument correctly on the basis of one-on-one observations, assigning scales, arpeggios, etudes, and various repertoires of increasing technical difficulty. At the same time, instrumental performance students are also trained in music theory and aural comprehension (ear-training) in order to develop musical literacy, and to become stylistically informed by learning music history. However, despite the comprehensive music curriculum, it still has shortcomings in imparting the process of musical interpretation, a process required to extract the essence and emotional affect contained within any given musical work. And oftentimes, the subject of musical interpretation takes the back seat in the musical development of an individual and usually is left for the individual to explore and experiment by themselves without a systematic approach.

I believe that the lack of systematic approach in how to interpret music is not without reason. The established pedagogical approach in teaching how to play an instrument is through oral and written tradition, and thus technical by nature. Students are taught the relationship of the notes on the page to their respective instruments, and the level of competency on an instrument is dictated by the level of technical proficiency and accurate execution. However, this pedagogical approach seems to ignore that technical proficiency does not correlate to the level of musical interpretation, and fails to address how to express musical content. Better execution does not mean better interpretation. Instead, an accurate technical execution only permits higher quality and fidelity of sound production and transmission itself, but does not speak of the quality of the contents of what the musician wants to convey.

On the other hand, attempts in explaining musical interpretations have been made through applications of philosophical hermeneutics in music by the likes of Lawrence Kramer, Susanne Langer, and Martin Heidegger to name a few. However, this approach through hermeneutics, which originates from interpretation of biblical documents, too often try to wrestle with the philosophical subjectivity of musical affect and intent, and semiotics of music. The problem with musical hermeneutics is that it makes the assumption that music contains a singular meaning, yet the problem arises in that we, as composers, performers and audience, have no control over our affective and/or associative reaction to music. Even over time, the same music takes on different meaning to the same person.

Leonard Bernstein (1976), in his Six Harvard Lecture Series titled "The Unanswered Question" tries to explore what the meaning of music is, drawing broad correlations with linguistics, but to which end the lecture still leaves the very question unanswered. In his third lecture titled "Musical Semantics," Bernstein makes a terse point that musical meaning arises from the process in which we make the music meaningful by creating meaningful relations of the notes and then transforming those musical materials 'metaphorically,' or as creating a relationship of 'this is that.' However, when Bernstein performs the example of a Beethoven piano sonata explaining how the meaningful relationships begin to express meaning, the musical content is already far too along the process of making the music meaningful, as Bernstein can already perform from the work from memory. This paper will take a step back and try to explore the process of making music meaningful by explaining the cognitive processes leading up to the point of needing hermeneutics, an objective and a more practical process that can be applied as a performer and also as a pedagogue to encourage meaningful interpretation.

The technical accuracy and demand imposed by the musical education system, and the ambiguity and uncertainty in what is being interpreted may be partly blamed for the distinction of sound production and the musical affect it produces. However, I believe the real difficulty of meaningful interpretation stems from the written music, also known as the score. Musicians and music scholars alike give much weighted authority on the score, and rightly so, for it is the direct product of the composer that is available to the public. But, at the same time, musicians intrinsically understand that the score is only the representation of the music and that the score must be realized through performance in order for the music to be heard and understood. I believe that this distinction of technical motor movements required for sound production and the subjective perception of musical affects creates a dissociation within a musician to perform mechanically, without a meaningful expression that can be transmitted through music. To understand why then the dissociation of technical execution and meaningful interpretation of the score occurs when realizing a score to sound, the nature of the score must be examined to understand what information it actually contains and represents.

Score as a performance guide

The score is a two dimensional abstract visual representations of music in the form of staff-notation, a tangible physical form of the intangible ephemeral sound. The horizontal axis represents the passage of time and the vertical axis represents the sound frequency or pitch. It is the medium that informs and points the performer to the ideas of the composer by providing instructions for how and when to play what notes with which instruments. Because the very nature of notation is an abstract representation of a physical phenomenon, it requires its users to be literate in the notational system, contributing to the authority yielded to the written score. Unlike the dissemination of music by oral tradition, which is vulnerable to variations and modulations in

every instance of its musical realization, written music is a robust system of symbolical conventions that allows for musicians and composers to concretize a specific musical idea for a repeated performance, analysis, and edition. The staff-notation can be summarized into two principle elements that allow for repeated and exact musical execution; descriptive and prescriptive notations.

Descriptive notation

Kanno (2007) explains that descriptive notation is the standardized way of notating pitch, rhythm, articulations and musical texts that informs and describes the performer what the music should sound like. It is a system based on common-place musical performance practices, creating a certain standard between all musicians to be shared, such as pitch, volume, tempo, and duration of notes. However, Kanno also argues that despite its rigid and robust system in describing sound, descriptive notation can only adequately express and approximate the music because of its reliance on existing conventions of notations based on performance traditions, isolated from its historical and cultural context "leaving out many parameters and values that are also a constituent part of music but indefinable in notation" (Kanno, 2007, p.233). Descriptive notation is useful when the sonorities intended by the composer represented by notation and are clearly understood by the performers without ambiguities, who in turn are able to realize and decipher the appropriate sounds from the notation in concurrence with the composer's intention (Kanno, 2007).

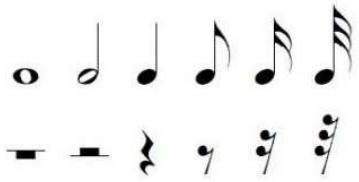

Figure 1.1 Note heads and rests representing the rhythmic values.

Prescriptive notation

Another type of notation is prescriptive notation, a system of notation that specifies the method of sound production with "an indication of actions to be taken" rather than its description (Kanno, 2007, p.235). Prescriptive notation takes into account of the musical parameters that cannot be made explicit in descriptive notation and relies on the kinesthetic and performative instructions for its description of sound, for example a trill. It is the notation that literally instructs the performer a specific action or performance for a certain sound. For example, string instruments can produce different timbres depending on how it is performed; *arco* (bow on strings), *pizzicato* (pluck the strings), *con legno* (percuss the strings with the stick of the bow), *con sordina* (play with a rubber mute over the bridge), and *ponticello* (bow extremely close to the bridge to produce a distorted metallic sound) to name a few. By its intrinsic qualities, prescriptive notation requires the performers to consciously participate in the process of deciphering notation into specific actions for creating the sonorities intended by the composer. This in turn puts "the responsibility to determine the objects of expression" encoded in a particular work on the performer (Kanno, 2007, p.248).

Limitation of the score

By examining what is really composed in the score, we begin to see that it is a complex, yet efficient way of instructing the performers how to realize the intended sounds of a given piece. Although the descriptive notational system is able to explicitly and accurately capture certain musical parameters, it contains limited information in style, aesthetic and emotional content of the composer's sound world, and ultimately their intentions and thought processes cannot be translated perfectly through written music. It is like how MP3 files are just strings of digital data until it is decoded by a digital-audio converter and reproduced with speakers; sheet music is a tangible

representation of a sound event that is to be decoded and reproduced by a musician. Kanno emphasizes the prevalence of diverse methods of notating sound as performative gestures in prescriptive notational system, which "pointedly remind us that notation is a means of articulating music and is not the music itself," and that the responsibility and the critical role of defining the sonic forms encoded in the score belongs to the performer (Kanno, 2007, p.252).

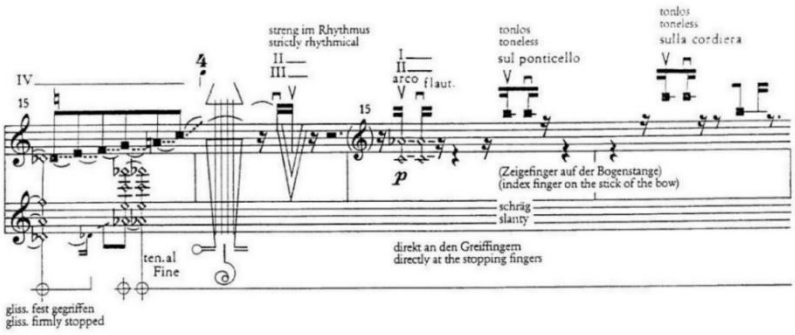

Figure 1.2 An excerpt of *Toccatina* by Helmut Lechenmann. As contemporary music began accommodating newfound sonorities and extended-techniques, staff notation also needed to devise new symbols for the new sounds and techniques.

Kanno's assertion becomes even more evident in modern music, as the notation system needs to accommodate to the new sonorities available, such as the example of Toccatina by Helmut Lachenmann in the figure above. Modern composers found that the conventional system of notation was not sufficient in representing new sonorities and harmonies, and its respective extended techniques. The composers themselves would create the visual symbols along with a legend to help guide the musicians in deciphering the written music. As the new sonorities become more common with time, its notation also becomes conventional becoming part of the vocabulary of representing sound in a visual form, such as the Bartok pizzicato (notated as ) for string instruments (when the string is plucked vertically as to slap against the fingerboard for a percussive effect).

Interpretation of the score

Even though the notation system provides an elaborate and effective means of representing the music, the fidelity of the music is lost at least two times by the very same system of notation it employs to encode the composer's intentions and musical ideas. The first time occurs in the moment of composition when the music in the composer's mind is represented into a visual written format. Brian Eno, an important figure in the development of studio recording compositions, astutely observes that "the composer writes a piece of music in a language that might not be adequate to his ideas—he has to say this note or this one, when he might mean this one just in between, or nearly this one here" (Eno, 1983, as cited in Cox, 2004, p.127). The second time occurs when the musician subjectively interprets what is written according to one's own understanding. As discussed before, the score on a superficial level is merely an instruction manual, a performance guide of how the piece is to be realized. The responsibility of the musician is to decipher what is written on the page and realize it into physical existence by performing it. This very act of realizing the notes on the page into sound is the basic principle of performance and more importantly interpretation.

Being able to realize the score becomes the top priority for a performer, which helps to explain the emphasis on technical fidelity in realizing the score in western classical performance traditions. Only when the score is realized as sound, musicians and listeners are able to access much more valuable information than what is written on the page; the actual music that is represented within the score. The level of interpretation will vary between each musician based on their level of musical literacy, technical capability, stylistic preference, and countless other factors. Nevertheless, as soon as the score is realized into sounds, the performer is able to begin to hint at what the intention of the composer may have been. It is this overlap of sound and

connection with its musical affect that links the composer and the musician across time and space, and in which interpretation begins to become meaningful in performance.

When the score is realized literally and simply utilized as complex set of instructions for producing sounds, it leads to a performance that is rather mechanical. It is like when a person being able to read and speak a foreign language with all the correct pronunciation and inflection without understanding what is being read or spoken, or simply perceiving string of letters instead of words composed of letters. But unlike words, which transmit explicit semantic meanings, instrumental music does not transmit semantic definitions, but rather arouses affect through sound that is subjectively felt by the performers and consequently by the listeners. The role of the performer expands to not only to being able to realize the score into sound, but also to understand, extract and perform the musical affect that is contained and implied in the score. In order to do so, musicians must view the score as more than a set of instructions of how to realize a piece of music. Rather, the musician must recognize that the score is a representation of music that requires to be realized into sound in order to explore the emotions, affect and intention contained in the sound.

Meaningful Interpretation

Level of processing

Although the purpose of interpretation is now clearer, the process of transforming the score into sound and refining it furthermore into music full of affect remains unexplained. When the musician looks at the score, the symbols and shapes on the pages are immediately perceived as staff notation. As the notes are deciphered, musicians already begin to perceive the phrase structures contained within the melody and harmony, and group the notes accordingly. As the musician continues to learn the entire piece, the smaller phrase groups are grouped together as

bigger musical forms that divide the whole piece into parts. All the while, the music begins to take shape from disparate sounds as the sound material is understood as musical ideas. And when a sound is understood as an idea, the musical affect can be finally accessed and becomes musically meaningful.

In order to explain how musicians may access these musical affects and interpret the score meaningfully, the "depth of processing" in memory research proposed by Craik and Lockhart (1972) must be explained. Craik and Lockhart argue that memorization of stimuli "can be understood as a byproduct of perceptual analysis" and is a result of "the depth to which the stimulus has been analyzed" (Craik & Lockhart, 1972, p.671). They claim that when a stimulus is perceived, its physical or sensory features such as lines, shapes, pitch, and loudness are analyzed first, then further processed in the later stages of analysis involving complex pattern recognition and extraction and association of meaning from the perceived stimuli (Craik & Lockhart, 1972). This idea of different levels of processing stage is commonly referred to as depth of processing, where greater "depth" implies "a greater degree of semantic or cognitive analysis," resulting in a better encoding of perceptual material into long-term memory (Craik & Lockhart, 1972, p.675).

The framework proposed in the article describes a hierarchy of information in the encoding stage of information processing. Shallow levels of processing include visual processing, involved with encoding visual information; phonemic processing, involved with encoding sonic information; and motor memory development, involved with coordination of kinesthetic movements. Information in this level is encoded only by rehearsal, or a consciously repeated effort of specific cognitive processes. Deeper levels of processing involves taking those sensory information from the shallower levels and forming them into patterns of recognizable objects, elaborated or enriched further by forming associations with one's past experiences. It allows the person to "make more

use of learned cognitive structures so that the item will become more complex and semantic" (Craik & Lockhart, 1972, p.679). Level of processing is a series of stages that restructures information from basic sensory perceptions into complex meaningful objects. This formation of hierarchical structures is the foundation of how meaningful interpretation is developed. As an example of how this hierarchy is established in music, I will use the final four measures (mm. 100-104) of the Prelude from Bach's Unaccompanied Cello Suite No. 6, as provided below.

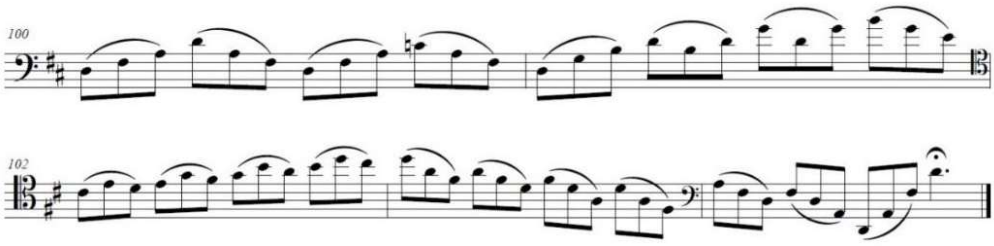

Figure 2.1 Measures 100 to 105 from the Prelude from the Unaccompanied Cello Suite No. 6 by J.S. Bach.

Shallow processing. For most performers, the initial stages of interpretation of deciphering information contained in the score into sound requires an extended period of time of learning. Even though more time is invested in this stage, the level of information processed, learned, and 'encoded' in this stage is rather shallow in the framework of depth of processing. Williamon (2002) asserts that performers engage with musical information through aural, visual, and kinesthetic processes, which reflects the processes involved in shallow levels of information processing described earlier. Visual memory deals with "images of the written page and other performance features that have been impressed upon the 'mind's eye'"; aural memory "enables individuals to hear compositions in the 'mind's ear', anticipate upcoming events in the score and make concurrent evaluations of a performance's progress"; and kinesthetic memory involves physical coordination that "enables performers to execute notes automatically" (Williamon, 2002, p.118-119).

Kanno also posits the same claiming that "learning pitch and rhythm" and "coordinating it with the body" are the initial two stages of interpretation of the score (Kanno, 2007, p.233). Much of the work involves deciphering the information in the score and refining the production of sound with the goal of achieving better fidelity in sound and transmission of the performer's intention. This process is repeated until the performer is familiarized with the musical materials and satisfied with the level of technical execution. Although the performer can perform at this stage of the interpretation process, the resulting performance will seem more like a demonstration in technical prowess and end up sounding more mechanical than musical. High fidelity of the realization of the score into sound, even though is an integral part of interpretation, is not an outcome of a good interpretation, but a way to transmit clearly the meaningful interpretation resulting from forming deeper musical structures.

Visual memory. When the performer first looks at the score, the primary task of interpreting written music is visual, and requires deciphering the visual elements of the score to determine what notes are to be played when. In the early stages of learning, visual information of the score becomes strongly associated with the musical material, and it is common to use "spatial imagery," or the association of musical passage with physical location on the page (Chaffin 2009, p.356). The musician initially organizes the musical material "by pages rather than the formal structure" of a piece of music, arbitrarily structuring the music by how it is presented visually on the score (Chaffin, 2009, p.356). In the later stages when the musical material is well learned, the reliance of visual information of the physical aspect of performance (i.e. hand positions, fingering patterns) becomes more evident (Chaffin, 2009).

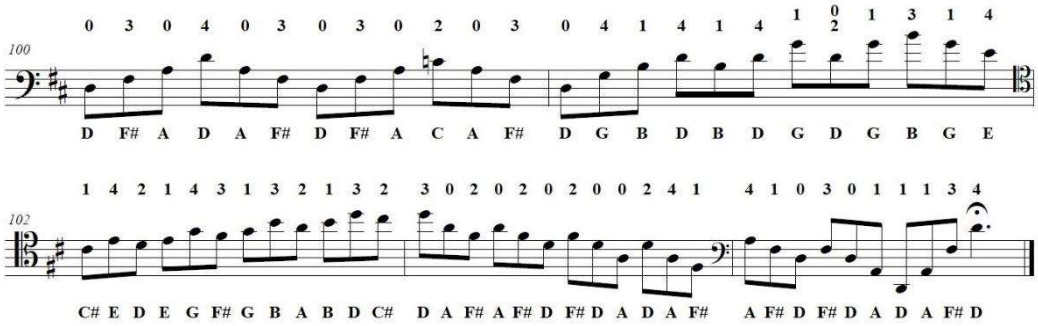

Figure 2.2 Excerpt from Bach with the note names and fingerings written out, but without articulation markings.

In the figure, articulation markings have been stripped and the notes are deciphered into its note names, without its octave range, on the bottom. Also these last 2 lines appear at the bottom of the last page, which happens to coincide in its respective form to its physical location in the score. Although only 12 tones are implemented (only the notes D, E, F#, G, A, B, C, C# appear in the figure), it is repeated over various octaves represented by different clefs. While visually similar, each note head represents a specific sound, with specific duration, which adds a time dimension.

Motor memory. Repetition of sequences of physical actions over a prolonged period of time creates motor memory, or the memory responsible for allowing "actions to be executed automatically by providing kinesthetic memory of the sensory feedback from joints, muscles, and touch receptors" (Chaffin, 2009, p.355). Technical aspects of performance, such as feeling the physical distance between notes, or vibrato just to name a few, become automatic and comfortable, in other words "natural." But to reach this level of automation requires an extensive rehearsal over an extended period of time.

Another important feature of motor memory involves 'mirror neurons.' They are a type of neurons in the motor system "that respond to seeing the corresponding action performed by

another," meaning seeing another person perform a certain action stimulates similar areas of motor coordination required for performing that same action in the observer (Rizzolatti and Craighero, 2004, as cited in Chaffin, 2009, p.355). Visually observing another person's movements or performance helps one coordinate better and learn the musical materials faster than without the visual observation.

Auditory memory. Repeated rehearsal of auditory information for prolonged period of time elicits auditory memory, or the ability to reproduce mentally the sounds heard. Various studies describe people being able to 'hear' a melody in their heads, "usually without accompanying imagery from other modalities, suggesting that the ability is based on an independent auditory memory" (Chaffin, 2009, p. 355). In performance, auditory memory guides the musician to anticipate "what comes next, providing cues to elicit the music from memory, while also letting the musician know that things are on track" (Chaffin, 2009, p. 355). It is also responsible in recovering from mistakes, being able to continue the song mentally despite the shortcomings of interpretation. The development of the auditory memory is also a crucial aspect of being able to interpret meaningfully, which I will later explain.

Deep processing. Kanno (2007) asserts that once the musical material is well rehearsed and coordinated with the instrument, the performer proceeds to the stage when the interpretation is made 'musical.' This is a necessary step in interpretation in order for the performance to not "sound like a direct translation from notation to sound" (Kanno, 2007, p.233). Williamon also asserts that a performer enters the deeper processing of information when the aural, visual and kinesthetic sensory information learned from the score is organized and structured in a unified manner (Williamon, 2002). The sensory information encoded in shallow processing is further analyzed and restructured into complex musical structures that are "stored into meaningful groups

(or 'chunks'), often becoming associated with specific physical actions and commands," such as scales, chords, and arpeggios (Williamon, 2002, p.122). Instead of perceiving the individual notes, the performer begins to form bigger meaningful groups from the individual notes.

The musical restructuring begins with the smallest unit of musical element, a note. A group of notes create harmonies and those harmonies form a phrase with its boundaries marked by its harmonic progression and cadence. A group of phrases are then analyzed and restructured into a musical form, which also provide definition and clarity in the overall architecture of a piece of music. This phase is critical in interpreting meaningfully because the raw sensory perceptions processed in shallow levels begin to take musical significance, creating specific relations in rhythm, harmony and melody, timbre and dynamics. But even though reorganizing individual notes into hierarchical structure tremendously helps the performer to understand how the composition is organized, it still fails to explain how musical affect is recognized and produced in the music.

Structural memory. Structural memory refers to the "overall sequential organization and goal structure" of a given narrative (Chaffin, 2009, p.356). In western classical music tradition, the musical narrative structure is revealed through the "hierarchical organization of a piece into sections and subsections based on melodic, harmonic, and metrical structures" (Chaffin, 2009, p.356). Apart from preparing the technical and physical aspects of interpretation, the musician must also analyze and group together individual notes into phrases, phrases into section, sections into forms, and so on. The groupings can continue to create even larger musical structures, which require creating even larger relationships between each level of groups, or hierarchical levels. How the performer parses the perceptual information into musical chunks highly depends on the level of musical literacy and aural comprehension of harmonic progression, or in other words, being

able to create phrase boundaries. It must also be noted performers can make adjustments in the technical aspects of performance to better fit their own understanding of the musical material.

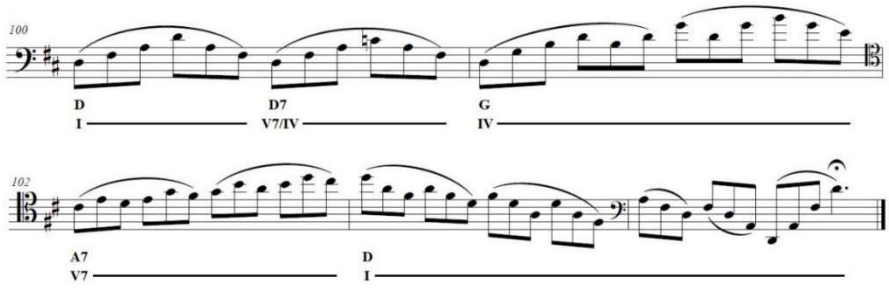

Figure 2.3 The individual notes are first grouped as chords which are further analyzed to show their harmonic function.

In the example of Bach, the deeper structures are revealed when we group together the individual notes into recognizable chords, a musical pattern responsible for harmony. The first two beats of measure 100 can be grouped into D major and the latter two into D dominant. Measure 101 is entirely composed of G major, and the next measure can be explained as an embellishment of A dominant (notice the notes on that fall on the pulse). The A dominant resolves to D major again for the remaining two measures. Grouping each notes into chords, or other musical patterns, is the initial step in deeper processing, and once chords are formed, more complex relationships between the notes can be recognized. This Prelude is in the key of D major, in which case, the example begins on the tonic (harmonic relations are written as roman numerals). The D dominant in this context can be recognized as a secondary dominant of G major, or the subdominant, which the secondary dominant resolves to. Then the next measure is a dominant that resolves back to the tonic D major, the key of the piece. This harmonic relation of [I - V7/IV – IV – V7 – I] can be grouped into a harmonic progression, or a phrase. And in the example, I have changed the bowings in order to better show the harmonic changes, slurring groups of 6 notes instead of 3.

Emotional memory. As a performer, producing and transmitting emotional content and affect through music is the most crucial aspect of interpretation. It is the final step in interpreting meaningfully; being able to recognize and internalize the music and its emotional affect hidden in the score. Although the question of what music might mean is still of debate, the fact that "music achieves its affective power through seemingly abstract tone sequences, largely devoid of representational content," is undeniable, even to those who know nothing about music (Huron, 2010, p.575). Musicians are observed to be more acutely sensitive to the emotional affect produced by sounds, finding difficulties in performing from memory when asked to interpret without expression, leaving researchers to believe that "playing without expression eliminates emotional cues that normally contribute to the retrieval of the music from memory" (Chaffin, 2009, p.356). One explanation, proposed as early as 1956 by Leonard B. Meyer, is that music creates expectations in a listener, and either meeting or breaking the musical expectation provokes an emotional affect.

Because music "consists of a sequence of sound events that unfolds in time," Meyer and many subsequent experimental cognitive psychologists have concluded that the temporal dimension in music allows for anticipation, surprise, and delay of the sound material that make up the theoretical foundations of musical affect (Huron, 2010, p.576). One of the fundamental ways of creating expectation is by creating a sense of tension. Musically, this is possible by creating dissonance in harmony, timbre, rhythm, dynamics and countless other parameters available in music. The more tense or dissonant the music becomes, the anticipation of a resolution becomes greater, and eminent consonance is expected. The ebb and flow of consonance to dissonance, resolving back to consonance is arguably what makes music emotional. Margulis (2005, as cited

in Huron, 2010, p. 587) proposes three types of musical tension arise from specific musical contexts and assumes that there are multiple differentiated types of tension.

> Surprise-tension is thought to arise when events occur that were not predictable beforehand, and registers phenomenologically as an experience of intensity and dynamism, motivating closer attention from the listener. Denial-tension is thought to occur when an unexpected event occurs in place of an alternative, highly expected event, and registers phenomenologically as an impression of intentionality or will in the music. Expectancy-tension is thought to occur when an event generates a particularly strong expectation for a subsequent one, and registers phenomenologically as an impression of forward-directedness in the melody. All of these impressions are fleeting, subtle, distinctly musical, and, this model argues, consequences of expectations formed dynamically as music transpires. Margulis's model builds on the work of Lerdahl and Narmour, adds a hierarchic component, forms quantitative predictions, and makes explicit a proposed relationship between expectation and tension. (Huron, 2010, p. 587)

Musical affect can be recognized by being sensitive to the increasing dissonance and the expected consonance and playing accordingly (for example giving emphasis on the V7 – I resolution). The process of expanding one's harmonic vocabulary through music theory must also be accompanied by being able to feel the musical affect it produces. However, the process of how a person acquires harmonic affect is still a process that is much to be researched. Of the research conducted, it has been shown that people learn to anticipate certain sequences of sound based on simple repeated exposure "even when there is no musical principle or structural relationship connecting" the sound events (Huron, 2010, p.577). It can be said that the listener's individually specific sonic

environments is the main factor that influences the ability to create expectations and understand predictability, while simultaneously absorbing the shared similar sonic environments of a given culture, resulting in acquiring a culturally shared musical expectations and forms of predictability (Margulis, 2005, as cited in Huron, 2010).

Expert Memory

A study conducted by Williamon (1999) reveals that audiences, especially trained musicians, preferred memorized performances more than non-memorized performances, suggesting that memorized performances are more conducive for a direct psychological and emotional connection between the audience and the musician. However, the study only surveys the emotional reception of the audience and does not take into account the extra time and the process of memorizing music. If, according to the research, memorized performance results in positive reception from both trained musicians and the general public, then what happens in the extra time taken to memorize music warrants further exploration.

As discussed in previous chapters, the process of learning music from the score requires an extensive series of pattern recognition in order to formulate and encode shallow structures. Once a material is well encoded, experts are observed to form deeper structures with the encoded materials, constructing schematic knowledge to organize individual information into bigger chunks or patterns (Tulving, 1962, as cited in Chaffin, 2009). But the depth of information processing only explains the encoding aspect of memorization; deeper the processing, the better the musical materials will be encoded into long-term memory. The encoded information requires a "retrieval scheme to organize the cues that provide access to the chunks of information," constructed from deep processing, and experts makes extensive use of highly practiced retrieval

strategy as proposed by skilled memory theory proposed by Chase and Ericsson in 1982 (Chaffin, 2009, p.358).

Even though the task and benefits of memorization is clear to the musicians, the process of memorization is treated as an unclear process that is left for "each person to find their own method" and not as a cognitive facility everybody possesses (Ginsborg, 2002, as cited in Chaffin, 2009, p.361). A systematic approach based on cognitive science is necessary in teaching memorization. Encoded information needs an efficient way of being retrieved from long-term memory, which will be discussed in this chapter. And the memorization of music will have a dramatic effect in how one understands and meaningfully interprets music, resulting in a more intimate connection between the performer and the audience, as shown by Williamon (1999).

Content-addressable memory: performance cues. As musicians learn a piece from sheet music, the initial approach involves superficial level of information processing. The beginning stages of learning music rely heavily on the motor-based procedural knowledge. In this stage, auditory and motor chains required for performance, known as associative chain, are formed and as a result an implicit memory of the piece. Because of the superficial level of encoding and the sequential nature of music, associative chains have a major limitation in that in order "to reach any link in the chain you have to start at the beginning" (Chaffin, 2009, p.352). This has serious implications in performance: when memory fails in a concert situation, the musician simply cannot restart from the beginning. Memory failures are unavoidable, but there are ways to help recover from these failures more gracefully than starting again from the beginning.

The main difference between novice and experienced musicians is that the latter creates a vast mental map of "landmarks" in a given piece of music that "allows them to keep track of where they are as the performance unfolds" (Chaffin, 2009, p.352-353). These landmarks, also known

as performance cues, are created by the process of deliberate memorization to transform "the motor and auditory chains" into content addressable memory, or being able to directly and immediately recall memorized contents (Chaffin, *et al*. 2002, as cited in Chaffin, 2009, p.352). Performance cues are easily created by simply thinking of a new starting point, or a cue (e.g. start of the second section) while practicing the respective musical material. After a few repetitions to "strengthen the associative link between the new cue" and the performance of it, the performer can now directly access this new cue point in the music anytime (Chaffin et al. 2002, as cited in Chaffin, 2009, p.357). Although creating performance cues may seem simple, this process is essential for transforming implicit and procedural knowledge, derived from motor-memory, into a language-based declarative knowledge that makes memory retrieval more of a self-initiated conscious act (Chaffin, 2009).

As explained before, performance cues are recalled directly without the need for prior cues for successive links. Associative chains, which are reactions to previous materials "cued by sound, action, and emotion," are susceptible to memory failure because if there are no stimuli to react to, the performance cannot continue (Chaffin, 2009, p.358). Performance cues are content-addressable, meaning the memorized material can be recalled, or addressed, directly without prior stimulus. Another advantage of performance cues is that because performance requires coordinating many different cognitive and bodily systems, there are multiple types of retrieval cues available at different levels of hierarchical organization, "each of which lays down its own memory traces, subject to its own schemas…making memory for performance more robust than memory for text" (Chaffin, 2009, p.354). Much like how associative chains are cued by different types of sensory information, performance cues utilize different types of memory "according to which aspects of the music they address" (Chaffin, 2009, p.360).

In the following diagram of a hypothetical hierarchical retrieval scheme (Figure 2.4), we can clearly see the hierarchical layout clearly organized reflecting the shallow and deeper levels of processing. Unlike associative chaining which only involves shallow processes, performance cues can be created in any level of the hierarchical organization of a piece. Chaffin (2009) categorizes them into structural, expressive, interpretive and basic performance cues: *structural cues* outline the important places in the formal structure, such as phrase cadences and section boundaries, and its respective components; *expressive cues* refer to the subjective musical feelings and affect the performer associates with the sound material; *interpretive cues* are musical gestures pertaining to interpretation and performance, such as dynamic and tempo changes; *basic performance cues* focus on the dexterously controlled motor memory for critical technical details of performing specific passages. And even though musicians may employ different types of performance cues specific to each performers and their respective instruments, they most likely all share a similar understanding of the musical forms and structures of a piece resulting from similar theoretical analysis, or the hierarchical organization of given piece of music (Ericsson and Oliver, 1989, as cited in Chaffin, 2009).

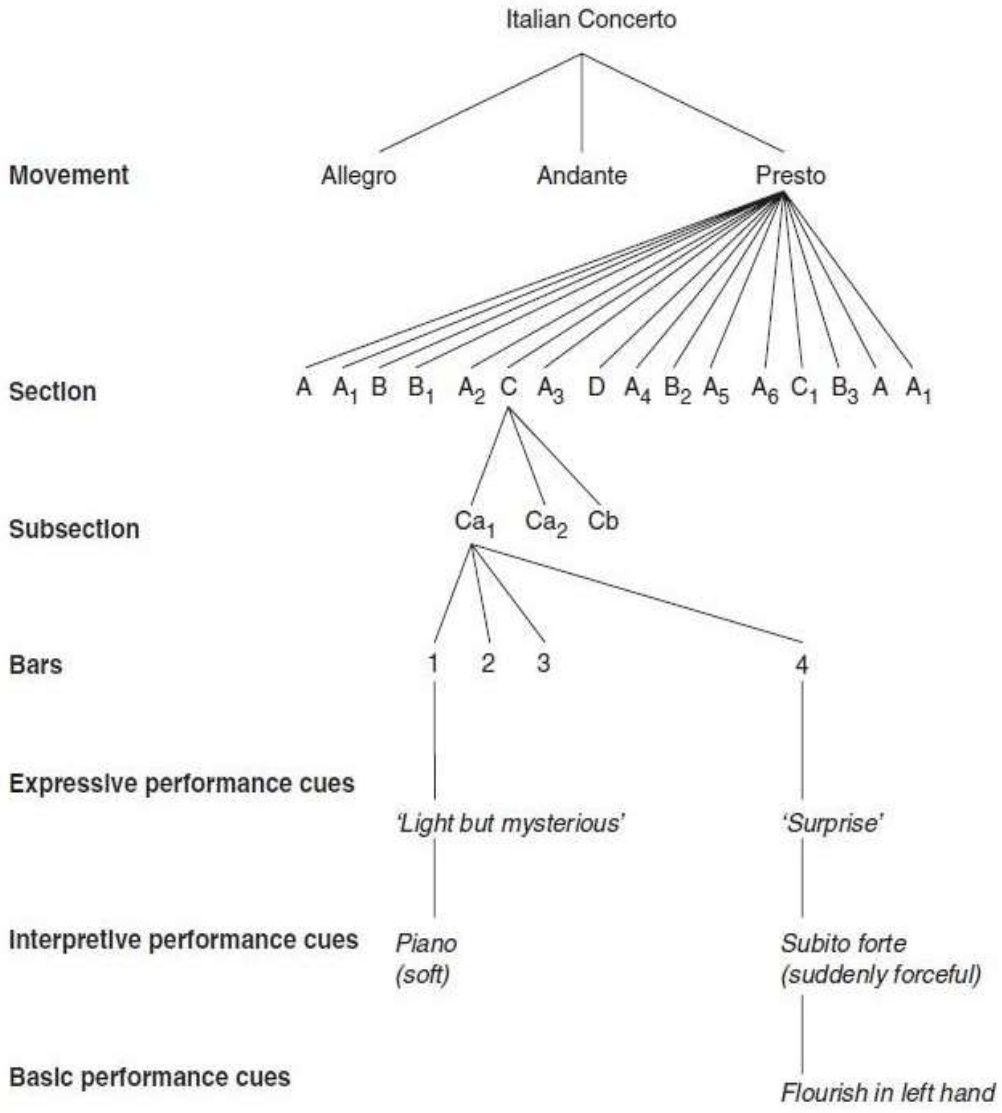

Figure 2.4 A hypothetical model of an 'unpacked' retrieval scheme organized into its respective hierarchical levels. Different types of performance cues can be created at different levels to address various details regarding to performance of a work (adapted from Figure 33.1, Chaffin, 2009, p.359).

The level of processing of information states that being able to create deeper structures requires a prior processing of the shallower structures, and in doing so creating performance cues at deeper structure points allows access into the shallower substructures. The hierarchical organization is established as the musician processes the music on a deeper level, as discussed before, and they are made content-addressable by the location of the performance cues in the hierarchy, "attending to each level of organization and each type of cue in turn" (Chaffin *et al.* 2006; Williamon *et al.* 2002, as cited in Chaffin, 2009, p.361). In effect, setting up performance cues at a higher level of the hierarchical organization reinforces and makes the content processed at a deeper level addressable, while simultaneously being able to access all the details at the lower levels of the hierarchy. This also implies setting up performance cues at higher levels requires the written music to be conceptually processed and interpreted at deeper levels, otherwise the information contained within the music to be interpreted cannot be accessed.

Creating performance cues at higher levels of organization is how experienced musicians not only memorize a piece of music, but also learn a new piece by first gauging the how the overall music should more or less sound and express. Expert musicians focus mainly on the structural and expressive cues, while allowing cues at lower levels of hierarchical organizations and information processed at lower levels to be handled automatically (Neuhaus 1973; Chaffin *et al*. 2003, as cited in Chaffin, 2009). The advantages of performance cues ensure that musicians can successfully recover should memory failures occur, and be able to "reliably perform challenging works from memory on the concert stage" (Chaffin, 2009, p.360). The ability to discern and create performance cues at higher levels makes it possible for an effective and robust organization, and the ability to recall a piece of musical opus in its entirety consistently (Chaffin, 2009).

Aural memory feedback loop. All experienced performers primarily focus on creating performance cues, as opposed to focusing on the technical fidelity of interpretation, as Chaffin and Logan points out in 2006. Performance cues offer a safety net for the performance, but more importantly performance cues is a surefire way to make the musical material content-addressable. Experts do this by recoding implicit and procedural knowledge of how to do something into a language-based declarative knowledge as a "propositional form so that they can be rehearsed in working memory as a thought" (Chaffin 352-355). This kind of mental instructions is a form of *linguistic memory* that reminds the performer **"**what to do at key points in a performance" usually directing other modalities of memories pertaining to performance such as motor, auditory, visual, and emotional memories (Chaffin, 2009, p.355). Performance cues enable the performer to transform technical information regarding to performance into self-initiated musical thoughts that can be rehearsed consciously in working memory.

Baars (1988, as cited in Chaffin, 2009), discovered that "rehearsing a mental instruction in working memory broadcasts it throughout the nervous system, automatically activating other systems and coordinating their activity," meaning that thinking or imagining about doing an activity, a process known as imagery, also activates similar regions in the brain as when actually doing that activity. For musicians, this means that they can now mentally rehearse the performance cues without physically 'interpreting' the sheet music, and the different modalities pertaining to performance will still become activated, although not as much as when one is actually performing with an instrument. When a musician is able to recall a piece of music in its entirety from memory (notice that we are now escaping from the grasps of authoritative sheet music), the musician enters a phase of what can be described as aural memory feedback loop.

Professional musicians are known to employ imagery, especially when time and/or space is restrictive for actual rehearsal, to improve their performance on their respective instruments as well as to memorize and refine the emotional content of a piece of music (Lotze, 2003). More so, Lotze *et al.* observed that the vividness of motor and auditory imagery correlated with the total time of musical training; more experience and the total time spent playing an instrument yields more vivid auditory and motor imagery, especially for those who started musical training at an early age. Various studies in mental imagery of musical performances confirm that neural activation patterns are shared between execution of motor movements and imagery of motor movements (Meister et al., 2004, Halpern and Zatorre, 1999). But the same cannot be said for the auditory system. The most confounding observation made in the studies initially conducted by Halpern and Zatorre, and further affirmed by Meister *et al.* (2004) and Lotze *et al.* (2003), is that although musicians, especially professionals, reported vividly hearing the music while performing auditory imagery (or as described by some as hearing sounds in "the mind's ear"), the brain region responsible for auditory processing does not become activated as one would expect.

Regardless, the power of aural memory feedback loop is that the aural materials can be accessed without physically performing the music, or interpreting, hence no longer bound by the limitations of the performer, be it technical or conceptual, and can be explored as a mental representation and as a thought. The aural material rehearsed from aural memory is inherently processed on a deeper level, and because performance cues are self-initiated without external stimulus, every instance of rehearsal and repetition simultaneously reinforces the performance cue and its associated processes, resulting in a feedback loop. Yet auditory memory feedback loop is more than just a mental tool for better memorization. It also signifies the development of a musical consciousness, or the ability to think in music and hear and feel the auditory image.

Memorized performance: key to meaningful interpretation

As Williamon observed, the audience is more receptive and attuned to the performer and the music when performed from memory, however, as he mentions, his research only focuses on the perspective of the audience. Williamon argues that because more time is invested in rehearsing the piece, the musical material is handled more comfortably. Yet the research variable was whether the score was present on the stage along with the performer (done so by placing a music stand, with or without the score). Although Willliamon's research does take into account of the immense preparation required for deliberate memorization, he doesn't explain the very process of memorization. And this process required for memorization, as discussed previously, is the key to being able to interpret meaningfully.

Once the score is removed from the learning process, the performer enters into an aural memory feedback loop, in which musical materials can be retrieved and refined further mentally without the need to physically perform, while simultaneously reinforcing the memorization of the sound materials. Being able to remove the score from the interpretation process is critical in being able to interpret meaningfully. When a performer is able to enter the aural memory feedback loop phase, two important shifts occur within a performer. First, the performer no longer needs to interpret the score in order to understand how the sound material should be heard, but rather this information is retrieved from the aural memory as performance cues, and with enough training and time invested, as auditory image; the absence of score makes it possible for the musician to interpret the music that is formed internally instead of interpreting the visual and symbolical representation of music. Second, as the sound material transforms into musical thoughts, it also becomes, technically, the same format as what the composers heard in their mind's ear.

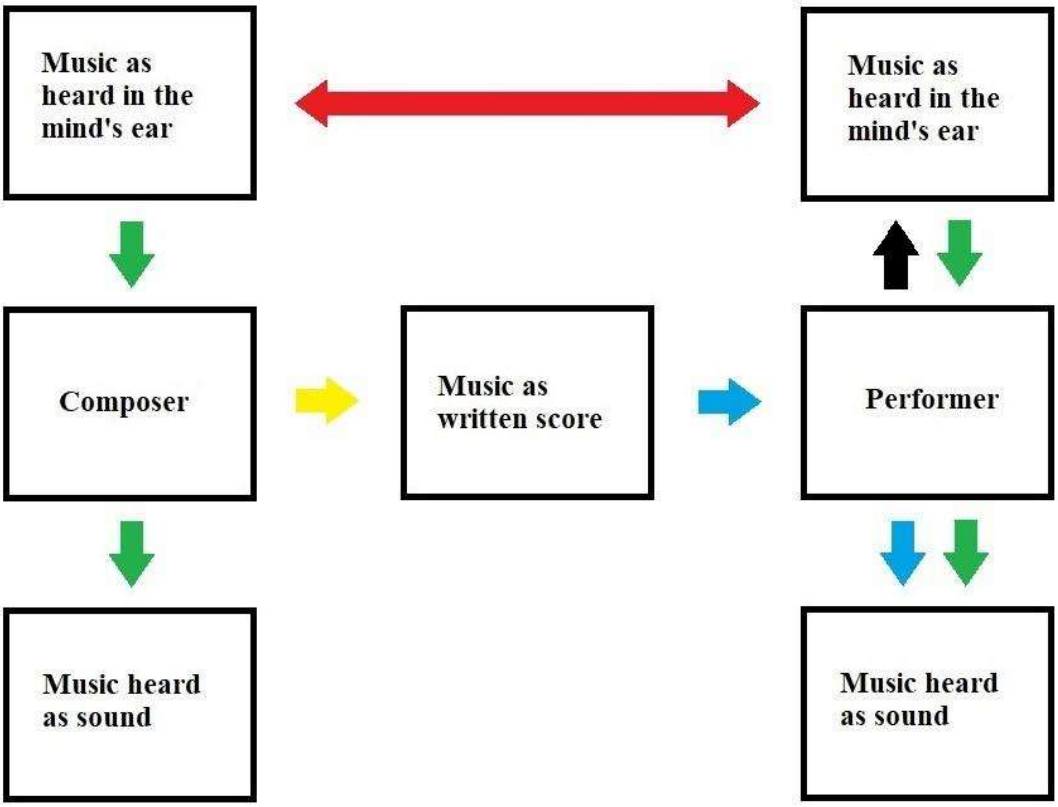

Figure 2.5 The process of meaningful interpretation. The yellow arrow represents the transcription of musical ideas heard in the mind of the composer. The blue arrows represents the basic interpretation of musical score. During rehearsal, the sound of music interpreted becomes encoded into the mind's ear of the performer, represented by the black arrow. The green arrows represent meaningful interpretation, for the music being interpreted is no longer a visual representation but a mental one. The red arrow represents the connection between the composer and the performer created by music existing as a mental representation.

The score serves as a medium for the composers to write the music heard in their mind in a tangible form to be disseminated, and in the end is a crude format to represent the music that is heard in the mind, and even cruder way to represent subtle musical affects. In turn, basic interpretation is required of the musician to, in a sense, reinterpret the score back into the sound format (blue arrows) to be encoded into aural memory (black arrow). Once the music is fully formulated in the mind of the musician, the music is now back in its original format, as a mental conception of the composer. Music in the form of a mental conception, a string of thoughts, becomes the connecting element between the composer and the musician (red arrow), not the sheet music that once served to represent the music. And only when the music is heard and understood in the same format as the composer can meaningful interpretation of music begin. Meaningful interpretation occurs when musicians first imagine the sound they want to produce and then try to interpret and transmit those sounds in their mind through their instruments.

Difficulty of meaningful interpretation

Historical and cultural context. One of the main difficulty in interpreting written music as a modern performer is understanding the performance traditions in a cultural historical context that could not be articulated through notation. The un-notated and rarely spoken musical tendencies and traditions of the historical period of any given composition are vital to musicians to interpret and contextualize the intended music contained in the score (Walls, 2002). Walls explains that seemingly innocuous notational markings imply an entire set of distinct musical traditions and sounds that were available at the time of the composition. The musical conventions and sonorities are dependent on the time period, and because of this unwritten specificity, Walls argues that every score must be contextualized historically in order to clearly understand the composer's intention and the music.

Figure 2.6 This 8th note figures, albeit visually represented equally on staff notation, will drastically change in interpretation based on style, genre, and era (e.g. in swing, the figure will be interpreted closer to an uneven dotted 8th note rather than even 8th notes, or 'swinging' the 8th notes).

In order to interpret and realize the composer's intentions properly, the performers must understand the historical perspective imbued in the score and analyze not only the notes on the score, but also the historical context the score was written in (Walls, 2002). For example, the original instrumentation must be inspected and how the instrumentation affected the notation in the score. Instrumental techniques affecting articulation, phrasing, timbre and other aspects of sound production also differ from period to period, along with rhythm, musical syntax, and musical traditions and conventions of the period that couldn't be explicitly notated (Walls, 2002). But even after extensive investigation of historical context, the performer still has to make "a musical judgement…about what aspects of the historical circumstance belong in our understanding of the score and what might be discarded as irrelevant or unnecessary" (Walls, 2002, p.31). The decision to "adopt or reject" historical accounts depend on what the performer deems appropriate to maintain or disregard for the current period.

Composer's intentions? Subjectivity of musical affect and development of a musical consciousness. The central point of meaningful interpretation is focused on discerning and understanding the composer's assumptions and intent made available to us through musical scores. Although the ultimate authority regarding fidelity of interpretation is placed on the score, we cannot ignore the fact that scores are merely symbols and representations that approximate the

composer's sound world and intended musical affect. The initial stages of interpretation does require the musician to learn from the score, however, once the learning process enters the deeper stages, the manner in which the score and the music it represents is approached must also change. While the sounds being produced is crosschecked with the score, the performer must decipher, understand, extract, and transmit the musical affects that are represented as succinct words or phrases.

More importantly, extended rehearsal of deeper processing results in a heightened development of auditory memory and the capacity to generate auditory imagery. This cognitive facility is what allows music to be heard as a personal thought and feeling, and interpreting these musical thoughts and feelings becomes inherently meaningful. As explained before, it seems that the subjectivity in meaningful interpretation occurs because of the individual perception and understanding of musical affect through repeated exposure of the sound material in the individual's personal musical experience and the culturally shared sound experience.

Conclusion

The fact that we have carefully archived and preserved scores for instruments that are no longer in production by composers who are no longer living speaks volume of the power of preservation of thought in physical mediums. Also transcriptions and arrangements for other instruments all seem to point out that the score contains more than a complex set of explicit and implicit instructions of how to perform. Rather, scores are a physical medium that represents the sound world of the composer, an immortalization through abstract representation that transcends both space and time, and the limits of corporeal existence.

The composers don't even necessarily have to be proficient in the instruments they are composing for, or even in extreme cases not even physically listen to the sound material itself (Beethoven's late period comes to mind), which all points to the crucial role of the performer: it is the responsibility of the performer to decipher and transmit what compelled the composers to write the notes in the score. Through an arduous process of pattern recognition and creating hierarchical organization, the performer converts the written music into music as a mental representation, as a self-generated thought without external stimuli, and develops a musical consciousness with deliberate practice and rehearsal over a long period of time. Meaningful interpretation, then, is the interpretation of the music generated internally as a musical thought and affect.

The process of meaningful interpretation is necessary in the current academic system of instrumental performance study that gives utmost priority in technical execution and fidelity in realizing written music. The system caters to the idea that the score of the music exists before the music and fails to recognize that the score only visually represents the music that has already been formulated in the mind. Only the shallow processing of interpretation is taught and reinforced, assuming that one already possesses heightened cognitive facilities attuned to music-making, and fails to foster the development of a musical consciousness in the individual which deeper processing of interpretation yields.

Much like how a child learns to speak the language before writing, music must be approached in the same manner, by exposure (Wooten, 2013). Much like how written language permits development of complex ideas, written music also permits musical ideas or sketches to be analyzed, manipulated, and developed later at one's own convenience. But more importantly prolonged repetition of deeper processing of written music is a necessary component in the development of an enhanced aural memory and a musical consciousness evident through

auditory imagery, in which the music can be generated internally without an external stimuli. And when the musician interprets and realizes one's own musical consciousness into sound, the interpretation becomes meaningful.

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