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Lou Harrison's *Concerto for Piano with Javanese Gamelan: Synchronization of East and West*

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ABSTRACT

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Lou Harrison’s compositions for Indonesian gamelan and Western instruments have served as representations of Harrison’s distinctive transcultural voice. His *Concerto for Piano with Javanese Gamelan* represents a fascinating musical synthesis between two great classical traditions. More than blending Eastern and Western instruments within a single composition, hidden beneath this juxtaposition lies a Harrison’s complex creative method. The purpose of this study is to examine Harrison’s method of forging Western and Javanese idioms within a single work.

In order to gain a better understanding through musical analysis, I include chapters concerning the development of exoticism in twentieth-century Western music, with brief historical background on traditional Javanese gamelan, and Harrison’s compositional trajectory toward his *Concerto for Piano with Javanese Gamelan*. In this concerto, I provide critical understanding of his compositional process using both in Eastern and Western elements. The analysis covers both the macrocosmic and microcosmic structures of the musical form in each movement, pitch-class sets, and rhythmic complexity. Through this method, one can see how Lou Harrison synthesizes the piano successfully with the gamelan idiom by blending two distinct musical cultures, while also emphasizing and reconciling their idiosyncrasies.
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INTRODUCTION

Lou Harrison is one of the most significant contributors to the legacy of American classical music in the twentieth century. Harrison is noteworthy for having combined Western and Eastern musical traditions to create an entirely new sound. His exploration of various musical traditions led him to create new musical instruments, but Harrison has attracted the most critical admiration particularly for his effortless blend of Indonesian gamelan and Western instruments, and his continued interest in writing for gamelan. Yayoi Uni Everett of Emory University states in the book *Locating East Asia in Western Art Music* that Harrison was praised for his deep understanding of the gamelan principle and his true love for gamelan.¹ And the ethnomusicologist Neil Sorrell writes that Harrison “has moved to a position where he feels completely at home not only with the instruments but also with the concepts of the gamelan.”²

Harrison’s tendency toward new sounds involving world music, mixing various styles together, makes stylistic classification of his works difficult if not impossible.³ According to Leta E. Miller and Fredric Lieberman,

To Harrison the process of composition is a sophisticated game. He encounters a style or sonority that attracts him, eagerly learns to imitate it, and then combines it with other influences. In the course of creating a new composition, he then selects from his toys (“which I’ve laid out on a wide acreage”), reassembling them

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into novel hybrids that, while echoing their sources, nevertheless speak with a distinctive, personal voice.\textsuperscript{4}

Lou Harrison’s works for gamelan and Western instruments represent his distinctive cross-cultural voice. These pieces demonstrate his life-long interest in a variety of Asian music, and his interest in combining distinct musical styles within a single composition. His music also exhibits complex compositional elements that bring cultures together. Given the improvisatory character of Harrison’s music, particularly of his works for Gamelan and Western instruments, one might be easily convinced to think that he gave little thought to coherent structure in his works. Yet, I hope to prove through careful analysis that Harrison made deliberate choices, organizing his ideas according to a clearly discernable “method” derived from both Western and Indonesian classical traditions. The fusion of styles and forms yields an ingenious cultural interchange based in music.

Harrison began his studies of gamelan as early as 1951 by imitating its sound, but it was not until the mid 1970s that he learned traditional Javanese gamelan techniques from Pak Cokro, and Sudanese style from Undang Sumarna. Harrison began writing works for gamelan in 1976, and two years later he made his first attempt to combine gamelan with Western instruments. The first two works, from 1978, include \textit{Main Bersama-sama} for gamelan and French horn, and \textit{Threnody for Carlos Chavez} for gamelan and viola. After that time, he frequently returned to this blend of sounds, exploring the compatibility of various Western instruments with the gamelan. Other significant works include the \textit{Double Concerto for Violin, Cello, and Gamelan} (1982), \textit{A Cornish Lancaran} for soprano, saxophone, and Javanese gamelan

(1982), and *Concerto for Piano with Javanese Gamelan* (1987). According to Leta Miller and Fredric Lieberman:

> Through his gamelan works Harrison completed his long-sought goal of uniting East and West both by introducing compositional processes of one culture into another and by physically combining sound-producing media from disparate musical ensembles.\(^5\)

To Harrison, instrumental color is of primary importance, and he accomplishes it not only by his artistry in traditional instrumentation, but also by his use of extended techniques, his imitation of non-Western sounds with Western instrumental combinations, and his unique combinations of instruments from various cultures. The essence of his skill is his ability to incorporate wide-ranging influences in his compositions while presenting a sense of unity. Harrison said, “the games to forge from these various influences a personal style, to dismantle his compositional toys and reassemble the pieces into a new one that mirrors its lineage while boasting of a distinctive character all its own.”\(^6\)

Lou Harrison’s *Concerto for Piano with Javanese Gamelan* offers a fascinating case study for his musical synthesis between two great classical traditions. In the process of the studying and analyzing Lou Harrison’s *Concerto for Piano with Javanese Gamelan* in both traditions, I referred to Leta E. Miller and Frederic Lieberman’s *Lou Harrison* and *Lou Harrison: Composing a World* and Heidi von Gunden’s *The Music of Lou Harrison*. Both Miller and Lieberman’s books include a comprehensive biography of Harrison, which investigates his artistic output of music and dance, instrument construction and the percussion orchestra. The book *Lou Harrison* also includes chapters on intonation and temperament systems, the music of

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\(^5\) Miller and Lieberman, *Composing a World*, 173.

Asia, along with his personal philosophy and values. *Composing a World* also includes extended interviews with John Cage, Mark Morris, Daniel Schmidt, Robert Hughes, and others who talk about Harrison’s personality and his music.\(^7\) Gundén’s book includes a biography of Lou Harrison and provides brief analysis of many of Harrison’s pieces following a chronological order. Gundén also gives an outlined chronology of Harrison’s life as well as a catalog of his compositions categorized by genre.\(^8\) Bill Alves shows a deeper analytical study of Harrison’s music in the article “Kembangan in the Music of Lou Harrison.” He claims that Harrison’s gamelan music remains faithful to a deeper Javanese spirit of *kembangan* (improvisation), and to the gamelan ideals of community, balance, and harmony on multiple levels.\(^9\) Alvis’s analysis of the gamelan pieces with Western instruments comes from a purely gamelan point of view, with no Western classical outlook. The dissertation of Rachel E. Chacko “Beyond the Myth of East-West Hybridity: An Analysis of Lou Harrison’s Works for Gamelan and Western Instrument” was also a helpful source.\(^10\) Chacko did a close analysis at exploring the nature and function of melody in his four compositions: *Bubaran Robert* of 1976, *Main Bersama-sama, Thernody for Carlos Chavez*, and *Bubaran Robert* of 1981. Her analysis focuses on Harrison’s exploration on writing melody, showing how it could create form and serve a central purpose in his music.\(^11\) Randall Lawrence Griswold’s *Concerto for Piano with Javanese*  

\(^{7}\) Ibid., vii-xiv.  
\(^{9}\) Bill Alves, “Kembangan in the Music of Lou Harrison,” *Perspective of New Music* 39, no. 2 (Summer 2001): 29.  
\(^{10}\) Rachel E. Chacko, *Beyond the myth of East-West hybridity: An analysis of Lou Harrison’s works for gamelan and Western instruments.* (Ph.D, University of Colorado at Boulder, 2010).  
\(^{11}\) Ibid., iv.
Gamelan paper was a significant source concerning Western analytical technique.\textsuperscript{12} I also referred to Allan Forte’s *The Structure of Atonal Music* to find the principal sonorities based on pitch class sets.\textsuperscript{13}

Current understanding about Harrison comes mostly from interviews, either with him or with those who knew him, and particularly from comments about his works rather than from the work themselves. There has been little detailed analysis about Harrison’s music in general. As a result, we only know the surface level of his compositions. The purpose of my study is to reveal Harrison’s method of forging Western and Javanese idioms within a single work—*Concerto for Piano with Javanese Gamelan*. The concerto is one of his last and extensive works combining both Javanese and Western instruments. To facilitate this discussion, I will devote two chapters on a brief survey of the relevant traditions of Javanese and Western classical music before I move on to the Concerto itself. I will then apply this knowledge in a detailed analysis of the Concerto in Chapter V.

Chapter I focuses on exoticism in twentieth-century art music as a context for Harrison’s Piano Concerto, starting with Debussy in developing a style of harmonic language, similar to gamelan music and continuing with Poulenc, Colin McPhee, Britten, Cowell, and John Cage. Chapter II places Harrison’s experiments with new timbres—flowerpots, steel brake drums in *Labrynth No. 3* for percussion ensemble, etc.—in a biographical context to show how Harrison borrowed from the traditional music of other cultures, including gamelan ensembles. Because gamelan instrumentation, tuning systems, notation, and the structure of gamelan are essential

\textsuperscript{12} Randall Lawrence Griswold, *An Analysis of Lou Harrison’s Concerto for Piano with Javanese Gamelan*. (Master of Arts in Music, San Diego State University, Summer 2001).

to my analysis of Harrison’s Concerto, I shall include a brief introduction to
traditional Javanese gamelan in chapter III. Chapter IV concentrates on building
American gamelans which gave Harrison a means to compose many new pieces.
Using this new material, he created hybrids by combining Western and non-Western
instruments in many of his works, including the *Concerto for Piano with Javanese
Gamelan*.

Chapter V includes my analysis of the *Concerto for Piano with Javanese
Gamelan*. My analysis of the musical form emphasizes tuning, rhythm, and melody.
Through this analysis, I hope to demonstrate how Lou Harrison successfully
integrates and synthesizes the gamelan idiom with the Western piano by changing its
temperament and by blending two distinct musical forms, emphasizing their
idiosyncrasies while reconciling their differences.
Chapter I

EAST MEETS WEST

Many Western composers in the nineteenth and early twentieth centuries were eager to experiment with new idioms using a new musical language. Some, like Giacomo Puccini, Giuseppe Verdi, Camille Saint-Saëns, Gustav Holst, and others who were fascinated with exotic cultures, began incorporating the sound of oriental music in their operatic and Symphonic works. One of the greatest examples is Verdi’s opera “Aida” which takes place in ancient Egypt, and uses exotic scales to evoke ancient Egyptian music.

In contemporary works, particularly since the 1900s, it has become more common to include “Eastern” musical elements, specifically gamelan, in one’s compositions. Western composers, especially Claude Debussy, Francis Poulenc, Colin McPhee, Benjamin Britten, Henry Cowell, John Cage, Lou Harrison, and others, using various artistic approaches have sought to blend particular aesthetics, concepts, and sound derived from Asian practice. Some of them have focused on timbres and multi-layering, while others have emphasized exotic scales, tuning systems, and rhythms.

The Paris Exposition Universelle of 1889 was particularly influential on French composers’ experimentation because it featured a variety of music from other cultures. It gave Claude Debussy and Maurice Ravel direct exposure to not only traditional Chinese and Japanese music, but also Indonesian gamelan. Debussy knew about gamelan as early as 1887 when J.M. van Vleuten, the minister of the interior to

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the Dutch East Indies, presented gamelan at the Paris Conservatoire. But it was not until 1889 at the Exposition Universelle that Claude Debussy attended live performances by native Javanese gamelan players and dancers.\footnote{Neil Sorrell, \textit{A Guide to the Gamelan}. (Portland, Oregon: Amadeus Press. 1990): 2} This experience inspired him to develop a style of harmonic language similar to gamelan music, using pentatonic and whole-tone scales, both of which imitate a very free system of intonation with little or no emphasis on a tonal center. For example, one may perceive gamelan-like pentatonicism in orchestral works such as “Nuages” from the \textit{Three Orchestra Nocturnes} (1899), and \textit{La Mer} (1903). In 1903, Debussy also wrote \textit{Pagodes}, inspired by the percussive sounds and multi-layering of Javanese gamelan. Here, he explores techniques for using textural contrasts to create form and movement with limited melodic and harmonic development.
As one can see in example 1.1, his melodies and accompaniment figures are based on the pentatonic scale and whole tone scale (both known as anhemitonic scales\(^{18}\)), with characteristics similar to the Javanese *pelog* scale\(^{19}\). Other techniques that are similar to gamelan music include ostinatos, polyphonic textures, and gong-like timbres. Put another way, one could argue that Debussy is presenting an accurate

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\(^{17}\) Mervyn Cooke, “*The East in the West*: Evocations of the Gamelan in Western Music”, 261.

\(^{18}\) Anhemitonic scales is a scale which does not contain semitones.

\(^{19}\) Please refer to appendix A.
and evocative rendition of gamelan using a Western piano. Remarkably, Pagodes is also considered one of Debussy’s impressionistic compositions, and so one might argue that the “impressionistic” and “Indonesian” elements in Debussy’s music are actually related. Many of his pieces are built entirely on this acoustical sense of the piano. Debussy’s reverence for these nuances were articulated in his article of 1913, where he writes, “Javanese music is based on a type of counterpoint by comparison with which that of Palestrina is child’s play. If we listen without European justice to the charm of their percussion, we must confess that our percussion is like primitive noises at a country fair.” What is remarkable here is the way Debussy frames the subtleties of gamelan music in terms relative to more familiar themes of Western music. He appreciates what he perceives as its counterpoint—a common measure of intelligence and learning in Western music—and extols its complexity, praising it above the sublime mastery of Palestrina, who was Europe’s most renowned Renaissance contrapuntalist, and the fount of modern contrapuntal learning. And, ironically, Western percussion, not Indonesian, is portrayed as being primitive—as “noisy” as country dances might seem to Western ears. Notwithstanding Debussy’s inflection of the familiar, cultural trope about the “noble savage,” his comments are pertinent to the “East meets West” mentality that would affect the reception of gamelan music among Western composers.

After Debussy, the most explicit borrowing from gamelan music in France is the Concerto for Two Pianos, composed by Francis Poulenc in 1932. The concerto was written in the wake of an appearance by a Balinese gamelan at the Exposition

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21 Ibid., 262.
Coloniale in Paris in 1931. 23 Although his imitation of gamelan is not as subtle as Debussy’s, Poulenc’s concerto includes five sections based on the pentatonic scale, the pitches of which, as shown in example 1.2, seem to correspond to those heard by him at the Exposition Coloniale.

![Example 1.2 Poulenc Concerto for Two pianos, mm. 173-76.](image)

The Canadian-born composer and ethnomusicologist Colin McPhee offered a different model for creating a fusion of Eastern and Western sounds, when he combined Indonesia gamelan music with the rhythms and harmonies of jazz. In 1929, McPhee heard some of the earliest recordings of Balinese music from friends. He described the sound as “like the stirrings of a thousand bells, delicate, confused, with

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23 Mervyn Cooke, “"The East in the West"": Evocations of the Gamelan in Western Music,” in The Exotic in Western Music, 264.
24 Ibid., 266.
a sensuous charm, a mystery that was quite overpowering.”

In 1931, he traveled to Bali and then lived there for eight years. He devoted over half of his life to gamelan music, both as a scholar and composer, and worked with Balinese dancers and musicians. He transcribed over forty pieces of Balinese music for Western instruments, including Balinese Ceremonial Music for two pianos (1934). The three-movement work evokes gamelan sonorities and the use of the gamelan’s two tuning systems. The other composition that showed a heavy Balinese influence is Tabuh-tabuhan for two pianos and orchestra (1936). The work consists of three movements, which include extended quotation of Balinese music and references to Latin rhythms and Gershwin-style orchestral jazz. It is perhaps this Gershwin-like fusion that led one critic to call the piece “An American in Bali.”

Colin McPhee later introduced gamelan music to the British composer Benjamin Britten during his stay in America from 1939–42. After visiting Indonesia in 1956, Britten wrote the ballet The Prince of the Pagodas, using a more or less standard symphony orchestra to capture the sound of the gamelan, shown in example 1.3. In addition to adopting the gamelan’s pentatonic scale, Britten’s fondness for broad gong strokes permeate in almost every orchestral score, including his last opera Death in Venice (1973), shown in example 1.4.

Example 1.3. Britten, \textit{The Prince of the Pagodas}, from Act 2, scene 2.$^{27}$

Example 1.4. Britten, \textit{Death in Venice}, from Act 1, scene 5.$^{28}$

$^{27}$ Mervyn Cooke, “The East in the West”: Evocations of the Gamelan in Western Music,” 275.
Henry Cowell, John Cage, and Lou Harrison were instrumental in cultivating interest in Eastern cultures in America, and gamelan in particular. Now Javanese and Balinese gamelans abound in North America, especially in California, under the influence of Indonesian teachers; some Americans, such as Dennis Murphy, William Colvig, among others, have built their own gamelans out of aluminum and other materials. Henry Cowell, who had been interested in world music since his youth, introduced an ethnomusicology course “Music of the World’s People” in the 1920s at the New School for Social Research in New York. At that time, he discovered gramophone records of Balinese music and listened to them with McPhee. Cowell became well known for his extended piano writing, which included tone clusters and unconventional timbral effects that indicate an association with the gamelan.

Through Cowell and John Cage, Lou Harrison learnt about gamelan. One of Cage’s prepared piano works, *Amores* (1943) shows a strong dependence on simple modality and ostinato figurations reflecting his post-Debussian interest in the gamelan. Introduced by Cowell, Cage coined the term “prepared piano” in 1940 to describe the use of various instruments and other tools to modify the standard piano timbre. He would place items such as screws, wooden pieces, or any other common items that would create a percussive sound on the piano. Cage once described the sound of prepared piano as “a melody which employs sounds having widely different timbres.” In this piece, Cage shows the extensive influence of gamelan, specifically in his use of ostinato patterns, as shown in example 1.5.

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28 Ibid., 276.
Example 1.5. Amores, score of section 3 of Movement I (mm.10-15)

To a Western listener’s ear, gamelan music may sound exotic and perhaps strange and “out of tune.” However, gamelan has deeply influenced Western music since the turn of the twentieth century, indeed more than one may think. As I will show in the following chapters, Lou Harrison would combine styles of music within a single composition in sophisticated ways. He has been consistently praised for his successful eclecticism, and his works for gamelan and Western instruments has received more attention than any of his other works. Lou Harrison was the first to start using real gamelan instruments and even to make his own, what has come to be referred to as “American Gamelan” music. The next few chapters will focus on Lou
Harrison, specifically in his *Concerto for Piano with Javanese Gamelan*, to show how his works revel in an interplay between the cultures, mixing the “exotic” with a traditional Western classical sound world.\(^\text{32}\)

CHAPTER II

LOU HARRISON’S COMPOSITIONAL STYLE

Lou Harrison was born in Portland, Oregon on May 14, 1917, the first child of Calline Silver and Clarence Maindenis Harrison. His mother was a granddaughter of a wealthy businessman. Coming from a wealthy family, Clarence decorated her house with Persian carpets and Asian artwork. Leta E. Miller and Fredric Lieberman have suggested that these two contrasting visual styles from his childhood influenced Lou Harrison’s fascination with the music of Asia and “pre-Mozartean Europe.”

Harrison once said:

My drama is to try to recapture childhood riches, the beauties of Asian things. Somewhere along the line I learned that if you couldn’t buy it, like Mom did, you could, maybe, make something, and that’s part of my creative urge—to make riches. That’s why I decorate the gamelan instead of using plain wooden boxes. And I still would like to paint. I love to decorate things.

When he was nine, his family moved to northern California, and then from 1926, the Harrison family moved frequently to various cities in northern California, once every year or two. As a teenager, Harrison enjoyed spending his free time reading books, playing the piano, and studying scores. At this early age, he already experimented with instrument building and reassembling electronic tools like the phonograph, evidence of his future innovation in creating musical instruments.

After graduating from high school in 1934, Harrison moved to San Francisco. During his eight years there, he was exposed to a variety of music including dance,

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percussion, Asian music, and early music. For example, at the Mission Dolores he learned about Gregorian chant, which would later form into what he called “melodicles.”  

Coming from the Pacific rim of California brought Harrison into contact with other similarly minded composers interested in Pacific cultures. Henry Cowell, Carl Ruggles, and John Cage, in particular, would shape his stylistic development in this regard. Arnold Schoenberg and Charles Ives would also influence Harrison deeply.

In 1935, Harrison enrolled in Henry Cowell’s class “Music of the Peoples of the World” at the University of California Extension. Harrison also took private composition lessons from Cowell, initiating a personal and professional friendship that would continue until Cowell’s death in 1965. Nearly every aspect of Harrison’s compositions in this period shows Cowell’s influence. For instance, he began to show interest in manipulating small motives in his music. His rhythms became more complex, particularly in his early percussion works. He also began to experiment with extended keyboard techniques, such as strumming and plucking the strings, and striking the keyboard with one’s fists, heel of the hand, or forearms. Perhaps Cowell’s most important influence on Harrison was his advocacy of non-Western musical cultures: Amerindian, Latin American, and especially the classical traditions of Asia, which could be used as sources for new music.

Harrison regularly attended performances of traditional Chinese opera in San Francisco. Like Debussy, Harrison experienced gamelan for the first time at a cultural exhibition, having attended a live performance of a Javanese gamelan orchestra at the Golden Gate Exposition on Treasure Island in 1939. He also attended performances of

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Javanese classical dance at the Curran Theater in San Francisco. All of these performances later inspired him to learn about and compose for non-Western instruments, specifically gamelan, which will be discussed thoroughly in chapter IV.

Recognizing Harrison’s remarkable talent, Cowell introduced him to other prominent composers, including Arnold Schoenberg, Edgard Varèse, and Carl Ruggles. In 1936, based on Cowell’s recommendation, Harrison wrote to Charles Ives requesting scores for his piano sonatas. A few months later, he asked for Ives’s chamber music works. Through Ives’s music, Harrison seems to have adopted a new freedom with experimentation.

After carefully editing some of Ives’s scores, including “He Is There!” The Robert Browning Overture, The Second String Quartet, and The First Piano Sonata, Harrison premiered Ives’s Third Symphony in 1946 with the New York Little Symphony Orchestra. The following year, Ives was awarded the Pulitzer Prize for this work. In appreciation for Harrison’s editorial work and promotion of his music, Ives expressed his gratitude by awarding half of his prize money to Harrison and assigned the royalties for many of his works to him, asking that Harrison use it to further his own musical endeavors. Apart from his influence on Harrison’s freedom in structure and harmonic language, Ives’s quarter-tone piano pieces also inspired Harrison to experiment with tuning systems in his later works. The quarter-tone pieces influenced Harrison to explore tuning systems more broadly, like “Just Intonation” — that is, a tuning system based on pure intervals derived from the overtone series. To express his gratitude to Ives for sharing his prize money, Harrison composed an orchestral work after Charles Ives passed away, At the Tomb of Charles Ives (1963), which uses yet another tuning concept called “free style.” The free style is an extension of Just

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Intonation technique, in which the tuning dispenses entirely with the concept of a fixed tonal center. Instead, each pitch is related only to the surrounding notes either harmonically or melodically, mostly in strict ratios derived from the overtone series. The result of intertwining these various intervals creates a stunning spectrum of harmonic colors.

Cowell also introduced Harrison to John Cage, one of the leading avant-garde composers of his time. Having common interests in percussion and dance, Harrison and Cage collaborated on many percussion and dance concerts. They use newfound instruments such as buffalo bells, old brake drums, and a variety of non-Western instruments, and their performances were well received by audiences and critics. For instance, they wrote *Double Music* (1934), a work composed for four percussionists. Listening to Cowell’s advice, both composers began experimenting with unique percussive sounds. For instance, Harrison used objects such as flowerpots, brake drums, tin sheets, and metal pipes in his *Labyrinth No.3* for percussion ensemble (1941).

Harrison’s interaction with Carl Ruggles led him in yet another direction—toward the baroque music of Handel. Through Ruggle’s guidance, Harrison began to link contemporary experimental styles on the one hand and the intricate counterpoint of the Baroque on the other. Harrison admired Carl Ruggles’s finely crafted counterpoint and his ability to create a musical texture rivaling Handel’s in clarity. Later, in 1942, Harrison enrolled in Arnold Schoenberg’s weekly composition seminar. These seminars were the most inspiring aspect of his Los Angeles experience. If Ives taught Harrison freedom, Schoenberg seems to have taught him

\[41\] Ibid., 28.
about method. Harrison was mainly impressed with Schoenberg’s ability to build large-scale structures from simple and coherent phrase relationships. Harrison writes:

The most profound influence was toward simplicity. Nothing but the essential. And from that I learned very greatly. Whenever I would get bogged down, just stop and thin it all out and come to the essentials and proceed in a lighter, thinner way. Never force, never overcomplicate! Never get caught in a pudding or tar pit…. In part, it was meant that I needed a lighter, more essential touch. I was heavy! He (Schoenberg) complained of the same thing. Somehow the question of lightness once came up and he looked around sadly at us and said, “I try, but everything I touch turns to lead,” which must have been a terrible statement to us from a born Viennese.”

One can see this influenced Harrison’s melodic writing in his compositions. He is known as a writer of simple yet memorable tunes, which often seems immediately accessible to many listeners.

In the summer of 1943, Harrison moved to New York City, and remained there for the next ten years. There, he reconnected with John Cage and Henry Cowell, who welcomed him into the artistic circle around Virgil Thomson. By 1944, through Virgil Thomson’s influence, Harrison worked as a music reviewer for the New York Herald Tribune. Both Thomson and Harrison found much in common: perhaps it was Harrison’s love for the French Baroque as opposed to the German repertoire; or his devotion to melody; or perhaps it was his gift for turning a phrase both musically and rhetorically. They established a close friendship that continued until Thomson’s death in 1989. During this time, Harrison’s compositional techniques matured as he began to develop a personal voice. Through Thomson’s help, he reviewed a wide range of

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43 Leta, *Composing a World*, 22.
musical concerts, from orchestral works and jazz to Chinese music. Through discussion with Thomson, Harrison refined his compositional technique, specifically in the area of orchestration. All the while, Harrison continued with his literary criticism, writing for music journals such as *Modern Music, View,* and *Listen: The Guide to Good Music.* All of this helps to establish Harrison’s literary voice—particularly his role as a music critic.

Living in New York proved difficult both financially and socially for Harrison. He suffered a nervous breakdown in 1947, and was hospitalized off and on over a period of nine months at the Psychoanalytic Clinic at Presbyterian Hospital in New York. Some colleagues predicted that he would never write significant music again, but they underestimated his resolve and determination. The hospital’s quiet environment allowed Harrison to be musically creative and to reevaluate his compositional language. His post-breakdown period was characterized by “studies in diatonicism,” particularly in expansive melody. Harrison moved away from a dissonant idiom and started focusing on melodic lyricism in diatonic and pentatonic modes. After 1950, Harrison permitted this lyricism to dominate, rooting out the elements that had obscured melodic clarity and diatonic directionality while at the same time maintaining a commitment to contrapuntal integrity.

The post-hospital period (1949-1951) became one of the most productive in Harrison’s life. Some of his most frequently performed works from this period are *The Perilous Chapel,* and *Solstice,* both collaborations with the dancer and

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46 Peter Yates, “*A Trip up the Coast,*” *Arts and Architecture* 74, no.12 (Dec 1957), 10.
choreographer Jean Erdman; the *Suite for Cello and Harp*; four of his *Seven Pastorales; Marriage at the Eiffel Tower*, and *The Only Jealousy of Emer*.

In 1949, Thomson gave Harrison a copy of Harry Partch’s book *Genesis of a Music*. Partch had built an original intonation system from an octave divided into forty-three unequal parts and invented new instruments for it. This book inspired Harrison to experiment, and embark on his own investigation of historical and contemporary tunings.\(^{49}\) The first composition to emerge from this study was the *Seven Pastorales* for chamber ensemble based on a Pythagorean tuning of his piano.\(^{50}\) This idea led him to experiment with a variety of sounds and textures, sometimes with new instruments of his own creation using a tuning that would become important in his later works. The *Concerto for Piano with Javanese Gamelan*, which will be discussed thoroughly in Chapter V, is one of the great examples where he incorporates new tuning systems and new instruments with Western instruments.

In the summer of 1951, the same year as Schoenberg’s death, Harrison accepted a faculty position at Black Mountain College in North Carolina. There, he composed *Rapunzel*, a fifty-minute twelve-tone opera in five acts, for three solo singers and a chamber orchestra. This work explored new harmonies that show his love for the music of Schoenberg and Alban Berg: a fascinating mixture of spare, non-harmonic\(^{51}\) music with modern twelve-tone techniques. Harrison says his opera involved "self-analysis," exploring various feelings and insights that he gained during nine months of analysis and psychotherapy following his breakdown. By this time

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\(^{49}\) Ibid., 22

\(^{50}\) Pythagorean tuning is a system of musical tuning in which the frequency ratios of all intervals are based on the ratio 3:2. This ratio, also known as the "pure" perfect fifth, is chosen because it is one of the most consonant and easy to tune by ear.  

\(^{51}\) Non harmonic music is a music that uses specific pitch-class sets or twelve-tone row horizontally and vertically, and does not have hierarchy in harmony, like tonic and dominant.
Harrison had departed from his early style, which often used dense and complex counterpoint. Melodically, this work is serially organized, and is often highly chromatic. *Rapunzel* was his last major serial work and served as a bridge from Harrison’s pre-breakdown works to his mature, more transparent style.\(^{52}\) In this opera, Harrison also showed his interest in Asian music, especially *gamelan*. He outlined the drone tones in Act 3 using a pentatonic mode (D–E–G–A–B), played by harp, celesta, and tack-piano, which he usually refers as “the gamelan section of the orchestra.”\(^{53}\)

Example 2.1. *Rapunzel*, Act 3, beginning of the instrumental ritornello\(^{54}\)

After a two-year residency at Black Mountain College, Harrison returned to Northern California in 1953. A few events that followed shortly thereafter would strongly affect his compositional approach. His first trip to Asia in 1961 resulted from an invitation to the “East-West Music Encounter Conference” in Tokyo. There, he gave a presentation entitled “Refreshing the Auditory Perception,” in which he discussed the importance of “just intonation.” His trip to Tokyo also enabled him to study firsthand the Asian music that had fascinated him since his early study with Cowell. Harrison’s interaction with Asian music also led to a period of experimentation where he combined instruments and musical forms from various cultures. For example, Harrison’s *Concerto in Slendro* for violin, two tack-pianos,

\(^{52}\) Leta E. Miller, *Method and Madness in Lou Harrison’s “Rapunzel*, 121.

\(^{53}\) Ibid., 109.

\(^{54}\) Ibid., 110.
celesta, and percussion combines the pentatonic *slendro* scale from Javanese gamelan with the Western Baroque three-movement (fast-slow-fast) form.\(^{55}\)

After the conference in Japan, Harrison received funding from the Rockefeller foundation to further his study of non-Western music in Thailand. But after his meeting with Dr. Lee Hye-Ku at the Japanese conference, and listening to Korean classical music, Harrison decided to study in Korea instead. Harrison was also invited by Professor Liang Tsai-Ping to Taiwan in 1962 to study *gu-zheng*, a traditional Chinese sixteen-string zither, along with other forms of Chinese classical music.

After a few years of studying non-Western music and instruments, and while serving as composer-in-residence for the “Festival of Music and Art of this Century” at the East-West Center of the University of Hawaii in 1963, Harrison composed *Pacifika Rondo*—a seven movement work combining Asian and Western instruments. In this composition, he explored various sounds and textures after learning how to play a variety of Asian instruments. *Pacifika Rondo* is written for a Western orchestra of strings, brass, and percussion, along with several non-Western instruments: a *sheng* (a Chinese free-reed mouth organ), a *p’iri* (a Korean double-reed aerophone), a *cheng* (a Korean hour-glass-shaped double-headed drum), a *pak* (Korean wooden clapper), *kayagum* (Korean zither), *daiko* (Japanese barrel drum), and *jalataranga* (a melodic percussion instrument from India composed of ceramic bowls tuned by filling them to various levels with water). With the exception of the sixth movement, which is in equal temperament, the rest of the movements are in just intonation, a type of tuning that Harrison favored.

Harrison’s experimentation with non-Western music continued in 1965 after he was awarded the Phoebe Ketchum Throne Award to support a year of study in

\(^{55}\) Please refer to appendix A.
Mexico. While in Mexico, he wrote a book entitled *Music Primer* (1971), where he explains to his students his compositional methods, philosophy, and theoretical ideas about music up to 1970. In this book, he describes traveling to a specific country to learn to tune and recognize specific intervals. He also discusses various kinds of notation, specifically the East Asian notation used in Javanese gamelan.  

Harrison joined the music faculty at San Jose State College (now San Jose University) in 1967, where he taught composition, orchestration, and world music. It was while there that he met his life-partner, William Colvig, an electrician and amateur musician with an interest in acoustics. Both shared the same interests in instrument building and intonation system. Together, they constructed harps, wind instruments, metallophones, and replicas of Asian instruments.

In 1971, with the help of a commission from the Judith S. Thomas Foundation, Harrison premiered his second opera, *Young Caesar*, written for seven puppeteers, five singers, and five instrumentalists. For it, Harrison and Colvig built their own percussion orchestra tuned using just intonation. Because it sounded similar to the bell-like sound of the Indonesian gamelan, they named the instrument “An American Gamelan,” and further nicknamed it “Old Granddad.” This is the first example of a full ensemble of American gamelan instruments. Two other compositions that use Old Granddad are *La Koro Sutro* (1972) and *Suite for Violin and American Gamelan* (1974).

Harrison’s interest in intonation systems led to his course on that subject at the Berkeley World Music Festival in 1975. It was during this time that he met Pak Cokro, a faculty member at the California Institute of the Arts who had brought traditional Javanese gamelan from Indonesia. This meeting gave Harrison an

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57 Leta, *Composing a World*, 62.
opportunity to learn gamelan from a native Indonesian. He arranged for Pak Cokro and his gamelan “Kyai Hudan Mas” (Venerable Golden Rain) to establish residency at San Jose State College, and this afforded Harrison the opportunity to study traditional Indonesian music intensively with Cokro and his assistant, Jody Diamond. Shortly thereafter, Harrison and Colvig built their own gamelan ensemble at San Jose State, which they named “Si Betty” to honor Los Angeles music patron Betty Freeman. This particular gamelan was built to replicate Indonesian instruments, particularly those of “Kyai Hudan Mas,” while also adding Harrison’s own elements such as just intonation. Upon its completion in 1976, Harrison wrote Gending Pak Chokro, Bubaran Robert, and Gending Samuel for traditional gamelan. This was followed by a series of compositions that included Western solo instruments and traditional gamelan. Main Bersama-sama calls for French horn and gamelan (1978); Threnody for Carlos Chavez is for viola and gamelan (1978). Then came the Double Concerto for Violin, Cello, and Gamelan (1981-82), and Concerto for Piano and Javanese Gamelan (1987).

In 1980 Harrison returned to Mills College. Later that year he was honored with the Milhaud Chair (named after the French composer Darius Milhaud). In 1981-83 he held the Marry Woods Bennett chair, and in 1988 he was bestowed with an honorary doctorate. As one of his first projects at Mills College, Harrison and Colvig, with the help of percussionist William Winant, started to build a third gamelan set. Like Si Betty, the new gamelan had both a pelog and slendro\(^58\) set of instruments tuned in pure ratios.\(^59\) They named the two sets “Si Darius” and “Si Madeline” after

\(^{58}\) Please refer to appendix A.

\(^{59}\) Pure ratios means the notes and intervals of a scale is based on a series of pure fifths with a ratio of 3:2. This is one of the easiest to tune by ear.
the renowned French composer Darius Milhaud and his wife, in recognition of Milhaud’s years of service on the Mills College faculty.\textsuperscript{60}

In 1983, Harrison moved to New Zealand for six month as a Fulbright Senior Scholar. He and Colvig used this opportunity to travel around the world. Because he was near Indonesia, Harrison decided to visit the islands for the first time. By chance, Vincent McDermott, a gamelan expert on the faculty of Lewis and Clark College in Portland, happened to be in Java at the time. McDermott arranged for lectures and presentations of Harrison’s compositions at Surakarta’s major arts academy. According to McDermott, his Javanese hosts felt honored that one of America’s major composers was studying their culture and writing new works for gamelan.\textsuperscript{61}

Upon returning to the United States in 1984, Harrison received several commissions for new works for both Western instruments and gamelan. Harrison also held many engagements as composer-in-residence at several universities and prestigious music festivals, including the Atlantic Center for the Arts, the University of New Mexico, the University of Southern Florida, the Cincinnati College-Conservatory of Music, and Saratoga Springs in New York. In this period he composed Three Songs, a Piano Concerto with Selected Orchestra, Homage to Pacifica, Mass for St. Cecilia’s Day, A Parade for M.T.T., and Rhymes with Silver. Harrison spent his last years revising some of his works, including Young Caesar, the Mass to St. Anthony, and the Third Symphony.

Between February 6 and 9, 2003, the contemporary Music Festival at the Ohio State University featured a significant number of Lou Harrison’s compositions over four concerts. To the shock and grief of everyone, Harrison suffered a heart

\textsuperscript{60} Leta, Composing a World, 72.
\textsuperscript{61} Ibid., 74.
attack in Chicago while on his way to the festival, and passed away on February 2, 2003. The festival was held in his memory.

The eclecticism of many of Harrison works makes it difficult, if not impossible, to find a stylistic classification for his writings. In Harrison’s music, divergent styles coexist within single compositions. Serialism finds reconciliation with melodicism, for example, in the *Suite for Symphonic Strings*, while gamelan and piano are blended in the *Concerto for Piano with Javanese Gamelan*. His major contributions to twentieth-century music are spread among different areas: the development of the percussion orchestra, the construction of new musical instruments, theories of tuning and temperament, and Asian-American-European hybrids of music.\(^{62}\) Harrison once said that he would prefer to be remembered for his diverse styles rather than for focusing on one area alone.\(^{63}\) Yet, his passion for non-Western music, specifically gamelan, was such a crucial part of his output that one would be hard pressed not to consider it the essence of his legacy. With this in mind, it now remains to show how Lou Harrison used the gamelan in his compositions.

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\(^{62}\) Ibid., 254-5.  
\(^{63}\) Ibid., 255.
CHAPTER III
INTRODUCTION TO JAVANESE GAMELAN

The beauty of Lou Harrison’s *Concerto for Piano with Javanese Gamelan* resides in its combination of Western and Indonesian elements. Therefore, in order to grasp the subtle nature of the work, it is essential to begin one’s examination with a brief overview of classical Javanese gamelan. Indonesia is a nation made up of thousands of islands and hundreds of distinct cultural groups with their own ethnic character and history. Yet, the old Javanese proverb “Bhinneka Tunggal Ika,” meaning “Unity in Diversity,” sums up Indonesian identity as based in rich cultural diversity. One of Indonesia’s most significant and popular forms of music is gamelan. Each island culture has its own distinct tradition of gamelan, but the most prominent traditions come from the islands of Java and Bali. For the purposes of this examination, it shall suffice to concentrate on Javanese gamelan, as this is the essential source from which Harrison draws his materials.

The term *gamelan* comes from the low Javanese word *gamel*, which refers to a type of hammer, like a blacksmith’s hammer. Javanese gamelan is a musical ensemble made up primarily of metallophones and gongs, many of which are struck by hammers. The remaining instrumentation includes drums; a xylophone-like instrument with wooden bars called the *gambang*; a two-string bowed fiddle called the *rebab*; and bamboo flute called the *suling*. Singers and dancers are also included in certain forms of the ensemble. There are approximately twenty different types of instruments in a complete gamelan ensemble; however, the total number of instruments may be as high as seventy-five.

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The gamelan participates in a wide variety of activities in Java. Usually, gamelan music is played during rituals. In traditional belief, the gamelan is sacred and is believed to have supernatural power. For this reason, both musicians and non-musicians behave humbly and respectfully toward the gamelan. It is also believed that each instrument is guided by spirits, and for this reason, musicians are required to show their devotion by removing their shoes and sitting cross-legged (sila) while playing their instrument. It is also forbidden to step over any instrument because it might offend the spirit by doing so. Other than ritual, gamelan music is used to accompany activities such as drama and dance. Hence, gamelan pieces (gendhing) may be categorized according to their usage: gendhing klenengan for concert music, gending wayangan for the wayang puppet shows, gending beksan for accompanying dance, and gendhing pakurmatan for ceremonial functions.65

Traditionally, gamelan forms an integral part of the ritual life of the village. One learns about the ensemble as a part of everyday life, starting by absorbing the styles of the music, and gradually learning how to play the various instruments. Before the twentieth century, gamelan music had been passed down orally for over a thousand years. Hence, the nature of the earliest traditional gamelan remains shrouded in mystery.

No two-gamelan instruments will have the exact same tuning. Small variations in the quality of the bronze affect pitch, and hence the intervals between pitches. Javanese musicians seem to appreciate these ingenious nuances. Each gamelan has its own characteristics and overall sound. To tune an entire gamelan set is an extensive process, and it takes at least twenty years for the intonation to settle. Owners go to considerable expense to maintain an exact tuning.

The instruments

A Javanese gamelan ensemble may include combinations of voices, string and wind instruments, and membranophones, but it is dominated by idiophones such as gongs and keyed percussion. The majority of gamelan instruments are made of bronze and struck with various kinds of mallets. Each instrument has its own role in the orchestra. The orchestra is divided into three functional categories: the instrument that regulates musical time; the balungan\textsuperscript{66} instruments, which are those that carry the basic melody in both its simple and elaborate forms; and the punctuating instruments that underline the musical structure.

Gamelan instruments can also be categorized based on the volume of the sound they produce. The loud-sounding instruments are the ones made of bronze, whereas the soft-sounding instruments emphasize the sound of strings, such as the rebab and wind instrument like the suling. As one may observe in figure 3.1, the loud instruments—gong, Kempul, Kenong, Ketuk, Kempyang, Bonang, and kendang—are placed in the right front, middle, and back rows of the ensemble, while the soft instruments—gender, rebab, gambang, suling, slentem, and singers—are in the middle and left front of the rows.

Among these instruments, the kendang (drum) takes a leading role by setting the tempo and rhythm, which signal the melodic patterns for a piece. The kendang is held horizontally on its stand and played with bare hands. It has drumheads on both sides, one larger than the other. Usually the small head is played with the left hand, and the large head with the right. The largest drum, called kendang gendhing, is reserved for sections that have a peaceful or majestic character. Sometimes, it is played together with the smallest drum, kendang ketipung, to produce the loud sound.

\textsuperscript{66} The word balungan is taken from the word “balung” meaning bone, implying that balungan forms the skeleton of the music.
dynamics called *kendang kalih*, which means two drums. The drumming may consist of either a repeated, simple rhythmic pattern or an elaborate rhythm related to dance movements. The *kendang* uses various tunings, which complement the type of drum and drumming style to be played, but its pitches need not agree exactly with the pitches of the other instruments in the ensemble.\footnote{Sumarsam, Introduction to Javanese Gamelan, accessed on January 4, 2014, http://sumarsam.web.wesleyan.edu/Intro.gamelan.pdf, 18.}

Figure 3.1. Basic layout of gamelan ensemble\footnote{Jennifer Lindsay, Javanese Gamelan, Traditional Orchestra of Indonesia, 33.}

The large instruments in the back of the ensemble of figure 3.1 are the punctuating instruments. They mark the colotomic structure of the composition by dividing and subdividing large phrases. The middle-sized instruments, placed in the middle of the ensemble, are the *balungan* instruments. *Balungan* refers to the skeleton
or framework of gamelan composition. The *balungan* instruments play the melody while others, mostly small instruments, and singers elaborate on it at faster speeds. This distribution of the *balungan* and heterophonic elaboration among various instruments, within a colotomic structure of large gong strokes, constitutes the “contrapuntal” design of gamelan that so deeply impressed Western composers from Claude Debussy to Lou Harrison.

Figure 3.2. Instruments of the Gamelan: Their function in the ensemble

The *gong ageng* is the largest and deepest sounding instrument that marks the largest phrases of a *balungan*. The stroke of a large gong marks the end of the main phrases. The *gong ageng* is the largest and deepest sounding instrument that marks the

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musical unit known as the gongan. The Gong ageng (figure 3.3) can vary in size, and therefore creates a variety of pitches. There is at least one large gong in each gamelan set, but it is common to have two, or more, tuned to distinct pitches. Other types of gong includes gong suwukan, which is smaller in size and higher in pitch than the gong ageng, and the gong siyem, which is the same size as gong suwukan but has a more resonant sound.

Figure 3.3. Gong Ageng

The other hanging gongs are called the kempul (figure 3.4). They punctuate a smaller musical phrase than the kenong. Formerly, there was only one kempul in the ensemble, but now there may be as many as ten, one for each note of the two tuning systems.

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70 Jennifer Lindsay, Javanese Gamelan, Traditional Orchestra of Indonesia, 10.
The *kenong* (figure 3.5) is a large kettle gong laid horizontally on crossed cords inside in a wooden frame. It has a low but clear and resonant tone. Originally, there was only one *kenong* in a gamelan ensemble; however, as gamelan developed, it became common to have as many as ten *kenong* in the ensemble.

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Figure 3.4. *Kempul*\(^{72}\)

Figure 3.5. *Kenong*\(^{73}\)

\(^{72}\)Ibid.
The ketuk (figure 3.6) is a small, slightly flatter horizontal gong tuned to a specific pitch, and is usually played by the kenong player. The sound of the ketuk is short and dull, in contrast with the clearer tone of the kenong. The instrument that works together with the ketuk is the kempyang (figure 3.7). It is a set of two horizontal gongs tuned to almost the same pitch. The kempyang usually subdivides a ketuk phrase. Whereas the ketuk is an essential gamelan instrument, the kempyang can be omitted. It is very common to have a single musician play both instruments.

Figure 3.6. Ketuk

Figure 3.7. Kempyang

\[73\] Ibid.  
\[74\] Ibid.  
\[75\] Ibid.
The balungan instruments include the saron and slentem. The saron (figure 3.8) is a type of metallophone made of heavy bronze bars laid over a hollow wooden trough and struck with a wooden hammer.\textsuperscript{76} The saron comes in three sizes, from the lowest to the highest pitch: saron demung, saron barung, and saron peking or saron panerus. Each successive saron is pitched an octave higher than the preceding saron. Even though it is possible to have many saron demung and saron barung, there is only one saron peking in a single gamelan set. The saron peking has a bright tone that could easily dominate the general saron tone. The saron has the greatest dynamic range in the gamelan, from soft, almost inaudible playing, to the exhilarating sound that dominates the ensemble.\textsuperscript{77}

![Saron Instrument](image)

Figure 3.8. Saron\textsuperscript{78}

The slentem (figure 3.9) plays in the same register as the kenong, an octave lower than the saron demung. Both the slentem and the saron are played with a similar technique using a single mallet.

\textsuperscript{75} Ibid.
\textsuperscript{76} Jennifer Lindsay, \textit{Javanese Gamelan, Traditional Orchestra of Indonesia}, 16.
\textsuperscript{77} Sorrell, \textit{A Guide To The Gamelan}, 32.
\textsuperscript{78} Bern Jordan, \textit{Javanese Gamelan} (April 2002)
The function of the *bonang* (figure 3.10) is to mediate between the *balungan* and the elaborating instruments. The *bonang* consists of a double row of bronze kettles (like small flat *kenong*) resting on a horizontal frame. Like the *saron*, there are also three sizes of *bonang*, from the lowest to highest in pitch: the *bonang panembung*, *bonang barung*, and *bonang panerus*. One of the important techniques for the *bonang* player is called *mipil*. It means to play tones one at a time but usually involves taking the notes of the *balungan* in pairs, and improvising around them while the *balungan* instruments play them simply. Another important technique played on the *bonang* is *imbal*. The *imbal* is a repetitive melodic structure composed of interlocking parts.

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79Ibid.
The elaborating instruments consist of the gender, gambang, celempung, siter, suling (bamboo flute), and rebab. Most of these instruments have ranges larger than a single octave. Musicians of these instruments strive to keep the contour of the balungan melody, but at a generally faster tempo and with a more varied rhythm than the balungan part.

The gender (figure 3.11) has a similar shape to the slentem, but it has thirteen keys and it covers two octaves. Like the other families of instruments, the gender also comes in a smaller size, tuned an octave higher, called the gender penerus.

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\[ ^{80} \text{Ibid.} \]
The gambang (figure 3.12) is the only instrument in the ensemble that is not made of bronze, but rather of hard wood, usually ironwood, and covers over three octaves. Because of its wider range and material, the contrasting timbre stands out within the ensemble.

Figure 3.12 Gambang

The celempung (figure 3.13) is a plucked zither that has twenty-six strings arranged in thirteen pairs, with each pair tuned to the same pitch. The strings are stretched over a slightly raised wooden trough resonator, and are plucked with the thumbnails. There are usually two celempung of different tunings in a full gamelan orchestra. The siter is a smaller version of the celempung, and is tuned an octave higher.

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81 Ibid.
83 Jennifer Lindsay, Javanese Gamelan, Traditional Orchestra of Indonesia, 27.
The suling (bamboo flute; figure 3.14) and rebab (figure 3.15) are the only wind and string instruments in the gamelan orchestra. The rebab functions as a melodic leader and bridge between voice and other instruments.

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84 Beede Gallery, “Celempung from the Javanese Gamelan Kyai Rengga Manis Everist” (2014)
85 Ibid.
A choral ensemble is usually included in a soft-style gamelan orchestra. There are two types of choirs: the gerongan (male choir), and the sindenan (female choir). Each choir plays a distinct role in the ensemble. While the gerongan sing together as a group, the sindenan line is always solo. The choirs serve to create another melodic layer in the overall structure of the music. They also sing words, which convey some stories, sometimes derived from the Ramayana or other Hindu epic.

In order to learn a gamelan instrument, one must play with other people. The student of Western classical music works alone perfecting skills one section at a time before putting the whole piece together. By contrast, one cannot practice gamelan alone for hours. A person who wishes to learn will start with a technically simple instrument, like the saron, while studying the form, melody, and technique at the same time. This way, one emphasizes the structural form, learning the totality and the experience of the piece first, and then gradually learning to fill in the component parts. As Henry Spiller writes:
Gamelan music of all sorts is about playing together with other people in a unified group in which mutual cooperation is rewarded with harmonious music. Expert gamelan musicians use their knowledge and skill not so much to stand out and shine in the group, but to blend seamlessly into the complex musical texture and make everybody shine—an approach to exerting power in all social interactions which Indonesians tend to value highly.86

**Tuning systems and Patet**

Most gamelan instruments are tuned to definite pitches corresponding to two kinds of tuning systems (*laras*): *slendro* is a pentatonic (five-note), system with no semitone; and *pelog* is a seven-note scale with varied intervals (*embat*) between notes including semitones. Therefore, a complete gamelan set of forty to sixty instruments is actually a double set—a *slendro* and a *pelog* gamelan—though they are never played simultaneously. The crucial difference between these tunings is that *slendro* is made up of five relatively equal intervals, whereas a seven-note *pelog* is made up of unequal intervals of short (semitone) and large (minor third) intervals. Although *pelog* consists of seven notes, it is rare to use all of them in a performance. Rather, the pitches are divided into two sub-scales that represent a combination of five out of the seven notes. As one can see in figure 3.16, 3.17, and 3.18, this results in the three pentatonic scales used in Javanese gamelan.

Figure 3.16. *Slendro* scale87

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87 Jennifer Lindsay, *Javanese Gamelan, Traditional Orchestra of Indonesia*, 39.
In general, both *slendro* and *pelog* of the same gamelan ensemble share a common pitch (*tumbuk*): *tumbuk* 5 or *tumbuk* 6. Each set of gamelan instruments is tuned using a unique method of interval sizes. Therefore, an instrument from one gamelan set cannot be replaced with another set. According to Jennifer Lindsay, the logic behind intonational variety stems from both historical and aesthetic factors:

The first reason is historical, for Javanese tradition ruled that the ancient, sacred gamelan sets could not be copied exactly, including the palace gamelans... The tuning of a gamelan set must be understood as part of its own identity, together with the actual sound quality of the bronze itself... Javanese musicians understand and appreciate the advantages of subtle differences in tunings in the performance of gamelan music. Expert musicians will know which

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88 Ibid., 39.
89 Ibid., 39.
pieces of music sound best on which gamelan sets, and which
gamelan sets sound happy, sad, or majestic, for example.90

Each tuning system contains three modes called *patet*. The Javanese word
*patet* means “to restrain,” suggesting that *patet* is a method for governing the choices
that musicians make. In *slendro*, these are called *patet nem*, *patet sanga* and *patet
manyura*. In *pelog*, there are *patet lima*, *patet nem*, and *patet barang*. These *patet*
are similar to modes in medieval Western music, where each is distinct from the others in
the way notes are emphasized, and in the way they express distinct psychoacoustic
properties. Each group (*patet*) consists of five notes, but these notes have different
hierarchical prominence, and have distinct instrumentation.91 Like the harmonic
hierarchy in Western classical music, some pitches are made to sound more stable
than others by playing them consistently at the most rhythmically important places—
at the ends of phrases in Indonesian gamelan.

Each of the six Indonesian *patet*, has a unique association with a mood and
time of performance associated with *wayang* (shadow puppet theater performed
throughout the night). This is particularly true of the three *slendro patets*. *Patet nem* is
associated with youth, *patet sanga* with maturity, and *patet manyura* with old age.
The *pelog patets*, on the other hand, do not have strong associations with *wayang*
performances and do not carry as strong temporal or sequential association of
progression from youth to old age. *Patet lima* is felt to be rather melancholy, serious,
and suitable for feelings of religious devotion.92 These *patets* are also distinguished
from each other by the time of night when they might be heard in a puppet
performance, starting with *patet nem* corresponding to the period between 9 p.m. to

90 Ibid., 41.
92 Judith Becker, *Traditional Music in Modern Java*. (Honolulu, The
around 1 a.m., *patet sanga* from 1 a.m. to around 3.30 a.m., and *patet manyura* from 3.30 a.m. until dawn. Because of their intimate association with discrete events in shadow puppet plays, each *patet* projects distinct action, dialogue, and narrative.  

**Rhythm and Irama**

The rhythmic leader of the whole ensemble is the drum or *kendang* because it sets the tempo (*irama*) and the tempo changes for the whole ensemble. There are four *irama* in Javanese gamelan, but not all pieces have all four. The number of *irama* depends on the *saron* line tempo. The faster the *saron* line, the less time other instruments have to fill the space between pitches of the *balungan*. A slower *saron* line allows for more embellishment. Most gamelan music can be played with at least two or three *iramas* levels.

A significant difference between gamelan and Western music involves rhythmic stress. Western music tends toward front-weighted grouping, where stress is placed on the first beat. Javanese music, on the other hand, uses end-weighted grouping. As Henry Spiller points out:

> A gamelan-oriented sensibility places the metrical emphasis in any rhythmic grouping at the end of the group rather than at the beginning, and associates any rhythmic subdivisions with the beat that comes after, rather than before, the subdivisions. Given 4-beat metrical groupings, most people familiar with Western music would regard the beat with the strongest accent as the first beat.  

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93 Jennifer Lindsay, *Javanese Gamelan, Traditional Orchestra of Indonesia*, 40.

Gamelan playing is not a soloist’s art. There is no one melodic line that can be singled out and played alone.\textsuperscript{95} Every part is integrated into the whole form. Unlike Western musicians who only specialize in a certain instrument, gamelan musicians need to learn and be familiar with all the instruments and the structure of interlocking phrases of the music. Even though a gamelan musician may be a specialist in one instrument, he will certainly be able to substitute on many other instruments to an extent.\textsuperscript{96} While Western classical musical forms are mostly designed to develop ideas and move toward the climax, gamelan’s basic structure is cyclic, and may be repeated any numbers of times.

**Notation**

Western scholars have had a profound influence on the way gamelan music is communicated, particularly in the development of music notation.\textsuperscript{97} Gamelan music was traditionally transmitted orally, and it was not until the late nineteenth and early twentieth centuries that a system called “Cipher notation” was developed. Before the cipher system, Javanese musicians learnt to play gamelan by ear. One has to spend much time listening to and observing gamelan performances to learn about gamelan. Within an oral tradition, no two performances are alike, and there is no fixed interpretation for a piece. Each one requires a process of reconstruction based on the basic melody (*balungan*) in every performance. Modification is common and an integral part of the performance process. Thus, it is very difficult to preserve the original structure of each piece.

\textsuperscript{95} Lindsay, *Javanese Gamelan, Traditional Orchestra of Indonesia*, 56.
\textsuperscript{96} Becker, *Traditional Music in Modern Java*, 23.
Because the use of notation has been commonplace in the art music tradition in Europe, Westerners began to use notation to record gamelan music. There were a few experiments with gamelan notation attempted between the years 1886 and 1942, but the cipher system is the most substantial notation used in Java. Notation systems were introduced by Europeans who mistakenly believed that a gamelan piece is a fixed entity, which, if captured in notation, could be preserved from vanishing. It is a Western concept “imposed” upon Javanese gamelan and not the invention of Javanese musicians. The purpose of notation is not to create the same performances, but rather to keep written records of gamelan repertoire. It was also developed to help Western scholars document the practices of Javanese musicians. Today, notation is also used as teaching device and for analysis purposes. Notation accounts for the basic melody line (balungan) played by the saron and slentem. It also indicates a colotomic structure, which is a musical foundation or timeline in which regular time periods are presented by punctuating sounds.

In “Cipher notation,” each note is assigned to a specific number as opposed to letters in Western music notation, and is read from left to right. Unlike the Western tradition, where each instrument has its own part, the only line that is notated in the gamelan ensemble is the balungan, played by the saron and slentem. Each number corresponds to the pitch of a specific gong or metal key. However, this system does not provide notation for the drum. Distinct registers, shown in figure 3.19, are presented by a dot below or above the number. The dot above a number represents an octave above, while the dot below represents an octave below. Rhythmic patterns are

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represented by simple symbols such as a single or double line above the note to suggest the subdivisions of the beat, while linear dots represent pauses.

![Cipher notation](image)

Figure 3.19. Cipher notation. The circle note indicates gong, and an arch indicates kenong.\(^{100}\)

The structure of gamelan music

Gamelan pieces have basic structures or forms, much like Western classical music. A gamelan composition consists of repeated cycles of phrases subdivided by many different instruments to yield a complex heterophonic structure. Musicians consider each of the standard colotomic patterns that undergird gamelan pieces as a form. Every form has a specific name which is determined by its distinct interlocking pattern of gong, kenong, ketuk, kempyang, and kempul strokes.\(^{101}\) For example, the ladrang form is characterized by a phrase of thirty-two beats, with a stroke of the large gong marking the last beat. The ladrang form is further divided into two sections: the umpak and the ngelik, each divided into sixteenth beats.

\(^{100}\) Becker, *Traditional Music in Modern Java*, 18.

Figure 3.20. Colotomic patterns for the Central Javanese *ladrang* form.¹⁰²

Figure 3.20 above gives specific details about when each instrument is played. The single *gong* (indicated with a “G”) plays at the end of the phrase. The *kenong* (indicated with a “N”) divides the thirty-two beat phrases into four equal phrases of eighth beats each. The *kempul* divides the eighth beat *kenong* phrases in half. The first *kenong* phrase is usually called *wela*, indicated with a “W.” Note that there are also eight beats between each *kempul* stroke. The *ketuk* stroke occurs every four beats and falls between the *kenong* and *kempul* strokes; and the *kempyang* strokes fall every two beats. Every part is completely regular, and the musician usually plays his part by keeping track of his own pattern, counting two, four, or eight, to thirty-two, depending on the instrument. The *gong* stroke indicates not only the end of one phrase, but also the beginning of the next phrase. Another example of elaboration for the *ladrang* form is shown in figure 3.21.

Figure 3.21. *Bonang panerus* elaboration pattern for *ladrang.*¹⁰³

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¹⁰² Ibid., 89.
¹⁰³ Ibid., 98.
Another common form of gamelan is the bubaran. It consists of a set of sixteen-beat phrases. Just like the ladrang form, the smaller punctuating instruments divide the phrase into smaller equal phrases. The ketawang form is a form that includes a gongan of 16 beats, with an alternating pattern of strokes on the kempul and kenong on the fourth beat of every gatra. Gatra is a melodic phrase that consists of four beats. The gending form, refers to a large-scale structure, which has 64, 128, or 256 beats in one phrase marked by a gong stroke; the pathetan or sulukan has no regular beat and is typically used to set a mood; and the sprepegan has regular meter with less symmetrical colotomic forms. The sprepegan form can be started and stopped on a moment’s notice and is quite useful for accompanying action scenes in dramatic performances.\(^{104}\)

Some instruments, such as the gender, gambang or celempung embellish in such a way that they are not rhythmically tied to the basic line. The gender and the gambang aim for longer musical phrases and this determines the melodic contour of the singing line and the patet (mode) of the composition. Because these instruments are not as rhythmically tied, it gives more room for improvisation.

In gamelan music, it is common to include a transition between two sections, called pathetan. This transition is usually played by few musicians and is characterized by an asymmetrical, non-cyclic structure with irregular rhythms. It also provides an effective means of leading into and out of the metrical, rhythmically regular structure of the larger composition. Pathetan functions as a framework, establishing a smooth transition from one section to another.\(^{105}\)

\(^{104}\) Ibid., 90.

Gamelan music has shown a great influence on Western Music from the early twentieth century until the present day. Fascinated by the timbres and textures of gamelan, a lot of composers wrote pieces that imitate the same atmosphere. Lou Harrison in particular, imitates not only the timbres, but also built his own gamelan ensembles and uses gamelan forms and rhythms in many of his compositions, including the *Concerto for piano with Javanese Gamelan* which I will discuss in Chapter V.
CHAPTER IV
LOU HARRISON AND AMERICAN GAMELAN

Lou Harrison writes, “a good gamelan is the most beautiful musical ensemble on the planet.”106 Early in his career he seems to have been attracted merely to the sound of the gamelan ensemble. He imitated the sounds of its instruments in his early percussion pieces, and then moved on to explore compositional methods for gamelan by writing for the traditional ensemble. He also applied these ideas to his own Western cultural tradition. Harrison’s resulting achievement is that he developed an indigenous American gamelan repertoire by composing more than fifty works for the Indonesian ensemble.107

Harrison became fascinated with gamelan music as early as the 1930s, but it was not until 1939 that he first attended a live performance of Balinese gamelan at the Golden Gate International Exposition in San Francisco. Harrison recalls, “it was the sound itself that attracted me.”108 While living in New York City in the 1940s, he read Colin McPhee’s articles on gamelan, and from there, Harrison started to imitate gamelan-like sounds on Western instruments. Significant examples include the ballet Solstice (1950), and the Suite for Violin, Piano, and Small Orchestra (1951), with movements entitled “First Gamelan” and “Second Gamelan.” In one of the movements of Solstice, Harrison imitates a gamelan sound through the combination of celesta, tack piano, and a double bass, whose strings are struck with drum sticks below the bridge.

108 Ibid., 148.
In 1961, Harrison composed *Concerto in Slendro*—a work that incorporated a scalar structure from Indonesian classical music, and which specified a special tuning for the keyboards that produces two kinds of slendro scales. The Slendro scale is a pentatonic scale without half steps, or, according to Harrison, a mode with wide seconds and narrow thirds. Harrison also creates a gamelan texture by having the violin play an elaborate version of a basic melody, known as a *balungan*. Harrison draws his inspiration here from gamelan, and not only its timbre but also its use of melody as the generating source for this work. It was not until the 1970s that he showed a major change in his gamelan compositional style. In his *Little Gamelan*, for example, a short piano piece for dancer, Katherine Litz, Harrison uses characteristic ostinato patterns, gong sounds, and melodic lines reminiscent of Balinese style.

As I discussed in Chapter II, Harrison’s interest in alternative tunings based on pure intervals led to his work on instrument building. Influenced by Harry Partch’s *Genesis of a Music*, he combined his just intonation technique in modern practice. Seeing opportunities for unique combinations of gamelan and just intonation, Harrison composed *Young Caesar* in 1971. It was originally written as a puppet opera for 5 puppeteers, 5 singers, and 5 instrumentalists playing a wide variety of Asian and Western instruments. Together with William Colvig, Harrison built a set of tuned metallophones for this particular opera, just like a traditional gamelan, later known as the “American gamelan.” Compared to the traditional gamelan, this gamelan is smaller in size and has fewer instruments.

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111 Ibid., 51.
Figure 4.1. “Old Granddad,” *Upper right*: large aluminum slab keys and stacked #10 tin cans as resonators. *Upper left*: smaller metallophone with keys made of conduit tubing. *Bottom*: suspended cut-off oxygen tanks, portable organ, suspended garbage cans, ranch triangles.

The instrument was built to add contrast between the music of Caesar and Nicomedes, the two main characters in *Young Caesar*. His objective in the piece was to use various tunings to make distinctions between scenes, and to contribute to the underlying drama of the work. In *Young Caesar*, he used a thoroughly Western D Major tonality: Ptolemy’s Diatonic Syntonon, or “stretched diatonic.”

Old Granddad was tuned using the Ptolemaic Sequence (a tuning for the diatonic scale), which represents Caesar (the West), while the additional metallophone was tuned to a pentatonic scale, which represents Nicomedes (the East). The resemblance between Granddad and a traditional gamelan is superficial, like similar compositions of Harrison’s from the 1950s. Not having studied the traditional Indonesian gamelan,

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Harrison relied on his acute ears to capture and imitate elements of gamelan style in his music. The comingling of instruments also seems to serve a rhetorical purpose inherent in the text, which explores East-West bonds of friendship: the meeting of Caesar and Nicomedes, the King of Bithynia.

Harrison’s initial excitement regarding gamelan music was inspired by a Balinese ensemble. However, after studying the Javanese gamelan in the 1970s, he came to prefer the more meditative Javanese tradition. About the distinction between these two styles, Colin McPhee writes:

Javanese gamelans have an incredibly soft, legato, velvet sound; Tempos are slow and stately, and there is little change in dynamics; the prevailing mood is one of untroubled calm and mystic serenity…Balinese music, on the other hand, is vigorous, rhythmic, explosive in quality…Javanese musicians find the music of Bali barbaric. Balinese complain that the music of Java sends them to sleep.113

McPhee might have oversimplified the contrast between the two styles, but his description has merit. The biggest difference between Balinese and Javanese gamelan does not lie in the loudness or softness of the ensemble, but rather in the nuances, both structural and improvisational, as well as the instrumentation. The major difference between Balinese and Javanese gamelan music is that Balinese music is strictly composed. There is very little space for improvisation, although there is some at times. Each piece is composed to achieve a “unified musical expression.”114 Whereas the complexity of Javanese gamelan comes from the musicians’ improvisations, Balinese

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musicians “rehearse to perfect their music more than any other large ensembles in the world.”

While Javanese and Balinese gamelan are the best-known forms of gamelan to most Western scholars, Jogjakarta and Sundanese gamelan are distinct styles. In fact, Harrison studied the Sundanese tradition with Undang Sumarna, a gamelan teacher from Sunda (West Java) at the University of California, Santa Cruz. Harrison subsequently composed several works for Balinese and Sundanese ensembles. Still, the majority of Harrison’s gamelan works are for Javanese ensemble.

As I mentioned in chapter II, Harrison met Pak Cokro in 1975. Through him and his assistant, Jody Diamond, Harrison learned the playing techniques for various gamelan instruments, and studied classical forms such as lancaran and bubaran. He also experimented by searching for a Javanese slendro and pelog scales in the overtone series. Looking at figures 4.2 and 4.3, one may observe that Slendro is a pentatonic scale without half steps, and pelog is a seven-note scale that includes narrow seconds and wide thirds. After careful work with ratios of pure or just intervals, Harrison established accessible slendro and pelog scales among pitches in the harmonic series used in just intonation. These pure intervals contrast with the tempered intervals of equal temperament, where two notes, though they may be separated by the same number of steps as in just intonation, may not have the exact same pitch ratio.

\[ \text{115 Ibid., 13.} \]
\[ \text{116 Please refer to appendix A.} \]
Having completed this intensive study of traditional gamelan, Harrison began composing for traditional gamelan instruments. As mentioned in chapter II, notable pieces written in 1976 include *Lancaran Samuel, Gending Pak Chokro, Bubaran Robert*, and *Lancaran Daniel*. While most of his early gamelan works often used a simpler traditional form, Harrison also experimented with new forms. Works such as *Gending Paul, Gending Jody*, and *Music for the Turning of a Sculpture* are in “free verse” form. While these works may sound like traditional gamelan in some ways, Harrison marks off phrases using a colotomic structure in a decidedly non-Indonesian fashion, and rather in a way that would seem logical to the Western ear.\(^\text{119}\)

Harrison’s second gamelan with Colvig is modeled after “Kyai Hudan Mas.” Even though he was fascinated by the *pelog* intonation of “Kyai Hudan Mas,”


\(^{118}\) Ibid., 39.

Harrison still emphasized particular sounds that he experimented with and he wanted to find an adjacent series within the overtone series that would serve as a *pelog* scale.\(^{120}\) Harrison sought the approval of Pak Cokro for his *pelog* intervals. Harrison writes:

> While I was trying out a *pelog* overtone series in my office at San Jose State, Pak Cokro knocked on the door. And he asked me what I was doing, and I told him, and then he asked me to repeat the last *pelog* that I had been doing. And he listened very carefully, and he said it was a very good *pelog*, and it would be very good for singing with. So I checked it off in my head and I thought, if we build a gamelan, I will do that.\(^{121}\)

As one can see in figure 4.4, Harrison used aluminum keys in this second ensemble “Si Betty,” instead of using bronze, because of its musical qualities, affordability, and its pitch stability. According to Pak Cokro, aluminum is the most suitable metal after bronze.\(^ {122}\) Moreover, Harrison made a few changes to the traditional design of the Javanese gamelan instruments. Instead of having a one-octave range, he extended the range of the *balungan* instruments to two octaves. He also had music stands built-in for those instruments. To reduce cost and labor, Harrison changed some materials for the instruments. For instance, the *kendang* were made using PVC sewer pipe, and the *suling* were made from PVC sprinkle pipe for the lower octave and aluminum tubing for the higher octave.

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\(^{122}\) Leta E. Miller and Fredric Lieberman. *Composing a World*, 165.
While based on Javanese gamelan, Harrison’s gamelan instruments were built in forms that differed from traditional Javanese instruments. For instance, the “kettle-shape” gongs were made from aluminum slabs, with the exception of the gong ageng, which was made of bronze. Additional bass gender instruments were added to substitute for the gong suwukan and kempul. And the kenong was made in a right triangle shape, while octagon shapes were used for the ketuk and bonang. Harrison was experimenting with a few options to imitate the sound of the gong ageng, by extending the range of gender-type instruments into the bass register, and by adding more slabs to the gong suwukan. He also used mild steel to cold forge the boss of the gong ageng. With the help of Mark Bullwinkle, he created a rim for the gong by

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welding three sections of sheet metal. Finally, the boss and the rim were welded to the face of the gong.\textsuperscript{124}

Harrison collaborated with William Winant to build his third gamelan, “Si Darius,” using aluminum, and tuned in just ratios. In addition, Harrison named the gong ageng “Kyai Mark” to honor Mark Bullwinkle who helped with the gong construction for his gamelan. This gamelan was similar to his second gamelan, except for the tuning. While keeping the same pelog mode to honor Pak Cokro, Harrison chose a different slendro tuning that had characteristics of the Greek modes.\textsuperscript{125}

Building his own gamelan ensembles enabled Harrison to experiment with new timbres. Having already written concertos for solo instruments accompanied by percussion ensemble, and then for his own American gamelan, Harrison now turned to the traditional gamelan for the same purpose. In 1978, he wrote several works combining gamelan and Western instruments, including Bubaran Robert (1978) for gamelan and trumpet, Double Concerto (1982) for gamelan and violin and cello, the Concerto for Piano with Javanese Gamelan (1987), and others.

In the 1980s, after composing solely for gamelan, Harrison began integrating his gamelan writing techniques for Western instruments. Rather than writing gamelan-inspired works based purely on his aural perception or sound, he moved beyond the sound of gamelan instruments. He composed works for Western instruments that incorporate not only surface features, but also characteristic methods of constructions from gamelan. Influenced by Henry Cowell, Harrison began to integrate an extended playing technique, and used non-Western structures in his works for Western instruments. A great example is the first movement of the Varied

\textsuperscript{125} Doty, “The Lou Harrison Interview,” 5.
Trio (1987) for violin, piano, and percussion. It is titled “Gendhing,” and is based on the same pentatonic slendro scale that was used in the Concerto for Slendro.

Example 4.1. Harrison, Varied Trio, Movement I, mm. 1-12.
In example 4.1, the opening measures “Gendhing” start with a pianist plucking the strings, setting the mode and introducing the basic melody (*balungan*); the vibraphone then takes over the *balungan* and adds some embellishment. The piano continues by plucking the strings of the *balungan* on every down beat while playing the same ornamental notes previously played by the vibraphone, but at half speed. The *balungan* is now articulated on the half-note level instead of on the quarter-note level. One can also see that Harrison introduces all of the rhythms (*iramas*) for the entire movement at the beginning, before the violin comes in playing an improvisatory-like melody that evokes the gamelan’s two-string fiddled (*rebab*).

![Image of music notation]

Example 4.2. Harrison, *Varied Trio*, Movement I, mm. 13-16.
In Example 4.2, each line plays a different rhythm (*irama*): the piano left hand plays *irama* I, the vibraphone plays *irama* II, and the piano right hand plays *irama* III. The violin plays on top, creating a multi-layered texture similar to the traditional gamelan ensemble.

The analysis above shows how Harrison applies the gamelan techniques in a Western composition. For instance, the opening two measures constitute a traditional gamelan *buka*,\textsuperscript{126} the heterophonic texture involving the *balungan*, as well as the change in note density that yields the various *irama* levels. All of these techniques can also be found in works like the *Concerto for Piano with Javanese Gamelan*, which will be discussed in the next chapter.

Harrison not only wrote for Western instruments, but also continued to compose for the gamelan, showing his fascination for Asia that had been part of his life since his youth. At the same time he brings this exotic music into interaction with his Western musical training. His objective was to combine Eastern and Western aesthetics by bringing together compositional methods and sound-producing media from distinct musical cultures.

\textsuperscript{126} Please refer to appendix A.
CHAPTER V  
ANALYSIS OF LOU HARRISON’S  
CONCERTO FOR PIANO WITH JAVANESE GAMELAN  

The Concerto for Piano with Javanese Gamelan was written in 1987 and premiered at Mills College on Lou Harrison’s seventieth birthday. It was dedicated to Belle Bulwinkle, the pianist who performed the work, while Jody Diamond directed the Mills College Gamelan. An analysis of the concerto’s form, tuning system, and pitch class set, as well as the rhythm and melody, all from a gamelan-inspired perspective, will demonstrate the varied nuances of Harrison’s blend of Indonesian and Western characteristics.

Having studied both Western classical music and traditional Javanese gamelan, it is very difficult to keep all elements together within a single piece of composition. Lou Harrison has to compromise and decide on what to keep and take away from each tradition. In this concerto for instance, Harrison only picked a few gamelan instruments to use instead of the whole ensemble. He also added a Balinese gamelan bell-like instrument “gentorak” in the beginning of the second movement. The other element is the harmonic language. Different from the traditional Western concerto, which includes a lot of modulations (harmonically unstable and constantly moving), the harmonic language in this concerto is relatively stable, which is the characteristic of gamelan music.
The concerto blends Western and Eastern elements, and is loosely based on the baroque solo concerto form.\textsuperscript{127} The *Concerto for Piano with Javanese Gamelan* calls for piano tuned to both the *slendro* and *pelog* modes of the Mills Gamelan. The basic layout of the concerto follows the typical three-movement concerto structure—Allegro, Adagio, Allegro—though the first movement does differ slightly from the standard form. The first movement uses a six-part arch form, while the second and third movements are in ternary, and rondo forms. At the same time, the concerto incorporates Javanese forms, tempos, and figuration.

Following the standard practice of notating gamelan pieces, Harrison uses cipher notation to indicate the pitches in his concerto. Each number corresponds to one rhythmic beat in the metric structure of the work. As Miller and Lieberman write,\textsuperscript{128}

> In more recent times, [Harrison] has begun to write out imaginative and creative parts for elaborating instruments as his gamelan compositions expand traditional garapan technique. Notating new elaborations, however, has also required him to coach his performers. Without specific notation or instruction to the contrary, his gamelan music should be realized according to traditional practice.

Although Harrison often writes out all of the instrumental parts in his gamelan compositions, he only wrote out the *balungan* in this piece. This allows gamelan musicians the freedom to create melodic embellishments, as would be the norm in a traditional Javanese gamelan performance.

\textsuperscript{127} The baroque concerto is a composition for a solo instrument and an accompanying orchestra and typically has three movements: fast (usually in ritornello form), slow (usually in ternary of binary form), and fast (usually in ritornello or rondo form).

\textsuperscript{128} Miller and Lieberman, *Composing a World*, 173.
MUSICAL FORM

Movement I

Analyzing from the Western classical point of view, the first movement of the *Concerto for Piano with Javanese Gamelan* is in a six-part arch structure. The six main sections are as follows: opening piano solo (mm. 1-56); A section (mm. 57-188), and transition (mm. 189-204); B section (mm. 253-296); return of the A section (mm. 253-296); and the concluding piano solo (m. 297 to the end). One might also think of this form from a gamelan point of view—as a ternary form with the introduction and ending of the piano solos as “pathetans.” As I mentioned in chapter III, *pathetan* is a brief passage in Javanese gamelan played by a few musicians. As shown in example 5.1, the music in these passages is characterized by an asymmetrical, non-cyclic structure and with irregular rhythms. Harrison uses this opening passage to introduce a few gamelan techniques, including the *mipil* technique. He also establishes the tempo (*irama*), which Harrison indicates in the score for the entire movement, from irama I up to irama III; this will be discussed in detail later in this chapter. These continuous subdivisions from quarter notes (irama I), going to eighth notes (irama II), and finally to sixteenth notes (irama III) foreshadow the tempo changes in this movement.

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129 Please refer to Appendix B.
130 Please refer to Appendix B.
Example 5.1. Movement I, introduction, showing the *mipil* technique, and establishing irama I and irama II
Example 5.2. Movement I, introduction, showing the irama III.

Harrison also incorporates a Javanese structure within the traditional ternary (ABA) form in this movement. The colotomic structure for the balungan in the first gong phrase (gongan) of the A section appears to be in the Javanese ketawang form. As I discussed in chapter II, ketawang is a Javanese form that includes a gongan of 16 beats, with an alternating pattern of strokes on the kempul and kenong on the fourth beat of every gatra\textsuperscript{131} and the strokes of the ketuk on the second beat of every gatra. As shown in example 5.3, Lou Harrison adds two extended gatra that have six beats in the second part of the gongan. This creates a metric irregularity, which is

\textsuperscript{131} Please refer to appendix A.
uncharacteristic of traditional gamelan. Instead of having the traditional sixteen beats, the *gongan* is extended to twenty-eighth beats.

Example 5.3. Movement I, Gamelan part, A section.

Whereas the gamelan maintains its regular four-beat phrases, with the exception of the two six-beat *gatra* phrases, the piano plays an irregular phrase, creating a pattern of 4+6+7 beats in the first *gongan*, and 4+7+4+5+7 beats in the second *gongan*, as shown in example 5.4. The gong stroke at the end of the section brings both the piano and gamelan back together and also signals the repeat of the A section.
Example 5.4. Movement I, A section, the numbers above the piano score indicate the *balungan.*
The first movement ends with a postlude or, I would argue, a *pathetan* for solo piano, to balance the introduction of the movement. This passage uses a system of resolution typical of the Javanese *gender* in *pathetan*, where the parts resolve outward from thirds and fourths to fifths and octaves, as shown in example 5.5 and 5.6. It has an improvisatory quality similar to the introduction, and slowly unwinds to imitate the few final gong strokes.

Example 5.5. Movement I, Postlude; see example 5.6 for clearer resolution
Movement II

The second movement begins with a gamelan introduction and ends with the piano. It is in ternary form using the *pelog* tuning. As shown in example 5.7, the movement begins in the gamelan with an introductory phrase (*buka*) by the *saron*, followed by the full orchestra. Unlike the first movement, which only has the *balungan* part written out, all of the gamelan parts are written out in the second movement, and with a specific realization showing the ornamentation. The notation comes from the *slentem* part using the *mipil* technique.\(^{132}\) It is in *sprepegan* form, which is a form that has a regular meter, but its colotomic form is less symmetrical, as I discussed in chapter III.\(^{133}\) Instead of having the regular sixteen beats in the *slentem*, it only has eight beats. One other uncharacteristic feature of the gamelan part is the placement of the *gong*, which is in the middle of the *gongan* (phrase) instead of at the end.

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\(^{132}\) Please refer to appendix A.

Example 5.7. Movement II, gamelan introduction

After one repetition of the *gongan*, the piano enters and introduces its main theme of the movement while the gamelan continues with a soft ostinato accompaniment. After a total of four repetitions of the *gongan* with the piano, the gamelan stops playing. In the final *gongan*, Harrison uses a technique similar to *klenangan* to create a transition between the exit of the gamelan and the piano’s second theme. In gamelan, *klenangan* is usually played by the *bonang* as a melodic accompaniment. As I show in example 5.8, it is an ascending scale-like passage from the left to right hand where two or three notes stay the same while one note changes; it is eventually played by just the right hand as soon as the left hand takes over the melody. This technique is also used as a transition to the piano’s second theme.

The structure of the B section is similar to the A section, with the exception that the piano and gamelan never play together in the B section. As shown in example 5.9, this time the *gong* is placed at the end of the *gongan*, as is traditional in Javanese gamelan. Again, the *balungan* is in a *sprepegan* form, and all the parts are derived from the *slenthem* with an additional *imbal*\(^{134}\) added. While it is common for the *imbal* of the *bonang* to stay consonant with the *gong* tone, Harrison changes it by putting pitch 3 (F) in the *imbal* together with pitch 5 (B-flat) in the *gong* tone. This technique is similar to switching from tonic (I) to dominant (V) in Western harmony. This adds to the contrast with the A section.

\(^{134}\) Please refer to appendix A.
Example 5.9. Movement II, Section B gamelan part.

Example 5.10. Movement II, piano cadenza.
To create a piano cadenza and change of texture, Harrison specifically writes “continue a bit after last gong,” as shown in example 5.10. The return of the A section is almost the same as the beginning but without the return of the piano second theme, and it ends with the *klenangan* pattern, as shown in example 5.11.

Example 5.11. Movement II, A section returns.

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135 Harrison, *Concerto for Piano with Javanese Gamelan, Movement. II*, 3.
Movement III

The final movement of the *Concerto for Piano with Javanese Gamelan* is in rondo form and it uses *slendro* tuning. The movement consists of alternating sections between gamelan and piano (A section) and solo piano (B section). With each repetition of the section, the piano varies its thematic material, starting with monophonic texture while the gamelan keeps the same melody (*balungan*). Like the second movement, the third begins with an introduction (*buka*) played by the *bonang* in a quick tempo (*seseg*).

In this movement, Harrison incorporates the Javanese *ladrang* form, which consists of thirty-two beats with four strokes of the *kenong* in two sections marked *umpak* and *ngelik*. Instead of having two equal sections, Harrison only uses twenty-four beats (with three strokes of the *kenong*) in the *umpak*, and sixteen beats (two strokes of the *kenong*) in the *ngelik* (refer to example 5.12 and example 5.13).
Example 5.12. Movement III. A section, starting with *bonang* playing seseg

**PITCH CLASS/ SCALES**

As Randall Lawrence Griswold has shown, one may use pitch-class analysis, a technique used by Western theorists, to reveal the coherence of Harrison’s harmonic usage throughout the concerto.¹³⁶ Pitch-class analysis is useful for analyzing atonal music to find out the most common intervals if the melodies are transposed or inverted. Unlike the standard pitch-class analysis, the pitch-class set in this concerto is used purely to show the most common notes/ scales that are used in every movement. The piece was designed to combine the pitches of *Si Darius slendro* (A-B-D-E-F#) in the first and third movements (example 5.14), and *Si Madeliene’s pelog* (Db-Eb-G-Ab-Bb-Cb) in the second movement (example 5.15). When the pitches are combined,

they make up ten of the twelve piano keys in each octave; the C and F are missing, while the B (C-flat) serves as a common tone between the two tunings.

Example 5.14. The Piano’s Slendro Scale

Example 5.15. The Piano’s Pelog Scale

Just like the concertos of the Baroque and Classical periods, Harrison has the piano play along with the orchestra in addition to playing as a soloist. The piano, tuned to match the gamelan, begins with an extended solo that introduces the slendro scale. Here, Harrison has the piano imitate the mipil technique. As one can see in example 5.16, the second note of each pair anticipates the next structural note in the balungan, played by the left hand. Although it is written out precisely, the piano part has an improvisatory character that stops suddenly and then follows a new rhythmic motive, which sets up the tempo for the gamelan entrance.

137 Please refer to appendix A.
Example 5.16. Movement I, Opening section.

In the first movement, Harrison uses the pitch-class set 6-32 (024579),\textsuperscript{138} which includes all the notes of the D-Major scale, except for G. The gamelan part uses set 5-35 (02457), which is a subset of the D-Major scale.

Example 5.17. Pitch-class set of Movement I.\textsuperscript{139}


\textsuperscript{139} Randall Lawrence Griswold, *An Analysis of Lou Harrison’s Concerto for Piano with Javanese Gamelan*, 45.
The main sonority of the first movement is represented by set 4-23 (0257), which is also a subset of the D-Major scale.

Example 5.18. Main sonority of Movement I, set 4-23 (0257).

Example 5.19. Movement I, introduction showing the pitch class (0257).
The pitch-class set in the second movement changes to set 7-33 (012468T), as the tuning switches to *pelog*. As I discussed in chapter III, although the *pelog* scale uses seven-notes, the gamelan only picks five notes to use in a piece. Although both the piano and gamelan are emphasizing subset 4-27 (0258) in the introduction and the end, in this particular movement, Harrison chose to use set 5-28 (02368) for the entire movement, as shown in example 5.21 and example 5.22.

Example 5.20. Pitch-class set of Movement II.

Example 5.21 Movement II, gamelan introduction with pitch class 4-27 (0258)
Example 5.22. Movement II, last measures in the piano part playing (0258)

**Movement III**

In the final movement, Harrison returns to the same pitch-class sets he used in the first movement: 6-32 (024579), and *slendro* set 5-35 (02479), shown in example 5.23. At the same time, in order to create a sense of unity among the movements, Harrison brings back the main sonority of the first movement, pitch-class set 4-23 (0257), in the last movement while emphasizing the subset 3-7 (025).

Example 5.23. Pitch-class set of Movement III
Example 5.24. Movement III, A section emphasizing set 3-7 (025) and set 4-23 (0257)

RHYTHM AND MELODY

One of the most important elements of traditional gamelan music is its perpetual rhythmic motion. The relationship between the panerusan (accompaniment) and balungan (melody) is typically expressed in multiples of two. For instance, in irama I, the panerus instruments play two notes for every one note of the balungan, whereas in tempo II, the relationship becomes four to one, eight to one, and so forth.

Example 5.25. Relationship between the balungan and irama
Example 5.26. Movement I, opening
As one can see in example 5.26, the piano solo in the first movement foreshadows the tempo (*irama*) in the entire movement. The piece opens with quarter notes, then continues through two successive subdivisions of the beat, first to eighth notes (measures 6-33), and then to sixteenth notes (measure 34), which establishes the tempo for the gamelan entrance at measure 56. Here, the *balungan* melody (*irama I*) equals one quarter note. In *irama I*, each beat in the *gatra* equals one quarter note, whereas in *irama II* (measure 101) each beat equals one half note, and in *irama III* (measure 205) each beat equals one whole note, as shown in example 5.27 and 5.28.

As I mentioned in chapter III, the emphasis of the strong beat differs between gamelan music and Western music. In this concerto, the gamelan music is shifted forward by one beat so that the strong final beat in the gamelan phrases (*gongan*) line up with the strongest first beat in the piano part. The piano becomes one of the gamelan instruments when the gamelan enters at measure 57. As shown in example 5.27, this section consists of two tempo (*irama*) changes: *irama I* at measure 57, where each melody note equals one quarter note; and *irama II* at measure 101, where the *balungan* becomes twice as slow. In this section, there are three layers: the colotomic structure articulated at the slowest level by the gongs; the *balungan* played by the *saron* at an intermediate speed; and the ornamental figuration at the fastest level in the piano.
Example 5.27. Movement I, Measure 57-134 showing irama I and irama II
Whereas a transition is usually required between changes of *irama* in Javanese gamelan, Harrison starts the B section directly after he finishes the *irama II* in measure 204. In measure 205, the *irama III* changes to each beat of the *balungan*, which equals one whole note in relation to the piano, as shown in example 5.28.

Example 5.28. Movement I, measure 203-210, *irama III*

The *gongan* also varies from the standard Javanese practice. In comparison to the regular *gatra* in Javanese works, Harrison includes an uneven number of measures (*gatra*): three instead of four *gatra* (refer to example 5.29). As Harrison notated in the score, in addition to the *pancer* on pitch 6, the *demung* instruments play *imbal* during this section. This technique is used to elaborate on the *balungan* in the slow

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140 Please refer to appendix A.
tempo. A contrasting character emerges in this section when the piano’s left hand switches into a jazzy dance with heavy accents in the bass.

Example 5.29. Movement I, gamelan part, B section

Example 5.30. Movement I, example of demung imb, B section.

Here we see an example of Harrison’s tendency toward expressive lyricism.

He often writes accessible and memorable tunes. Leta E. Miller and Fredric Lieberman describe the melodious quality of Harrison’s works as a rationale for his music’s ability to draw an audience:

Intellectual circles in contemporary music may at first distrust the ingenuousness of forthright melodic expression. His concert-going public, however, has a very different response— at times almost a relief that it’s OK to delight in simple pleasures and indulge in melodic sensuousness.  

In this concerto, the melodies suggest the free-flowing improvisatory character of his music. The melodies are composed based on “interval control,” a technique that he invented in his early years. In traditional gamelan compositions, the melody (balungan) is used as a framework for a composition. As I discussed in chapter III, the balungan provides the melodic framework for the composition and the elaborating

141 Miller and Liebermann, *Composing a World*, 225.
parts are more rhythmically active, which reinforces the main melody, and creates a rich melodic texture. In the first and third movements, the piano always plays the *balungan* together with the *bonang*, while at the same time having its own melody and accompaniment part; this creates a multi-layered texture in the piano part alone.

In the second movement, the piano part has its own theme and the gamelan has its own *balungan*. The role of the piano in this movement is mainly as a soloist, showing Harrison’s great melodic lyricism. As shown in example 5.31, in the B section, he starts out with a simple two-layer texture, with left hand playing the melody in syncopated rhythm, while the right hand is playing an ostinato pattern of sixteenth notes in a higher register. The melody slowly grows as he starts to add another layer with octaves in the bass, resulting in a dramatic climax for eight measures. After the climax, he slowly moves back to the middle register and sets the mood for the return of the gamelan entrance.

To create the sense of unity throughout the concerto, Harrison brings back the rhythm from the first movement introduction while playing the third movement melody, as shown in example 5.32. This section creates a transition to the coda where the last set of the A section is played, this time with “full imbals.”
Example 5.31. Movement II, B section, piano solo.
Example 5.32. Movement III, transition to the last A section

While it is standard to use only one gong tone in an entire gamelan composition, Harrison changes the gong tones in between two main sections to establish a harmonic axis similar to the “tonic-dominant” axis in the Western classical tradition. The gong tone shifts from pitch 5 or “A” to pitch 6 or “B” in the transition. This change of gong tone is facilitated through the use of a repeated tone (*pancer*)\(^{142}\) on “B” between all the gamelan’s melodic notes in the “B” section.

The gong ends on pitch 5 or “A,” which allows the gamelan to use its common tone (*tumbuk*) to switch from its first movement *slendro* to *pelog* in the second movement. In the second movement, Harrison uses the same technique as in the first movement, where the *gong* tone changes from pitch 1 (E-flat) in the A section to pitch

\(^{142}\) Pancer is a middle note, usually of constant pitch that is inserted between every note of a *gendhing*. 
5 (B-flat) in the B section, and then moves back to pitch 1 (E-flat) in the A section. This implies the tonic-dominant relationship in Western tradition.

CONCLUSION

After analyzing this concerto in detail, one can see that Harrison incorporates substantial elements of both gamelan and Western music. Looking at the concerto from a macrocosmic perspective, Harrison’s concerto seems Western in nature, the way he combines soloist and orchestra—piano and the gamelan—in a familiar three-movement form, and relies on repeating pitch-class sets and harmonic axes to establish unity. Again, the pitch-class set analysis in this concerto is used purely to show the most common notes that are used in every movement. However, at a microcosmic level, he incorporates gamelan structure in every movement, albeit in his own unique way. Each movement is a combination of two forms: ketawang and arch form in the first movement, sprepegan and ternary form, and ladrang and rondo form in the third movement. The melody for each movement is derived from the pitch-class sets in the slendro and pelog scales of the gamelan. Last but not least, the rondo form in the last movement also represents the alternation of two sections of the ladrang form: umpak and ngelik. With all these hybrids, Harrison still manages to project his own musical language, which makes his music stand out within the Javanese and Western classical traditions.
CONCLUSION

Lou Harrison wrote: “This whole round living world of the music—the Human Music—rouses and delights me. It stirs me to a ‘transethnic,’ a planetary music.” Most scholars widely acknowledge Harrison as a pioneer in forging successful fusions between Eastern and Western music. Having examined the Concerto for Piano with Javanese Gamelan, it now seems clear that Lou Harrison’s “transethnic” music involves a complex amalgam of Indonesian and Western voices.

What makes Harrison’s music stand out from his contemporaries is its authenticity—his deep commitment to each of his cultural resources. As Alan Rich comments:

In the best known of his music, [Harrison] comes up with an ingenious kind of transcultural music… In [some] pieces he will start with the ravishing orchestration of Indonesian gamelan music, its array of bright percussion… and patterned rhythms… Then he’ll set against this the sinuous shapes of Western melody—real song tunes of the sort nobody else writes anymore, at least not as well.

But there is more to Harrison’s authenticity than mere combinations of instruments and stylistic juxtapositions, which sets him apart from other Western composers. Claude Debussy, for example, strikes me as more of a musical tourist—a man of his time—borrowing sounds from other cultures, including gamelan. Lou Harrison, on the hand, adapts to the sound of the traditional Javanese, which creates an exotic musical surface to represent authentic Javanese music. At the same time, Harrison integrates traditional Western style in his compositions. As a result, his music sounds “exotic and familiar” at the

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same time. What is considered exotic is the use of unfamiliar instrumental tunings, timbres, and compositional forms and techniques that Harrison establishes in his work, while the familiar is embedded in his compositional process.

Harrison wrote eight works combining Western instruments and the gamelan from 1976 through 1987, and the *Concerto for Piano with Javanese Gamelan* is one of the most substantial. My research on forms, pitch-class, and rhythms in the *Concerto for Piano with Javanese Gamelan* has shown Harrison’s sophisticated approach in integrating Javanese method with the Western Classical concerto. And this analysis is enriched when one understands the gamelan and its musical form. Without a comprehensive analysis, one would not notice the gamelan forms in each movement. Harrison’s subtlety in using gamelan form with slight modification results in an organic blend with Western form. The specific organization of pitch-classes in Harrison’s music also shows a subtle organic blend. Without thorough analysis, one might not realize that the pitch-classes for the piano come from the *slendro* and *pelog* scales of the gamelan. One of the subtlest and yet the most significant blend between gamelan and Western music is its rhythmic sensibility. Harrison’s awareness of the distinct approaches to rhythmic stress causes him to shift the gamelan one beat later so that its final “Gamelan” stresses match the “Western” stresses of the piano rhythm. This smoothens the difference between the two rhythmic sensibilities, and makes the music sound more familiar to Western expectations.

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From a performer’s perspective, it is very important to study and understand the Javanese gamelan. Different from the traditional Western score, this concerto does not include a full score for piano and gamelan. There is only a piano part with a page of cipher notation for movement I and III. In the piano part, there is a number written above the grand staff indicating the balungan. One would have no clue what that means if one has not studied gamelan. Listening to this concerto with the score without knowing the structure of how gamelan works would also be confusing. Therefore, I hope this paper provides helpful information for pianists learning the concerto.

Because of Harrison’s numerous contributions to the development of twentieth century music, it is worth expanding and gaining a greater understanding of his musical compositions. In my opinion, there is much more to learn and discover beneath each of his compositions. One would understand his compositional process through detailed analysis of his works, especially in his fusion of gamelan and Western instruments. Analyzing the compositions from both Eastern and Western perspectives allows one to discover his imaginative methods in combining two cultures. Notable pieces worth analyzing include the Four Coyote Stories for Javanese gamelan with baritone (1987) and the Homage to Pacifica (1991).

As both Virgil Thomson and Vincent McDermott stated: “Although Lou will use Javanese techniques for the instruments, the pieces come out sounding very much like Lou Harrison.”146 But in my view, Harrison’s sound involves a deep commitment to his cultural sources. He has dedicated much of his life to

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the integration of diverse world music—one “big culture” with a rich palette of subgenres from which to choose. The *Concerto for Piano with Javanese Gamelan* reveals its “big cultural” identity through its synthesis of gamelan and Western music. This is the nature of Harrison’s authenticity.

Here, Harrison completes his long-sought goal of uniting East and West through his gamelan works. He introduces compositional methods of one culture into another by physically combining sound-producing media from disparate musical ensembles. “It seemed perfectly natural to me,” he states. “I don’t think of it either as a problem or as a distinction. It’s all part of making music as far as I’m concerned. There’s no they and me.” His ingenious way of combining two distinctive cultures makes him one of the greatest cross-cultural composers of all time.

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148 Ibid., 173.
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APPENDIX A

GLOSSARY OF TERMS

The following terms are compiled from the well-established scholars and books of gamelan study, and are used in this thesis. Here is the reference of list of the words:


Bonang: A rack of ten, twelve, or fourteen small horizontally suspended gongs arranged in two rows.

Buka: The opening phrase, or introduction of a gamelan piece.

Cengkok: A melodic pattern or melodic style.

Colotomic structure: A system which punctuates the balungan by strokes of the gongs, Kempul, kenong, kethuk, Kempyang, in a specific order and at a specific time. This system of punctuation is determined by the structure of the piece.

Gambang: A xylophone, with wooden keys laid over a through resonator.

Gatra: A melodic phrase consists of four beats.

Gender: A metallophone with thin bronze keys, each suspended over a tube resonator.

Gendhing: Generic term for gamelan composition.

Gong: (1) A generic term for any kind of vertically or horizontally suspended gong; (2) the largest gong in the gamelan (*gong ageng*).

Gongan: The formal structure of a gamelan piece marked by a stroke on a hanging gong, usually the *gong ageng*. 
Imbal: A style of playing in which two identical or similar instruments play interlocking parts, forming a single repetitive melodic structure.

Irama: (1) tempo; (2) refers to the different tempo relationships within a gongan or gendhing.

Kempul: A medium size hanging gong.

Kendang: A generic term for drum.

Kenong: A large horizontal high-pitched gong.

Ketawang: One of the formal structures of gendhing. It includes a gongan of 16 beats, with an alternating pattern of strokes on the kempul and kenong on the fourth beat of every gatra and the strokes of the kethuk on the second beat of every gatra.

Kethuk: A small knobbed gong.

Klenangan: Melodic accompaniment, usually played by bonang.

Laras: Tuning system.

Ladrang: Javanese form which consists of two sections, an umpak and ngelik, with each section are composed of 32 beats with 4 strokes of kenong.

Mipil: An embellishment technique by the bonang in which the tones are struck in succession, producing a single melodic line.

Ngelik: The higher pitch section in the ladrang form.

Pancer: Musical process in which a note, usually constant pitch, is inserted between each melodic notes.

Patet: Mode.

Pathetan: Preludes or postludes to gendhing, usually played by few solo instruments.

Pelog: Seven-pitch non-equidistant tuning system.

Saron: A metallophone with keys rest on a low trough resonator.

Saron barung: A middle-sized medium register saron.

Saron demung: A large-sized, low register saron. Also known as demung.

Saron panerus: the small-sized, high register saron. Also known as peking.
Seseg: Fast, usually refers to tempo.

Slendro: Five-pitch equidistant tuning system.

Slenthem: A large-keyed, single octave metallophone, tuned on octave below the *saron demung*, whose thin keys are suspended over bamboo or zinc resonators (*gender* family).

Suling: A vertical bamboo flute.

Tumbuk: The common tone or tones between a *slendro* and its matched *pelog* gamelan.

Umpak: An opening section of the ladrang form, then followed by a *ngelik*. 
APPENDIX B

The first movement of *Concerto for Piano with Javanese Gamelan* score with the measure numbers assigned. This helps determines the sectional structure of the movement.