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Music Appreciation

Understanding the Fundamentals of Music

Course Guidebook

Professor Robert Greenberg
San Francisco Performances



PUBLISHED BY:

THE GREAT COURSES
Corporate Headquarters
4840 Westfields Boulevard, Suite 500
Chantilly, Virginia 20151-2299
Phone: 1-800-832-2412
Fax: 703-378-3819
www.thegreatcourses.com

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Printed in the United States of America

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Professor Robert Greenberg was born in Brooklyn, New York, in 1954 and has lived in the San Francisco Bay area since 1978. He received a B.A. in music, magna cum laude, from Princeton University in 1976, where his principal teachers were Edward Cone, Daniel Werts, and Carlton Gamer in composition; Claudio Spies and Paul Lansky in analysis; and Jerry Kuderna in piano. In 1984, he received a Ph.D. in music composition, with distinction, from the University of California, Berkeley, where his principal teachers were Andrew Imbrie and Olly Wilson in composition and Richard Felciano in analysis.

He has composed more than 45 works for a wide variety of instrumental and vocal ensembles. His works have been performed in New York, San Francisco, Chicago, Los Angeles, England, Ireland, Greece, Italy, and the Netherlands, where the Amsterdam Concertgebouw performed his *Child's Play* for String Quartet. His numerous honors include three Nicola de Lorenzo Composition Prizes and three Meet-the-Composer Grants. Recent commissions have come from the Koussevitzky Foundation at the Library of Congress, the Alexander String Quartet, the San Francisco Contemporary Music Players, San Francisco Performances, the Strata Ensemble, and the XTET ensemble.

Professor Greenberg is a board member and an artistic director of COMPOSERS, INC., a composers' collective/production organization based in San Francisco. His music is published by Fallen Leaf Press and CPP/Belwin and is recorded on the Innova label. He has performed, taught, and lectured extensively across North America and Europe. He is currently music-historian-in-residence with San Francisco Performances, where he

has lectured and performed since 1994, and resident composer and music historian to National Public Radio's "Weekend All Things Considered." He has served on the faculties of the University of California at Berkeley, California State University at Hayward, and the San Francisco Conservatory of Music, where he chaired the Department of Music, History and Literature from 1989–2001 and served as the Director of the Adult Extension Division from 1991–1996.

Professor Greenberg has lectured for some of the most prestigious musical and arts organizations in the United States, including the San Francisco Symphony (where, for 10 years, he was host and lecturer for the symphony's nationally acclaimed "Discovery Series"), the Lincoln Center for the Performing Arts, the Van Cliburn Foundation, and the Chautauqua Institute. He is a sought-after lecturer for businesses and business schools, speaking at such diverse organizations as the Commonwealth Club of San Francisco and the University of Chicago Graduate School of Business, and has been profiled in various major publications, including the *Wall Street Journal*, *Inc*. magazine, and the London *Times*. ■

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Understanding the Fundamentals of Music

Scope:

Understanding how music is created is comparable to understanding how a language is constructed. Like a language, music has a syntax, a vocabulary. We start by listening to that language. We first learn to distinguish different sonic and temporal phenomena; then, we come to understand how those phenomena are interrelated. After that, we can begin to understand how and why we perceive structural integrity and expressive meaning in a given section of music.

Given the constraints of a course such as this, we will not learn how to read and write music. This course, then, is about using our ears, about discovering and exploring musical syntax through our ears by learning what the parts of the musical language *sound* like, rather than what they *look* like on paper. This is an infinitely more useful skill than simply learning to recognize musical constructs on paper with our eyes because we can apply such listening skills to almost any piece of music in almost any style.

The syntactical elements on which we will focus will be those of the European musical tradition, from the time of ancient Greece through the beginning of the 20th century.

We'll start with those aspects of the musical language that are most easily perceived by ear—timbre and meter—and from there, we'll move on to the more challenging syntactical elements of tonality and harmony. Lectures One through Three introduce the five basic categories of musical instruments—strings, woodwinds, brass, percussion, and keyboard instruments—and their individual timbral (sound) qualities. Lectures Four through Six explore the nature of beat, meter and tempo, including duple and triple meter, syncopation, compound meter, additive meter, and asymmetrical meter. We will also examine music that is not characterized by a regular meter. From Lecture Seven onward, we will examine tonality, beginning with its most basic aspects: pitches and the Pythagorean collection. We will explore pitch collections (modes), the major and minor modes, tuning systems, the

anatomy and function of intervals, key relationships and the circle of fifths, melody, and functional tonality, including harmonic progressions, cadences, and modulation.

This Western musical language is a rich, varied, and magnificent one. It is a language that pays us back a hundredfold for every detail we come to recognize and perceive, and it is a language that will only get richer and more varied as our increasingly global culture contributes ever more vocabulary to it. ■

The Language of Music

Lecture 1

"Music theory." Implied in that compact and oh-so-innocent-sounding phrase is the idea that there is a knowable, graspable, all-encompassing set of truisms that once understood, compartmentalized, absorbed, and digested, the very essence of music will stand revealed, its various elements and expressive content united into a singularity, the whole greater than the sum of its parts. Wrong.

Music is a language, and like any language, its syntax is constantly changing. The term "music theory" implies that there is a science of music, an all-encompassing set of truisms that, once understood, reveals the essence of music and establishes a set of rules that govern what composers can and cannot do as they create a piece of music. As such, the term music theory is misleading. We do not grasp musical syntax the way we grasp facts. Rather, we first learn to distinguish different sonic and temporal phenomena. Then we come to understand how those phenomena are interrelated. After that, we can begin to understand how and why we perceive structural integrity and expressive meaning in any given section of music.

To deepen the experience of listening to music, we need to understand some basic syntactical elements, including timbre, meter, tonality, and harmony.

Learning musical syntax is much like learning a language: We start with rudiments and gradually accumulate understanding as we comprehend that language in ever more sophisticated ways. Music is an art, not a science. What constitutes the art of music is a syntax that is constantly changing on the basis of the time, place, and aesthetic taste of a particular composer and the expressive reason-to-be of a particular piece of music.

This course will focus on musical syntactical elements of the European musical tradition from ancient Greece through the 20th century. The goal of

this course is to provide the intellectual tools and listening skills necessary to deepen immeasurably the experience of any music you might encounter, including concert music. The nature of this course precludes instruction in musical notation. We will not learn to read music, but this is a blessing in disguise because we will, instead, learn to use our ears, an infinitely more useful skill than simply learning to recognize musical constructs on paper. Indeed, we will learn to build a musical vocabulary that includes timbre, meter, tonality, and harmony.

Our working definition of music is "sound in time" or "time ordered by sound." When we talk about the sound aspect of music, we will be discussing everything from instruments and instrumental combinations to melody, harmony, texture, and tonality. When we talk about the time aspect of music, we will be discussing some aspect of rhythm.

We begin with that most easily perceived aspect of musical language, timbre: the physical sound produced by individual instruments and combinations of instruments. Instruments are classified by how they initiate and maintain their sound. There are five such major classifications: stringed, woodwind, brass, percussion, and keyboard.

Stringed instruments produce sound by bowing or plucking. Bowed stringed instruments are the most numerous in the modern orchestra. Plucked instruments include the harp and the guitar.

Woodwind, or wind, instruments initiate and maintain their sound when air is blown into a generally cylindrical instrument. Air may be blown directly through the instrument, as in the case of the piccolo and flute. Air can be blown into the instrument indirectly, through a thin piece of cane called a *reed*, as in the case of the clarinet and saxophone families. Air can also be blown indirectly into the instrument through two small reeds clamped together with a small space between them, as in the case of the double-reed instruments: oboe, English horn, and bassoon. Not all woodwind instruments are made of wood, but the term was coined when they all, in fact, were. The metal flute, for example, did not become standard until the 1930s.

The brass instruments produce one of those miracles of sound that occurs when a flatulent burst of air goes through several feet of tubing to emerge mellow and only vaguely metallic in sound at the other end. [***Trombone demonstration***.]

Percussion instruments initiate and maintain their sound by striking, scraping, rattling, or mashing one object against another.

Keyboards constitute a problematic classification because, properly classified, the harpsichord would be a plucked string instrument, the piano would be a percussion instrument, and the organ would be a wind instrument.

In the 1970s and 1980s, a sixth instrumental category might have been added: electronics. Electronics—synthesized sound—was once believed to be the wave of the future. But, as it turns out, the wave never happened. Composers prefer to write music for real people playing real instruments, and audiences prefer to listen to this kind of music. Ironically, digital electronics are used today to imitate those "antiquated" instruments they were supposed to replace.

The bowed stringed instruments are those of the violin family, which consists of four instruments, which have, collectively, a range of five octaves—the basic range of the human voice: soprano, alto, tenor, and bass (SATB).

The violin is the soprano voice. Perfected in workshops around Cremona, Italy, between approximately 1600 and 1750, the violin is capable of extraordinary lyricism, power, agility, nuance, and precision, as well as unworldly beauty. [***Musical selection****: Johann Sebastian Bach, Partita no. 2 in D Minor for Solo Violin, BWV 1004 (c. 1720), Chaconne*.]

The viola corresponds to the alto voice. It is slightly bigger than the violin and pitched a perfect fifth lower. It has a softer, fuller sound than the violin. [***Musical selection****: Robert Schumann,* Märchenbilder *for Viola and Piano, op. 113 (1851), movement 1*.]

Among the bowed strings, the violoncello ('cello, for short) is second only to the violin in terms of its lyric capabilities and range of nuance. It corresponds to the tenor voice. [***Musical selection**: Johann Sebastian Bach, Suite no. 3 in C Major for Solo 'Cello, BWV 1009 (c. 1720), Bourrée*.]



Library of Congress, Music Division.

Robert Schumann.

While the violin and 'cello together constitute the foreground of the string choir, the bass, like the viola, generally plays a supportive or background role. Because basses are less than ideal for playing thematic ideas, unless the composer wants a special effect, they are rarely given solos. Among the most famous bass solos in the orchestral repertoire is the funereal version of *Frère Jacques* from Gustav Mahler's Symphony no. 1. [***Musical selection**: Gustav Mahler, Symphony no. 1 in D Major (*Titan*, 1888), movement 3, opening*.]

There are three generic groupings of instrumental genres. A solo work is a composition for one instrument, exemplified by the partita and suite for 'cello by Bach that we just heard. A chamber work is a composition for two or more instruments in which there is but one player per part, such as the *Märchenbilder* by Schumann. An orchestral work is a composition for multiple instruments in which at least one part is doubled, meaning that two or more instruments are playing the same part (the same music). Mahler's Symphony no. 1 is such a piece. For example, it calls for roughly 30 violinists divided into two parts: 16 first violinists and 14 second violinists. The first violinists are all playing the same part. The same is true for the second violinists. The violin family creates a homogenous, flexible, and non-fatiguing sound. The violin family is the backbone of the orchestra.

The string quartet is the single most important chamber music combination. [***Musical selection**: Wolfgang Mozart, String Quartet in Bb Major, K. 458 (*Hunt*, 1784), movement 1, opening.*] A string quartet consists of two violins, a viola, and a 'cello, which play together as equal partners, creating a rich, homogenous sound. [***Musical selection**: Peter Ilyich Tchaikovsky, Serenade for Strings in C Major, op. 48 (1875), movement 1*.]

Bowed instruments are capable of producing an incredible variety of different sounds.

- Muted (*Con sordino*): Bowed strings can be muted using a small device (called a *mute*) that is clipped to the bridge of the instrument. In the following excerpt, the composer, Johannes Brahms, mutes the violins and 'cello in order to put the unmuted viola in high relief. [***Musical selection**: Johannes Brahms, String Quartet no. 3 in Bb Major, op. 67 (1875), movement 3 (repeated)*.]

- *Sul tasto* ("on the fingerboard") creates a soft, flute-like sound by bowing over the fingerboard. This technique has a downside: The rosin put on the bow to help it grip the strings is spread on the fingerboard, where sooner or later, the string player will put his or her fingers.

- *Sul ponticello* ("on the bridge") reduces the fundamental pitch almost to its overtones, creating a weird, "glassy" effect. This is stunningly illustrated at the end of Beethoven's C-sharp (C#) Minor String Quartet. [***Musical selection**: Ludwig van Beethoven, String Quartet in C# Minor, op. 131 (1826), movement 5 (repeated)*.]

- *Col legno* ("with the wood") requires players to flip their bows over and use the wooden side to play the strings, producing little pitch, but, rather, a "clicking" sound, especially if the composer indicates *col legno battuto*, meaning that the bow must bounce off the strings. [***Musical selection**: Hector Berlioz, Symphonie fantastique (1830), movement 5 (repeated)*.] This technique can scratch and even chip the bow, which can be as valuable as the instrument itself.

- *Pizzicato* ("plucked") is a very common technique involving plucked strings. There are various types of pizzicati, of which the most common is to pluck the string with the fleshy part of the finger. A more brittle effect can be obtained by plucking with the fingernail. A percussive effect can be obtained when the string is pulled back so far that, when released, it snaps against the fingerboard. This is called a *snap*, or *Bartok* pizzicato. [***Musical selection**: Peter Ilyich Tchaikovsky, Symphony no. 4 in F Minor, op. 36 (1877), movement 3 ("Scherzo Pizzicato"), opening.*] ■

Timbre, Continued

Lecture 2

With our ears thus properly informed, we can apply what we've learned to almost any piece of music in almost any style. … A picture might be worth a thousand words, but when it comes to music, a musical excerpt is worth a thousand pictures!

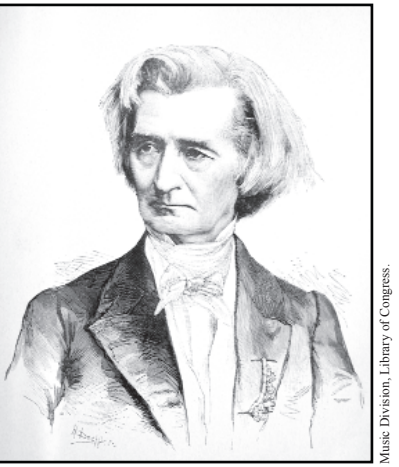
Our exploration of timbre continues with the plucked strings, which include the harp. The harp is the ancestral instrument of both the harpsichord and the piano. It is the only modern orchestral instrument that is of western European origin—specifically, of Celtic origin. In this lecture's first musical example, there are three primary instrumental timbres: flute, harp, and string orchestra. [***Musical selection**: Wolfgang Mozart, Concerto in C Major for Flute and Harp, K. 299 (1788), movement 2.*]

Virtually every modern type of wind instrument is part of an extended SATB (soprano, alto, tenor, bass) family of instruments. The most commonly heard instruments of the flute family are the piccolo and the flute. Despite its small size, the piccolo has a piercing sound. [***Musical selection**: John Philip Sousa,* The Stars and Stripes Forever *(1896).*]

Wind instruments are part of an extended family and, excepting the flute family, use one or two reeds to produce their sound.

The double-reed instruments—oboe, English horn, bassoon, and contrabassoon—are very difficult to play because of the mouthpiece, which consists of two tiny pieces of cane, bound together, leaving an extremely small space between them. This requires a player to use a lot of force to blow into the instrument. The oboe (meaning, literally, "high wood") produces a nasal, piercing quality of sound that makes it ideal for tuning the other instruments in the orchestra before a performance. The oboe family consists of the oboe, English horn, oboe d'amore, baritone oboe, and heckelphone, or bass oboe. The last three instruments are not, today, considered standard orchestral instruments. The

alto instrument of the double-reed family is the English horn, pitched five scale-steps below the oboe. The English horn is neither of English origin nor a horn. It and the oboe evolved from the ancient shawm. Both the oboe and English horn evoke the sort of pastoral melancholy associated with their ancestor. [***Musical selection**: Hector Berlioz,* Symphonie fantastique *(1830), movement 3, opening.*]



Music Division, Library of Congress.

Hector Berlioz.

The bassoon is dark and heavy in its lower register; clear and sonorous in its middle register; reedy and intense in its upper register; and lyric, penetrating, and flexible in all its registers. Another excerpt illustrates the bassoon's upper register. [***Musical selection**: Igor Stravinsky,* The Rite of Spring *(1912), opening*.] The contra or double bassoon is folded over itself several times. It is the lowest instrument in the orchestra and provides the foundation for the entire woodwind section. [***Musical selection**: Wolfgang Mozart, Sonata in Bb Major for Bassoon and 'Cello, K. 292/K. 196c (1775, arranged for two contrabassoons), opening*.]

In the single-reed family, there are 10 clarinets that are currently in use: soprano clarinet in A-flat (Ab), soprano clarinet in E-flat (Eb), clarinet in C, clarinet in B-flat (Bb—the "standard" clarinet), clarinet in A, alto clarinet in E-flat (Eb), basset horn in F, bass clarinet in B-flat (Bb), contra-alto clarinet in E-flat (Eb), and contrabass clarinet in B-flat (Bb). All or nearly all of these instruments may be heard in a concert band or big marching band.

For the purposes of orchestral music, three members of the clarinet family are commonly used: the soprano clarinet in Eb, the "standard" Bb clarinet, and the bass clarinet in Bb. The key designations indicate that these instruments are transposing instruments. This means that their notated pitches are different

from the sounded pitches. Most instruments—for example, keyboards and strings—are in C, meaning that they are nontransposing instruments in concert pitch: When a player sees C written on a page of music, she plays a C on her instrument, and the pitch that sounds is called a concert C. But this is not the case for transposing instruments.

The reason lies with the fingering. By using virtually the same fingering system, a musician can play all the instruments in a particular family of instruments. When the pitch of C is played on an oboe, it sounds as a C. But because the English horn is longer than the oboe, the same fingering that produces the sound of C on the oboe actually produces the sound of F on the English horn. For the English horn to play in the key of C, its part is notated five steps higher than C—in the key of G. It will then sound five steps lower—in the key of concert C. The score of a work written for both transposing and nontransposing instruments will contain any number of different key signatures.

All clarinets are single-reed instruments. A single-reed instrument employs a wide, thin piece of cane fitted against a mouthpiece called a beak. The wide reed allows clarinetists to make their instruments sing with a nuance, flexibility, and vocality equaled only by the violin and the 'cello. Our next musical excerpt demonstrates the special qualities of the Bb clarinet's three registers: the rich warmth of its low, or *chalumeau*, register; the round mellowness of its middle register; and the gentle, almost flute-like sweetness of its upper, or *clarino*, register. [***Musical selection**: Johannes Brahms, Quintet in B Minor for Clarinet and Strings, op. 115 (1891), movement 1, opening*.]

The sopranino clarinet in Eb, while not commonly heard, is nevertheless, heard often enough that it deserves to be demonstrated here. It has a shrill and piercing timbre. This quality suits it perfectly to its role in Hector Berlioz's *Symphonie fantastique*, where it represents a gnarled and evil witch who dances an obscene jig at a funeral. [***Musical selection**: Hector Berlioz,* Symphonie fantastique *(1830), movement 5, sopranino clarinet solo*.] Berlioz was the most innovative orchestrator to his time. His use of instruments and instrumental combinations became a model for every

generation that followed him, and his *Treatise on Orchestration* has been considered mandatory reading for composers and conductors since its original publication in 1843.

The bass clarinet in Bb combines the vocality and agility of a clarinet with the range of a Russian basso singer. [***Musical selection****: Johann Sebastian Bach, Partita no. 2 in D Minor for Solo Violin, BWV 1004 (c. 1720), Chaconne, arranged for bass clarinet*.]

The saxophone family, which was invented by Adolphe Sax for use in 19th-century French military bands, has found its true niche in jazz. Like clarinets, saxophones employ a single reed.

The wind quintet is the preeminent chamber combination involving wind instruments. The standard wind quintet consists of a flute, oboe, clarinet, bassoon, and French horn. Although a brass instrument, the French horn is as timbrally comfortable in the company of wind instruments as it is among brass. What makes a wind quintet so special for the listener and such a challenge for the composer is its amazing variety of instrumental timbres among the individual instruments and in combinations. In this, it is the polar opposite of a string quartet, which is about the blend of homogeneous instruments drawn from the same instrumental family. The challenge for the composer is to unite the wind quintet's rainbow of timbres into a timbral whole. [***Musical selection****: Carl Nielsen, Quintet for Winds, op. 43 (1922), movement 4, opening*.]

There are two categories of dynamics: fixed and graded. A fixed dynamic marking indicates a single, unchanging level of volume until another dynamic marking appears to change it. Fixed dynamics are arrayed around the two polarities of loud (*forte*) and soft (*piano*). [***Piano example****: Ludwig van Beethoven, Piano Sonata no. 8 in C Minor, op. 13 (*Pathétique*, 1798), opening chords, marked* forte *and* piano.] These dynamics are subject to individual interpretation. [**Piano examples**.] Moderately loud is indicated by the marking *mf* (*mezzo-forte*). Moderately soft is indicated by the marking *mp* (*mezzo piano*). Very loud is identified by the Italian superlative

fortissimo (*ff*) or *fortississimo* (*fff*). Very soft is identified as *pianissimo* (*pp*) or *pianississimo* (*ppp*).

Graded dynamic markings are those used to indicate a progressive increase in loudness or softness, respectively, crescendo or decrescendo (*diminuendo*). On a page of music, the marking looks like a hairpin, either expanding to the right for a crescendo or gradually contracting to the right for a decrescendo. ■

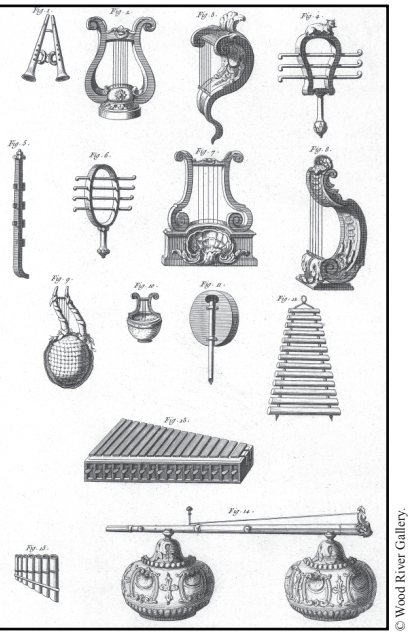
Timbre, Part 3

Lecture 3

"I never look at the brass. It only encourages them." — Sir Thomas Beecham

As the orchestra evolved and grew, various instruments were added to the basic string choir of the early 17th-century orchestra. The quote above from the English conductor Sir Thomas Beecham refers to the fact that brass instruments, by their very nature, have the power to dominate the orchestra. [***Musical selection**: Hector Berlioz, Requiem, op. 5 (1837),* Dies irae/tuba mirum.] Brass instruments include the French horn, trumpet, trombone, and tuba. Virtually all modern brass instruments employ a cup-shaped metal mouthpiece called a loose-lip mouthpiece.

The French horn developed not in France but in Germany and evolved from that most ancient of instruments, a hollowed-out animal horn. The modern horn consists of a gradually tapered, coiled, conical tube of metal around 12 feet in length, with a series of finger-operated valves that vary the overall length of the tubing and, along with the player's lips, thus control the pitch of the instrument. The French horn is the most difficult brass instrument to play. It takes decades to master the horn's astonishing range of four octaves. [***Musical selection**: Richard Strauss, Andante in C Major for Horn and Piano, AV86a (1888).*] The French horn



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Primitive musical instruments.

occupies the middle ground between the wind and the brass choirs. In the orchestral music of the Classical Era, the French horns often doubled the strings to reinforce their sound. The French horn is capable of glorious sound in its own right. [***Musical selection****: Robert Schumann, Concert Piece (*Konzertstück*) for Four French Horns and Orchestra, op. 86 (1849), movement 3*.]

The trumpet has a cylindrical bore that imbues the instrument with a much brighter and more piercing sound than the horn. Like the clarinet, the trumpet belongs to an extended family of instruments: piccolo trumpet, bass trumpet in Bb, cornet in Bb, cornet in Eb, flugelhorn in Bb, "standard" trumpet in Bb, and "standard" trumpet in C. A musical excerpt makes us aware of the agility of the solo trumpet and the incredibly fast repeated notes that can be played using double-tonguing technique. [***Musical selection****: Georg Philipp Telemann, Concerto in F Minor for Oboe, Strings, and Continuo, TWV 51:e1 (1712–1721), arranged for trumpet, movement 3*.]

The low brass consists of the trombone and the tuba. As an example of low brass sound, we hear an excerpt in which the three trombones imbue the music with magisterial dignity. [***Musical selection****: Robert Schumann, Symphony no. 3 in Eb Major, op. 97 (*Rhenish*, 1850), movement 4, opening*.]

The trombone is the most primitive of any modern instrument. The basic trombone has no valves, no keys, no levers, and no pads, just a slide by which the player manually extends or shortens the overall length of the instrument. The simplicity of the trombone's design produces one of the purest sounds on the planet. The slide makes it the most vocally flexible brass instrument. In terms of its lyric capabilities, the trombone is equal to the clarinet and the violin. The trombone family consists of seven different instruments, of which we generally hear only two in a modern orchestra: the tenor trombone and the bass trombone. Most modern orchestras feature two tenor trombones, one bass trombone, and a tuba to round out the low end of the brass.

The name "tuba" has been applied to many instruments over the years, including the euphonium, baritone, tenor horn, helicon, sousaphone, and Wagner tuba. What they all have in common is that they consist of a long,

conical bore and are operated using valves. What we call tubas today—the bass and contrabass saxhorns—anchor the brass choir in the same way that the double basses anchor the string choir and the contrabassoon anchors the wind choir. Saxhorns are surprisingly agile, despite their size, and have a fantastically deep range. [***Musical selection****: Gustav Mahler, Symphony no. 1 in D Major (*Titan*, 1888), movement 3, tuba (saxhorn) entry*.]

The brass quintet is the preeminent chamber combination involving brass instruments. The standard brass quintet consists of two trumpets, French horn, tenor trombone, and bass trombone or two trumpets, French horn, tenor trombone, and tuba. The individual instruments of a brass quintet blend into a homogeneous whole, with the French horn acting as the "timbral glue," connecting the trumpets with the low brass. Modern brass instruments are about power and brilliance. [***Musical selection****: Samuel Scheidt,* Galliard battaglia *(c. 1621)*.]

In the 20th century, the complement of percussion instruments used in the orchestra grew substantially. There are two basic categories of percussion instruments: pitched and nonpitched. A pitched percussion instrument produces a clear fundamental pitch, a sound that can be sung. A nonpitched percussion instrument produces a sound that cannot be sung. Pitched percussion instruments include the timpani, mallet instruments (such as the orchestral bells, or glockenspiel, xylophone, vibraphone, and marimba), celesta, and tubular bells. Nonpitched percussion instruments include drums, triangle, cymbals, and the orchestral gong (tam-tam).

At any given moment, each tympanum is tuned to a single pitch, so that the timpanist can play three or four particular pitches.

The timpani (kettle drums), which require a specialist to play (a timpanist), come in a variety of sizes and are typically played in groups of three or four. Each tympanum (singular of timpani) is capable of playing the distance of a fifth (five white keys on the piano). By using an array of three or four different-sized drums, a considerable range of pitches becomes available. Modern timpani are built with a foot pedal that tightens

and loosens the drumhead, allowing the instrument to be retuned during the course of a performance. At any given moment, each tympanum is tuned to a single pitch, so that the timpanist can play three or four particular pitches.

During the course of a performance, the timpanist must constantly retune each tympanum by putting his ear just above the drumhead and tapping it with his finger, while moving the pedal with his foot until the pitch is correct. Retuning during the course of a performance requires a great deal of skill. The timpanist may have only a few seconds to retune all of his timpani, and he does this while the timpani themselves vibrate sympathetically with the music being played by the rest of the orchestra. Beethoven was the first composer to treat the timpani, collectively, as a genuine and independent instrument. [***Musical selection**: Ludwig van Beethoven, Symphony no. 9 in D Minor, op. 125 (1824), movement 2, opening*.]

It takes training and skill to develop the fine sense of timing that is required in the percussion section. Every instrument, even the tiny triangle, can be clearly heard among the other orchestral instruments. [***Musical selection**: Johannes Brahms, Symphony no. 4 in E Minor, op. 98 (1885), movement 3, opening*.]



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George Friedrich Handel.

The orchestra came into existence as a result of the 17th-century opera house. By the end of the 17th century, the core of orchestral strings had been joined, in the larger and wealthier opera houses, by flutes, oboes, bassoons, trumpets, and even, on occasion, trombones. By the 1740s, the great composers of the High Baroque (Johann Sebastian Bach, George Frederick Handel, Georg Philipp Telemann, and Antonio Vivaldi)

had created a body of magnificent orchestral music that remains an essential part of the orchestral repertoire to this day.

The High Baroque orchestra was of two generic types: The basic group consisted entirely of strings—plus the ubiquitous harpsichord accompaniment (*continuo*)—numbering between 12 and 16 players. [***Musical selection**: Antonio Vivaldi, Violin Concerto in E Major, op. 8, no. 1 ("Spring" from* The Four Seasons*, c. 1725)*.] The second type of Baroque orchestra is the festive orchestra: a string orchestra with any number of wind and/or brass and percussion instruments added to the mix. Outside the opera house, such orchestras were usually pick-up groups put together for a special occasion. [***Musical selection**: George Frederick Handel,* Music for the Royal Fireworks *(1749), overture, conclusion*.]

In the 18th century, with the rise of the symphony as a compositional genre and the growing popularity of the orchestra as a performance medium among the aristocracy and the middle class, the orchestra continued to expand. Horns became a standard orchestral instrument, and by the turn of the 19th century, the clarinet was as well. The strings were still the backbone of the orchestra, and winds and brass were most often employed to support and reinforce the string sound, rather than as important instrumental timbres in their own right. [***Musical selection**: Joseph Haydn, Symphony no. 94 in G Major (*Surprise*, 1791), movement 4, opening*.] In explicitly celebratory orchestral works, trumpets and drums were added to create a pomp-filled environment. [***Musical selection**: Wolfgang Mozart, Symphony no. 34 in C Major, K. 338 (1780), movement 1, opening*.] Mozart had a particular affinity for the wind choir, which he featured in his orchestral music to a degree most unusual in his day. [***Musical selection**: Wolfgang Mozart, Symphony in G Minor, K. 550 (1788), movement 3, trio*.]

By the 1830s, the public concert had replaced the private, aristocratic entertainment as the essential orchestral venue. Large standing orchestras performing in public concert halls became the orchestral norm. The growing orchestra reflected a basic Romantic Era article of faith that bigger was better in terms of musical expression. Berlioz wrote that his ideal orchestra consisted of 467 players: 242 strings, 30 harps, 30 pianos, 12 cymbals, 16

French horns, and a wide variety of percussion! Gustav Mahler's Symphony no. 8 came to be known as the *Symphony of a Thousand* because of the number of performers, orchestral and vocal, who were reported to have participated in the premiere. [***Musical selection****: Gustav Mahler, Symphony no. 8 in Eb Major (1906), finale, part 2*.] Perhaps the biggest single change in the 20th-century orchestra was the demand by composers for an entirely new number and variety of percussion instruments. [***Musical selection****: Igor Stravinsky,* The Rite of Spring *(1912), "Sacrificial Dance."*] ■

Beat and Tempo

Lecture 4

Aside from being at the extremely short end of the vowel stick the word is, frankly, almost too general to be of any use. **We can talk endlessly about harmonic rhythm, body rhythm, innate rhythm, the rhythm of the spheres, the rhythm method, "I got rhythm, who could ask for anything more?" and so forth. So, aside from occasional use, we will do our best to avoid the word "rhythm" entirely.**

We have explored the most easily perceived facets of the sound aspect of music, as in our definition of music as "sound in time." We now move on to explore the time aspects of music. "Time" in music means "rhythm," but the word "rhythm" is too general a term to be useful. We will use more specific vocabulary. The beat, or pulse, is the shortest time division to which we can comfortably move our bodies, and it can transmit a great deal of musical and expressive information. [***Musical selection****: John Philip Sousa,* The Stars and Stripes Forever *(1896)*.] But "to which we can comfortably move our bodies" is a subjective definition of beat. [***Musical selection****: John Philip Sousa,* The Stars and Stripes Forever *(repeated at different speeds, or tempi)*.]

Powerful beats affect us metabolically. The power of movement or dance is instinctive. Once the beat is established, it becomes the continuum on which the entire musical structure rests until the composer or performer chooses to alter that beat and, thus, create a new continuum. It is amazing how much musical and expressive information is transmitted via the beat in a given section of music: the beat's relative strength, its speed, how certain beats are emphasized or accented, and how beats are grouped or not grouped. The beat in the Sousa excerpt is grouped in sets of two (or four). [***Musical selection****: John Philip Sousa,* The Stars and Stripes Forever (1896).], whereas in a Brahms waltz, the beats are grouped in threes [***Musical selection****: Johannes Brahms, Waltzes for Piano Four Hands, op. 39, no. 4 (1865)*.] The beat in the latter piece tells us that this is a dance, and its grouping in threes tells us that it is a three-step dance called a waltz.

The relative speed of a passage of music is its tempo. There are six basic tempo designations (and these, like other musical terms, are traditionally in Italian): *presto*, very fast; *allegro*, fast; *andante*, moderate, or walking speed; *adagio*, moderately slow; *lento*, slow; and *largo*, very slow. Those tempo designations are subject to individual interpretation. [***Piano examples**: Wolfgang Mozart, Piano Sonata in C Major, K. 545 (1788), movement 1, opening (played at three different speeds, or tempi)*.]

In 1815, a Viennese builder of mechanical musical instruments named Johann Nepomuk Maelzel patented the metronome. This device can be set to produce a clicking sound from 40 to 200 times a minute, thereby allowing a composer to designate a precise means of establishing the tempo. [***Piano example**: Wolfgang Mozart, Piano Sonata in C Major, K. 545 (1788), movement 1, opening (played at 116 beats per minute)*.] But not all conductors choose to honor a composer's metronome marking. The opening of Beethoven's third symphony, which is marked at 60 beats per minute, has been recorded at a slower tempo. [***Piano example**: Ludwig van Beethoven Symphony no. 3 in Eb Major, op. 55 (*Eroica*, 1803), movement 1, opening (played at 46 beats per minute and at 60 beats per minute)*.]

The last 30 years have seen a revival of period instruments in recordings. The relative merits of period instruments versus modern instruments have been hotly debated. To argue that we should hear Beethoven's music the way his audiences heard it assumes that there was a fixed instrumental standard in Beethoven's time. There was not. In his own day, Beethoven would have been unlikely to have heard as high a quality of performance as has been achieved in modern performances of his music. The real issue here centers on what the composer indicates in terms of balance, articulation, and tempo.

Beethoven scored his Symphony no. 3 for two flutes, two oboes, two clarinets, two bassoons, three French horns, two trumpets, timpani, and strings. The string section would have numbered about 40 instruments, playing on gut rather than steel strings, resulting in an overall orchestral complement of 54 players. [***Musical selection**: Ludwig van Beethoven, Symphony no. 3 in Eb Major, op. 55 (1803), movement 1, opening*.] In that recording, the conductor respected the size of the string choir that Beethoven would most likely have

used, retaining a crisp and beautiful balance. A larger, modern string choir would have drowned out the winds and brass.

In the 19th century, the strings were modified to make them capable of playing louder but at the cost of flexibility. It is easier to player faster on period stringed instruments, and therefore it is easier to honor the sorts of faster tempos and articulations that were created with these instruments in mind.

A beat can be steady and even, or it can be imprecise and sometimes even imperceptible.

A beat may not be steady and even. It may not even be perceivable. Here, the beat speeds up and slows down with the natural rhetorical ebb and flow of the storytelling. [***Musical selection**: Harry von Tilzer and Joseph Lamb, A Bird in a Gilded Cage (1900)*.] In that recording of *A Bird in a Gilded Cage*, the performance took a very flexible approach to beat. It speeded up the beat (*accelerando*) and slowed down the beat (*ritardando*) constantly. The term for this flexibility of beat is *rubato* ("robbed time").

The Polish-born composer and pianist Frédéric Chopin was famous for his rubato. [***Piano examples**: Frédéric Chopin, Mazurka in A Minor, op. 17, no. 4 (played as a dance and played as a song of regret)*.] The absence of an easily perceived beat often creates tension. Richard Wagner's music drama *Tristan und Isolde* illustrates the use of orchestral rubato to produce a sense of unease. The story of *Tristan und Isolde* concerns two lovers who cannot consummate their physical passion. By denying any semblance of beat for the first two minutes of the overture to this music drama, Wagner conveys that sense of frustration. [***Musical selection**: Richard Wagner,* Tristan und Isolde *(1859), overture, opening*.] This is a case in which notation and perception are two very different things. Although the notated music looks normal, the score indicates that the music should be played *lento* (very slowly) and with long pauses (*fermatas*). More than following the notated rhythms in their parts, the players are following the conductor's baton. Time is so stretched by this orchestral rubato that a regular beat is hardly perceived at all. ■

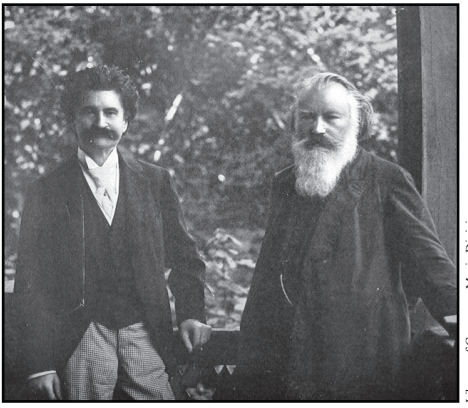
Meter, Part 1

Lecture 5

Sadly there's no science, or theory, to identifying meter. We just practice, and eventually, like the Crayola Crayon maven who can instantly identify that particular shade called Wild Blue Yonder, we just know what meter we're in when we hear it.

"Meter" refers to how individual beats are grouped in a given passage of music. Meter makes itself apparent through some sort of emphasis called *accent* or *accentuation*. Such accents usually occur regularly, most commonly creating patterns of two, three, or four beats. We will learn to identify and recognize these four basic types of meter: duple meter, triple meter, compound meter, and additive meter.

Duple meter is the occurrence of accented beats every two or four beats. [***Musical selection**: Hector Berlioz,* Symphonie fantastique *(1830), movement 4*.] Accented beats occurring every three beats create triple meter. [***Musical selection**: Johannes Brahms, Waltzes for Piano Four Hands, op. 39, no. 15 (1865)*.]



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Johannes Brahms and Johann Strauss on the verandah of the latter's villa in Vienna.

Accented beats are not necessarily louder than other beats. In Brahms's waltz, the "oom" in the "oom-pa-pa" is heard on notes lower than the "pa-pa." [***Piano example***.] That registral isolation—the lower notes—serves to emphasize them. Accentuation can be a result of melodic phrase structure. [***Musical selection**: Joseph Haydn, Symphony no. 94 in G Major (*Surprise*, 1791), movement 2, opening*.]

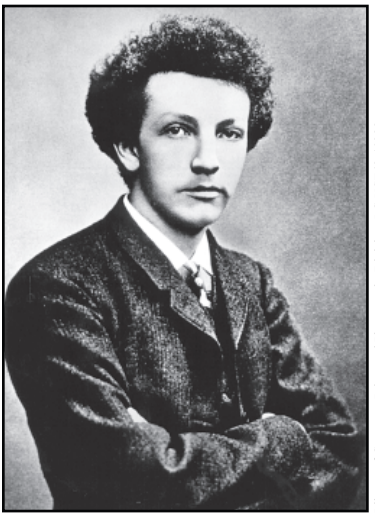
However they are emphasized, we perceive accented beats as being the first beat of whatever metric unit we are hearing. We call this first accented beat the downbeat. The beat that immediately precedes the downbeat is the upbeat.

Identifying meter is a physical process. First, we find the beat, then we "feel around" for the emphasis (accent), and in doing so, we sense whether the beats are being grouped in twos and fours (duple meter) or in threes (triple meter). We listen to several excerpts in duple meter. [***Musical selections**: Johann Sebastian Bach,* Brandenburg *Concerto no. 2 in F Major, BWV 1047 (c. 1719), movement 1, opening (repeated); Wolfgang Mozart, Clarinet Quintet in A Major, K. 581 (1789), movement 4, opening (repeated); Johannes Brahms, Quintet in B Minor for Clarinet and Strings, op. 115 (1891), movement 3, opening (repeated); Peter Ilyich Tchaikovsky, Symphony no. 4 in F Minor, op. 36 (1877), movement 4, opening (repeated)*.]

Once the beat and the meter are established, they continue until the composer alters them or stops them. This means that they continue through moments of silence. [***Piano example***.]

Triple meter is, at its essence, a dance meter. The overwhelming number of instrumental compositions in the 17th, 18th, and 19th centuries that are set in triple meter are based on triple-meter dances. The sarabande is a slow, stately dance in triple meter of Spanish origin. [***Musical selection**: Johann Sebastian Bach,* Goldberg *Variations, BWV 988 (1741), theme*.] The minuet, a courtly three-step dance, was popular for more than 150 years, from the mid-17th century through the early 19th century. It was the only Baroque Era dance to find its way into the instrumental music of the Classical Era. [***Musical selection**: Joseph Haydn, Symphony no. 100 in G Major (*Military*, 1794), movement 3, opening*.] The ländler is a slow-to-moderately-slow triple-meter dance of southern German and Austrian origin. Originally a peasant dance, it became popular in early-19th-century ballrooms until it was replaced by the waltz. [***Musical selection**: Gustav Mahler, Symphony no. 1 in D Major (*Titan*, 1888), movement 2, opening*.] The mazurka is a triple-meter Polish folk dance from the province of Mazovia, near Warsaw. Frédéric Chopin composed 51 mazurkas for solo piano that exhibit a huge

range of expressive character. [***Musical selection****: Frédéric Chopin, Mazurka in Bb Major, op. 7, no. 1 (1832)*.] The polonaise is another triple-meter Polish dance that Chopin made his own. His 16 polonaises for piano number among them some of the most justly popular and memorable music ever composed. [***Musical selection****: Frédéric Chopin, Polonaise no. 3 in A Major, op. 40, no. 1 (*Military*, 1838)*.]



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Richard Georg Strauss.

The waltz has become virtually synonymous with triple meter. In terms of popularity, the waltz has bested even the minuet and has been the single most popular ballroom dance for the last 200 years. The waltz reached its zenith as a compositional genre in Vienna in the mid- and late 19th century, where the estimable Strauss family made it the preeminent popular music of its time. [***Musical selection****: Johann Strauss II,* By the Beautiful Blue Danube *(1867)*.] A Viennese waltz craze swept across America during the last years of the 19th century and the first years of the 20th century. The so-called songs of the Gay Nineties are almost all waltz songs in triple meter. [***Piano examples****: John Palmer and Charles Ward,* The Band Played On *(1895); Chauncey Olcott,* My Wild Irish Rose *(1899); Henry Dacre,* Daisy *(1892); Charles Lawlor and James Blake,* Sidewalks of New York *(1894); Warren Shields and M. George Evans,* In the Good Old Summertime *(1902); Effie Canning,* Rock-a-bye Baby *(1886); Albert von Tilzer and Jack Norworth,* Take Me Out to the Ball Game*; Patty and Mildred Hill,* Happy Birthday *(1893)*.]

Not all music is characterized by meter. Plainchant, the liturgical music of the medieval church, for example, is unmeasured. [***Musical selection****:* Pange lingua *(c. 1270)*.] The purpose of plainchant was to uplift the soul by intensifying prayer; thus, the musical rhythms are strictly a function of the words being sung. A strong patterned beat was perceived by the church as

being a function of dance, which was considered to be the devil's playground. Hence, plainchant generally has no perceptible meter.

Although we are not relying on musical notation in this course, we will discuss its evolution and how it works. A true instrumental tradition that made a distinction among solo music, chamber music, and orchestral music, and that saw composers create music specifically for these evolving media did not appear until the Baroque Era during the mid-1600s. To facilitate the reading and notation of the dance meters that lay at the heart of the great bulk of Baroque instrumental music, measures (bars) and bar lines came into regular use during the mid-17th century and, by the late 17th century, were almost universal.

To facilitate the reading and notation of music, measures and bar lines were invented and, by the late 17th century, were universally employed.

A measure or bar is a notational device for indicating one metric unit of music. If, for example, a piece of music is in triple meter, every metric unit of three beats equals one measure; one measure in triple meter is three beats. [***Piano example****: four groups of triple meter, four measures long*.] Bar lines are notational devices: two vertical lines that enclose a measure—that is, one metric unit.

A time signature is a notational device that indicates the meter. Time signatures look like fractions. The top number indicates the meter (how many beats there are in each metric unit or measure). The bottom number indicates what sort of note gets one beat. If the top number is a 3, the music is in triple meter. If the top number is a 2 or a 4, the music is in duple meter. ■

Meter, Part 2

Lecture 6

What we will discover is that those accents don't quite line up with the march beat; they will be either slightly ahead or behind, and the rhythmic tension created by these two different rhythmic layers is the essence of what ragtime is all about. It's also, my friends, the essence of what jazz is all about.

In music of the Common Practice Period (c. 1600–1900), the meter of a particular movement tends to stay the same from the beginning to the end. In the 20th century, changing meter became common and remains so. A syncopation is an accent where we do not expect an accent. Because we expect accents on downbeats, syncopations are accents on beats other than the downbeat or even in between beats.

Syncopation can take two forms: It can be an accent or series of unpatterned accents at moments other than the downbeat, used to create a sense of rhythmic interest, ambiguity, and tension; or a pattern of syncopations might be employed to momentarily change the meter during a given passage of music. In the minuet from his String Quartet, op. 18, Beethoven accents the third beat instead of the first beat to create musical excitement in what was, for Beethoven, an increasingly obsolescent musical genre, namely, the minuet. [***Musical selection****: Ludwig van Beethoven, String Quartet no. 4 in C Minor, op. 18 (1799), movement 3, opening*.]

Ragtime is a synthesis of vastly different elements, some of western European origin and some of West African origin. In ragtime, the complex multiple rhythmic layers of West African drumming are transferred to the piano, with a march-like, on-the-beat left hand of the pianist supporting an off-the-beat, syncopated right hand layered atop. An excerpt from a Joplin rag illustrates syncopation used as an accent or series of unpatterned accents on moments other than the downbeat. [***Musical selection****: Scott Joplin,* Maple Leaf Rag *(1899), opening*.]

Syncopation can also effect a temporary change of meter. A pattern of syncopations, called a *hemiola*, gives the impression of a change of meter from triple to duple meter. [***Musical selection****: Ludwig van Beethoven, Symphony no. 3 in Eb Major, op. 55 (*Eroica*, 1803), movement 1, opening*.] This rhythmic ambiguity returns with a vengeance at the climactic moment of the movement. This is as brutal as Beethoven's musical language will allow him to be, and even today, this passage shocks. [***Musical selection****: Ludwig van Beethoven, Symphony no. 3 in Eb major, op. 55 (*Eroica*, 1803), movement 1, development*.] Beethoven was one of the most rhythmically inventive composers who ever lived. He isolated and manipulated rhythm in a way that was unique in his time. Indeed, his rhythmic audacity is very much of the 21st century.

Beethoven was one of the most rhythmically inventive composers who ever lived. He isolated and manipulated rhythm in a way that was unique in his time.

A compound meter is any meter that features a triple subdivision within each beat. When the beats grouped in threes are too fast to be considered the primary beats, we hear each three-note grouping as a single beat. A meter in which the primary beats are subdivided into very fast groups of three is called a compound meter because it is a composite of two different rhythmic levels: a primary beat subdivided into a fast group of three. The particular meter that we hear in Brahms's trio is called compound duple meter because the primary beat is in duple. [***Musical selection****: Johannes Brahms, Trio in Eb Major for Violin, Piano and Horn, op. 40 (1865), movement 4, opening*.]

Bach's *Brandenburg* Concerto no. 6 offers another example of compound duple meter. [***Musical selection****: Johann Sebastian Bach,* Brandenburg *Concerto no. 6 in Bb Major, BWV 1051 (c. 1721).*] The time signature for compound duple meter is usually 6 over 8 (6/8 time), meaning that there are two fast groups of three or six eighth notes in every metric unit. We listen to another example of compound duple meter. [***Musical selection****: Ludwig van Beethoven, Symphony no. 7 in A Major, op. 92 (1812), movement 1, theme 1*.] There is also such a meter as compound triple. [***Musical selection****:*

Johann Sebastian Bach, Two-Part Invention no. 10 in G Major, BWV 781 (1723), opening.]

By definition, any meter perceived as being a compound meter will be fast in tempo. [***Piano example**: Johann Sebastian Bach, Two-Part Invention no. 10 in G Major, BWV 781 (1723), opening*.] We perceive this as a compound meter because the triplet subdivisions of the beat are too fast to feel as the primary beats. But if we play fast compound triple meter slowly enough, one measure will eventually sound like three measures of regular triple meter. [***Piano examples**: Johann Sebastian Bach, Two-Part Invention no. 10 in G Major, BWV 781 (1723), opening, played fast and compared with a slower tempo*.] Thus, to be properly perceived as being compound, the tempo must be fast enough that the triplet subdivisions will be perceived as subdivisions and not as primary beats.



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John Philip Sousa.

Conversely, if a composer assigns a time signature of three-quarter time, then marks the movement *molto vivace* ("very lively" or "very fast"), we will not perceive it as being triple meter. [***Musical selection**: Ludwig van Beethoven, Symphony no. 9 in D Minor, op. 125 (1824), movement 2, opening*.] In fact, conductors do not conduct this movement in "three" but in "one." There is no special term for a meter like this; there is no such term as "compound single"! It's simply fast triple meter, conducted as if it were one beat subdivided into a fast triplet.

Additive meter is some combination of twos and threes. The following excerpt is an example of a meter of five beats arrayed as a three plus a two. [***Musical selection**: Peter Ilyich Tchaikovsky, Symphony no. 6 in B Minor,*

op. 74 (1893), movement 2, opening (repeated).] This movement has been called the "Five-Legged Waltz"; it sounds like a waltz and feels like a waltz, but it is missing a beat every other measure. Additive meter is common in eastern European folk traditions, but until the 20th century, it was virtually unheard of in western European music.

Modest Mussorgsky begins his *Pictures at an Exhibition* of 1874 with a movement entitled "Promenade." It starts with a fanfare consisting of four metric units of 11 beats each, spelled out in the score as a 5 plus a 6. [***Musical selection**: Modest Mussorgsky,* Pictures at an Exhibition *(1874), "Promenade," opening*.] About halfway through the piece, the additive meter that characterized the first "Promenade" goes into hyperdrive as Mussorgsky mixes and matches many different meters. This "Promenade" begins like the first one, with four units of 11, each spelled out as a 5 plus a 6, but it continues differently: 11 + 11+ 11+ 11+ 6 + 6 + 11 + 6 + 11 + 6 + 6 + 7 + 7 + 11 + 11 + 11. [***Musical selection**: Modest Mussorgsky,* Pictures at an Exhibition *(1874), "Promenade."*] Mussorgsky's score indicates that the music should be played "in Russian style." This refers to rhythmic asymmetry that is characteristic of the Russian language and Russian folk music.

Igor Stravinsky's *The Rite of Spring* (1912) offers a supreme example of metric asymmetry. The conclusion of an episode entitled "The Game of the Abduction" calls for these different meters: 3 + 5 + 5 + 3 + 4 + 5 + 6 + 5 + 2 + 6 + 6 + 6 + 6 + 2 + 6 + 4 + 6 + 6 + 4 + 6 + 6 + 6 + 4 + 2. [***Musical selection**: Igor Stravinsky,* The Rite of Spring*, "The Game of the Abduction" (repeated)*.]

Additive meter should be not confused with metric asymmetry. Unlike additive meter, metric asymmetry (as in *The Rite of Spring*) exhibits no regularly repeated metric pattern. In the 20th and 21st centuries, asymmetrical meter became part of the common syntax of composed music. In the 20th century, Dave Brubeck and Paul Desmond created a body of music employing additive meter. Paul Desmond's famous *Take Five* employs a meter of five beats, with the beats arrayed as a three plus two.

Dave Brubeck's *Blue Rondo à la Turk* of 1959 is neither a rondo nor very "blue" (as in blues-like); Brubeck claimed that the additive rhythms he used in the piece were inspired by folk music he heard on tour in Turkey. The theme is set in nine beats, subdivided in two different ways. [***Demonstration****: | | 1–2 | 1–2 | 1– 2 | 1–2–3 | | (repeated).* ***Piano example****: metric pattern as above*.] Every fourth measure (every fourth metric unit), Brubeck changes the way he subdivides the nine beats, going from | | 1–2 | 1–2 | 1–2 | 1–2–3 | | to | | 1– 2–3 | 1–2–3 | 1–2–3 | |. [***Demonstration of meter****, followed by m***usical selection***: Dave Brubeck,* Blue Rondo à la Turk *(1959), opening*.] Because the piece is played fast, Brubeck's groups of two can be felt as a single "short" beat and the groups of three as a single "long" beat. [***Demonstration of meter***.]

Brubeck saves his best rhythmic trick for last. At almost two minutes into the piece, the music begins alternating back and forth between | 1–2 | 1–2 | 1–2 | 1–2 | 1–2–3 | and straight, swinging duple meter in which the beats are the same length as the "long" | 1–2–3 |. [***Demonstration****: | | 1–2 | 1–2 | 1–2 | 1–2–3 | | (repeated 3 times); | | 1–2–3* **|** *1–2–3* **|** *1–2–3* **| | ;** *| | 1–2–3–4* **|** *1–2–3–4* **| |]** After alternating back and forth four times, the meter finally settles into a duple groove, and the musicians proceed to take their solos. [***Musical selection****: Dave Brubeck, Blue Rondo à la Turk (1959), opening*.] ■

Credits: "Blue Rondo a la Turk" By Dave Brubeck. Performed By the Dave Brubeck Quartet. Used by Arrangement with Derry Music Company.

Pitch and Mode, Part 1

Lecture 7

Although different cultures employ different pitch collections in their music, Western music currently uses a 12-pitch collection.

What we perceive as sound is the product of a concussion wave: tiny changes in air pressure. For example, the depression of the key that plays the pitch C on a piano begins a process that will make the piano's soundboard vibrate. [***Piano example***.] Air molecules oscillate in sympathy with the vibrating soundboard, sending out a concussion wave as the air pressure fluctuates. The concussion wave causes the thin membrane of the eardrum to vibrate, starting a process in which the vibrations are eventually converted into electric impulses that our brains interpret as a specific sound coming from a specific direction.

In musical terms, *noise* can be defined as too much sonic information for the brain to interpret as a singable pitch.

In musical terms, *noise* can be defined as too much sonic information for the brain to interpret as a singable pitch. A single piano key, when depressed, produces a discrete pitch. [***Piano examples****: pitch of C and C-major chord*.] But there is a threshold past which our ear cannot single out individual discrete pitches. [***Piano example****: cluster of pitches (noise)*.] The most extreme example of noise is white noise or static: a sound made up of all or nearly all audible sounds.

Non-pitched percussion instruments produce "noise" sounds that, unlike white noise, have attributes of timbre and register. We can tell the difference between a drum and a cymbal, for example. [***Musical selection****: Robert Greenberg,* It Don't Mean a Thing *(1989)*.]

Some sounds exhibit a single fundamental frequency, a discrete sound, one that we can comfortably sing. When, for example, piano strings vibrate, the most important vibration is on the string's full length. [***Piano example****:*

concert A plucked on piano string.] If our piano is in tune, the just-plucked string will vibrate back and forth on its full length 440 times a second. In other words, that string's fundamental frequency is 440 times per second. [***Piano example****: concert A*.] When we hear a sound we can sing, we are singing along with the discrete sound's fundamental frequency. [***Piano example****: concert A*.]

A *pitch* is a discrete sound characterized by a fundamental frequency with the attribute of timbre. When piano strings vibrate, they produce secondary vibrations that give off sounds that are higher than the fundamental frequency because they are produced by smaller increments of the string. These higher sounds are called overtones, or harmonics, and their number and intensity goes a long way to determining the timbre of a given instrument (or voice). [***Piano example****: pitch of concert A*.] The timbre of that A will vary tremendously depending on what instrument is playing it. The timbral difference is largely a product of an instrument's overtone signature, which is, in turn, a product of the size of the instrument, what it is made of, how it is played, and numerous other variables.

A *note* is a discrete sound with the attributes of timbre and duration; it is a pitch that has been notated. Pitches are notated on a five-line graph (called a staff). The higher the note head representing the pitch is placed on the staff, the higher it sounds. The duration of such pitches (how long they are held, or sustained) is indicated by hollow note heads or solid note heads and by adding various stems and flags to the note head. The general rule of thumb is that the more "stuff" attached to a note, the shorter its duration. It is incorrect to say, "I am going to play a *note* on the piano," unless that pitch has been notated and given duration.

The A above middle C is a very special pitch called concert A. This is the pitch to which Western orchestral players tune their instruments before a performance. By the early 19th century, concert A hovered around a fundamental frequency of 430. Modern instruments are tuned to A = 440. The difference between these frequencies is discernable in the following comparison. [***Musical selection****: Ludwig van Beethoven, Symphony no. 3 in Eb Major, op. 55 (1803), movement 1, opening (period instruments pitched*

at A = 430; same piece of music repeated with a modern orchestra pitched at A = 440).]

In 1885, an international conference in Vienna recommended universal adoption of an 1859 French recommendation that A should be pitched at a fundamental frequency of 435 cycles per second. This remained the most widely used pitch standard until the universal adoption of A = 440 in the 20th century.

Western pitch collections of the last 400 years represent a balance between melody and harmony: a reconciliation of melodic structures and harmonic structures based on the overtone series. Since approximately 1600, Western music has overwhelmingly relied on three particular pitch collections: major, minor, and chromatic.

The term "melody" describes any succession of pitches. The term "harmony" describes the sound and relationship between pitches heard simultaneously. The term "scale" implies a stepwise ordering of pitches, climbing up or down. As such, "scale" cannot be properly used to address a group of pitches in which no ordering is implied. The proper term to describe a group of pitches arrayed around a single tonal center (or tonic pitch) is "collection."

Different cultures have invented and employed different pitch collections. Traditional Japanese music uses a 5-pitch collection. Western music currently uses a 12-pitch collection. Some Arab music uses a 17-pitch collection. The American composer Harry Partch created a 43-pitch collection. What all these pitch collections have in common is the primacy of the interval of the octave. An "interval" is the relationship between any two pitches, and the interval of an octave is acknowledged as the essential building block of any pitch system. [***Piano examples****: two Cs an octave apart, demonstrating consonance (repeated); C and Db, demonstrating dissonance*.]

The ancient Greek philosopher and arithmetician Pythagoras experimented with numerical ratios in relation to sound. When he plucked a string, he discovered that the 1:1 ratio produces a unison and, therefore, consonant sound. [***Piano example****: low C (repeated)*.] When he divided the same

string in half, the plucked sound—a 2:1 ratio—produces a consonant sound. [***Piano examples****: low C and C one octave higher*.] Pythagoras realized that the simpler the numerical ratios between vibrating bodies, the more blended and consonant the sounds created by those vibrating bodies. Pythagoras's discovery had profound meaning for him and his fellow Greeks, who came to view music as the sonic manifestation of cosmic order. ■

Pitch and Mode, Part 2

Lecture 8

The interval of an octave—the distance of eight white keys on the piano—is the most basic interval in our universe, a sonic manifestation of a 2:1 ratio.

Pythagoras became aware of the paradox that pitches an octave apart represent: They blend together so profoundly that they do not sound like two different pitches so much as the same pitch. [***Piano examples****: C below middle C and middle C*.] If each successive octave were divided into an entirely different set of pitches, cacophony would result. [***Piano examples***.] Virtually every musical culture on this planet has chosen to divide the octave into a single set of pitches that is then duplicated above and below in higher and lower octaves. [***Piano examples****: Patty and Mildred Hill,* Happy Birthday *in octaves; C scale played an octave higher and an octave lower*.]

When the word "octave" was coined, the Western pitch system consisted of seven different pitches (the white keys on the piano). The word thus represented the eight pitches from any one pitch to its duplicate above or below. The "chromatic collection" is a pitch collection that represents all the pitches on a modern keyboard. It divides the octave into 12 equal segments. [***Piano example****: chromatic scale*.] The distance between the adjacent pitches is called a semitone, or half step. In Germanic-language cultures, alphabetical letters are used to identify the pitches. In Romance-language cultures, the pitches are identified by *solfège* syllables. [***Piano example****: C-major scale denoted as do-re-me-fa-so-la-ti-do*.]

On the keyboard, the black keys lying between the white ones are collectively known and notated as "accidentals," either sharps (symbol #) or flats (symbol b), depending on the key. The black key immediately to the upper right of any white key is called the sharp of that white key. For example, the black key immediately above C is called C-sharp. The black key immediately below any white key is called the flat of that white key. There is some ambiguity

here because a sharp and a flat are the same key on the piano. For example, C-sharp and D-flat are the same key and sound the same pitch when played. Such pitches are called enharmonic tones; they sound the same but will be spelled as one pitch or the other, depending on whether the key uses sharps or flats. (We will discuss key signatures in Lecture 10.)

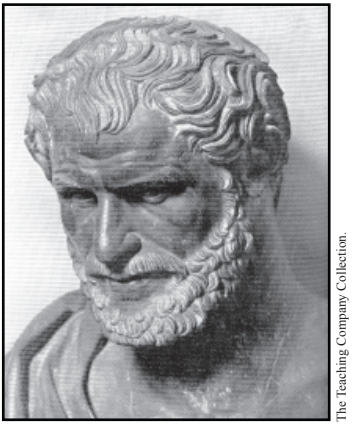
Very little Western music uses all 12 pitches of the chromatic collection all the time, and that music dates from about 1910. For thousands of years, Western music was characterized by pitch collections consisting of seven different pitches. These seven-pitch collections include the major and minor collections and the so-called church modes. A seven-pitch collection is called a diatonic collection. The Greek word "diatonic" means "proceeding by whole tones." The intervallic content of adjacent pitches in a diatonic collection consists of five whole tones (one whole tone = two semitones) and two semitones. [***Piano example**: C-major scale as an example of a diatonic collection*.] The first pitch of a particular diatonic collection is called the tonic pitch. For example, in C major, C is the tonic. The chromatic collection divides the octave into 12 different pitches; each adjacent pitch is a semitone, or half step, apart. The C-major collection comprises the white keys on a piano, from C to C (five whole tones and two semitones).

For thousands of years, Western culture divided the octave into seven different pitches.

The term "mode" also refers to diatonic collections. As we understand them today, there are seven different modes (seven different diatonic collections). Each one starts and ends on one of the seven pitches that are played by the seven white keys on the piano. The Ionian mode, better known as the major scale, encompasses the white keys on the piano from a C to a C. The intervallic profile of the Ionian mode/major scale is whole tone–whole tone–semitone–whole tone–whole tone–whole tone–semitone. Whole tones are symbolized with the letter *T* and semitones are symbolized with the letter *S*. Thus, the major scale can be symbolized as: T–T–S| T–T–T–S. [***Piano example**: C-major scale*.]

Much of the repertoire of plainchant is set in Dorian mode. It encompasses the white keys on the piano from a D to a D and has an intervallic profile of whole tone–semitone–whole tone–whole tone–whole tone–semitone–whole tone (T–S–T | T–T–S–T). [***Musical selection**: Thomas of Celano,* Dies irae *(*Day of Wrath*, c. 1125)*.] The dark, somber sound of Dorian mode is largely due to the minor third—the distance of three semitones—between the tonic and third degree of the collection.

The Phrygian mode encompasses the white keys on the piano from an E to an E. It has an intervallic profile of semitone–whole tone–whole tone–whole tone–semitone–whole tone–whole tone (S–T–T | T–S–T–T). The Phrygian mode has a stereotypically Spanish sound, produced by the semitone between the tonic and the second scale-degree of the mode and the whole tone between the tonic and the seventh scale-degree of the ode. [***Piano examples***.]



The Teaching Company Collection.

Aristotle.

The Lydian mode encompasses the white keys on the piano from an F to an F. The Lydian mode is a bright and brilliant collection with an intervallic profile of whole tone–whole tone–whole tone–semitone–whole tone–whole tone–semitone (T–T–T | S–T–T–S). Its brightness is largely due to the major third (a distance of four semitones) between the tonic and the third degree of the collection. [***Piano example**: Lydian mode*.] It is of limited use in music because of its raised or augmented fourth (a tritone) between its tonic and fourth degree.

The Mixolydian mode encompasses the white keys on the piano from a G to a G. This is another bright mode as a result of the major third between the tonic and third degree of the collection. Its intervallic profile is whole tone–whole tone–semitone–whole tone–whole tone–semitone–whole tone (T–T–S | T–T–S–T). [***Piano example**: Mixolydian mode*.]

The Aeolian mode encompasses the white keys on the piano from an A to an A. Like the Dorian mode, it is dark and somber in character, with a minor third between its tonic and third degree. Its intervallic profile is whole tone–semitone–whole tone–whole tone–semitone–whole tone–whole tone (T–S–T | T–S–T–T). The Aeolian mode, along with the Ionian mode (the major collection), is the most familiar diatonic collection to modern listeners. We know it as the minor collection or minor mode. [***Piano example**: Aeolian mode. **Musical selection**: Ludwig van Beethoven, Symphony no. 3 in Eb Major, op. 55 (1803), movement 2, opening*.]

The Locrian mode encompasses the white keys on the piano from a B to a B. Its intervallic profile is semitone–whole tone–whole tone–semitone–whole tone–whole tone–whole tone (S–T–T | S–T–T–T). Because of the diminished fifth (tritone) that lies between the tonic and the fifth degree of the mode, the Locrian mode is more a theoretical construct than of genuine musical use. [***Piano example**: Locrian mode*.]

The seven diatonic collections or modes together constitute the backbone of pitch material in Western music from the ancient world through the early to mid-20th century. Listen to them all again, back-to-back. [***Piano examples**: Ionian, Dorian, Phrygian, Lydian, Mixolydian, Aeolian, and Locrian modes*.] By the 1600s, the number of modes in common use had been reduced to two: Ionian and Aeolian, which came to be known, respectively, as major and minor.

More than any other factor, it is the third scale-degree of each of these modes that determines its relative brightness or darkness. The third degree of an Ionian mode is four semitones above the tonic, or first pitch. [***Piano example**: four semitones*.] The third degree of the Aeolian mode is located three semitones above the tonic pitch. [***Piano example**: three semitones*.] Borrowing from Latin nomenclature, where "major" means "larger" and "minor" means "smaller," the thirds that are four semitones in width are called major thirds and the thirds that are three semitones in width are called minor thirds. If the third degree of the mode is a major third (four semitones), the mode will have a brighter color. If the third degree of the mode is a minor third (three semitones), the mode will have a darker color. ■

Intervals and Tunings

Lecture 9

Western pitch collections of the last 400-plus years represent a balance between melody and harmony: a reconciliation of melodic structures and harmonic structures based on the overtone series.

As we have seen, Pythagoras investigated how increasingly complex numerical ratios yield increasingly complex pitch relationships, or intervals. His investigation concerned what is now known as the "overtone series." Pythagoras built a monochord, which for demonstration purposes can be a low key on the piano. [***Piano example****: low C*.] He found that a 1:1 ratio is the same sound, a unison. [***Piano example****: low C*.] He also found that when a monochord is divided into two halves, the pitch produced by plucking half the string is one octave higher than that produced by plucking the entire string. [***Piano example***.] The octave is thus named because when the term was created, the octave was divided into the seven-pitch diatonic collections that duplicated themselves above or below on the eighth pitch. Pythagoras's investigation into sound contributed mightily toward his own developing worldview that the universe and everything in it was expressible and explicable through numbers.

Pythagoras continued to divide his monochord. He next divided it into thirds, a 3:2 ratio. [***Piano examples****: C–G (played "melodically," or consecutively) and C/G (played "harmonically," or simultaneously)*.] The 3:2 ratio produces an interval of a fifth. The second pitch of this interval, which is created by plucking one-third of the string, lies five diatonic scale-steps above the pitch created by plucking half the string. [***Piano examples****: interval of a fifth*.] When Pythagoras divided the monochord into quarters and compared the sound created by one-third of the string (G above middle C) to that produced by one-quarter of the string (C^1), which is a 4:3 ratio, he found it produced an interval of a fourth. [***Piano examples****: G–C and C/G*.] These two pitches span four diatonic scale-steps.

Pythagoras was so taken with the primal power of the first three intervals he had "discovered" that he deemed them "perfect intervals," meaning prime or essential intervals. In order of increasing numerical complexity, they are octave, fifth, and fourth. These are the names given to these intervals in the 14th and 15th centuries. The Greek term for the octave is *diapason* ("through all the tones"); the Greek term for the fifth is *diapente* ("through five tones"); and the Greek term for the fourth is *diatesaron* ("through four tones").

Around the tonal center (the tonic), there is a hierarchy of the other six pitches in a diatonic collection. The perfect intervals come first in this hierarchy. The pitch a perfect fifth above the tonic pitch is the second most important pitch in any diatonic collection. In any diatonic collection, the fifth scale-degree is called the dominant pitch. The chords built atop the tonic and the dominant pitches are the essential harmonies in any diatonic collection, because the tension between them defines the tonic. The chord build atop the dominant creates tension. [***Piano example***.]

The pitch a perfect fourth above the tonic pitch, representing a 4:3 ratio, is the next most important pitch in a diatonic collection. In any diatonic collection, the fourth scale-degree (the pitch a fourth above the tonic) is called the subdominant. The harmonies that mark the ending of phrases, sections, or movements in tonal music are called cadences. In these cadences, the chord (or harmony) built atop the subdominant pitch almost always precedes the dominant chord, which then almost always resolves to the tonic chord. [***Piano examples****: subdominant, dominant, and tonic progression*.] Such a progression is represented as IV–V–I. (In C major, it would be a sequence of chords built atop F, G, and I.) [***Piano example***.] This familiar harmonic progression is the defining tonal element of any diatonic collection.

The Lydian mode is of limited use and the Locrian mode is of almost no use in tonal music. The Lydian mode encompasses the white keys of a piano from F to F. [***Piano example****: Lydian mode*.] The Lydian is a bright-sounding mode with a major third between its tonic pitch and its third scale-degree. But it has a flaw that renders it only marginally useful in traditional tonal music: From its tonic pitch upward to its subdominant pitch (I–IV) is not a perfect fourth but rather an interval one semitone wider, called an augmented

fourth, which happens to be a tritone. [***Piano examples**: augmented fourth, also known as a tritone*.] The tritone is an extremely dissonant interval that needs to resolve. [***Piano example**: tritone and resolution*.]

The perfect fourth provides stability. [***Piano example**: perfect fourth compared with tritone*.] The perfect fourth is a sonic manifestation of a 4:3 ratio. An augmented fourth (tritone) is a manifestation of a 45:32 ratio. The interval of the augmented fourth or tritone derives its name from the fact that it spans three whole tones (six semitones).

The Locrian mode is even less useful than the Lydian mode for similar reasons. The dark-sounding Locrian mode encompasses the white keys on the piano from a B to a B. [***Piano example**: Locrian mode*.] In the Locrian mode, the interval from its tonic pitch upward to its dominant pitch (I–V) is not a perfect fifth but rather an interval of one semitone narrower. This interval is called a diminished fifth, which also happens to be a tritone. [***Piano examples**: perfect fourth, diminished fifth*.] This extremely dissonant interval of the diminished fifth (a tritone) needs to resolve. [***Piano example**: tritone and resolution*.] What should be the most stable and important relationship in any diatonic collection—the tonic pitch and the dominant pitch a perfect fifth above it—is rendered unstable in a diminished fifth. Thus, the diminished fifth (a tritone) between I and V in a Locrian mode renders the collection de facto useless in tonal music.

Pythagoras marveled that in all the modes, except the Lydian and Locrian, the dominant and subdominant pitches bisected the diatonic collections into two perfect tetrachords: two equal groupings of four pitches. As an example of a tetrachord, we will use the Aeolian mode from an A to an A—an A-minor collection. From the tonic pitch A to the subdominant pitch D is a distance of a perfect fourth that encompasses within it four pitches: a tetrachord. [***Piano example**: A–B–C–D*.] From the dominant pitch E back to the tonic pitch A is also an interval of a perfect fourth that also encompasses within it four pitches: a tetrachord. [***Piano example**: E–F–G–A*.]

The diatonic modes also consist of two interlocking, or conjunct, tetrachords: in an A minor collection, A–B–C–D = perfect fourth and D–E–F–G = perfect

fourth. These interlocking or conjunct tetrachords together add up to seven pitches, a unit the ancient Greeks called a heptachord: a seven-pitch entity, meaning a diatonic collection.

Most music cultures are instinctively drawn to perfect intervals (octave, fifth, and fourth). Because those elements are most easily perceived and remembered, they became the basic building blocks of the Western musical language. Pythagoras and his followers, along with other ancient Greek music theorists, did their best to come up with a rational explanation for musical practice as it existed at their time. When gathered, summarized, and transmitted to Western Europe during the early Middle Ages, the process of investigation and codification of the ancient Greek music theorists became the basis for tuning systems as they exist to this day.

The process of investigation and codification of the ancient Greek music theorists became the basis for tuning systems as they exist to this day.

Unisons and octaves are not enough by themselves to create a complete musical experience. [***Piano examples****: unisons and octaves*.] A perfect fifth, unlike an octave, does not duplicate itself upward and downward. Instead, a new pitch is produced. [***Piano examples****: F–C–G–D*.] An ascending sequence of six perfect fifths (F–C–G–D–A–E–B), when placed within the span of an octave, produces all the white keys on the piano. [***Piano example***.] These are all the pitches necessary to construct the seven diatonic modes. This is known as the *Pythagorean collection*, the basis of Western musical language during the Middle Ages. The tuning system that creates the Pythagorean collection is called just intonation.

The system of diatonic modes made possible by the Pythagorean collection and just intonation served Western music well until the expressive revolution of the 14th and 15th centuries. In a Pythagorean collection, there is only one major collection—the Ionian mode—and one minor collection—the Aeolian mode. During the 14th and 15th centuries, the pitch resources available to Western music were expanded. Initially, this took the form of raising

("sharpening") or lowering ("flattening") certain pitches of a mode to avoid a particular dissonance, or to make a melody smoother, or simply for the sake of beauty. Ultimately, these incidental modifications of the modes gave way to a wholesale rethinking of Western pitch resources and tuning.

Theorists and aestheticians of the Renaissance and early Baroque Era continued to stack perfect fifths atop each other and made another stunning discovery. After rising through five more pitches, the 13th pitch was the same as the first pitch. Starting on a C, if we rise through successive perfect fifths, we move through a circle of fifths, touching on 12 different pitches before arriving back where we began on a C. [***Piano example**: circle of fifths*.] The five new pitches were added as the black keys on the keyboard. There is, however, a problem with this succession: If we move upward through this circle of perfect fifths (3:2 sonic ratios), when we reach the 13th pitch, we find that it is actually about one-eighth of a tone sharper than the one on which we began. The solution to this problem was to temper or shrink all or some of these fifths so that the 13th pitch would be the same pitch as the first.

One of the first attempts to temper or shrink the fifths created a system called mean-tone tuning, a system dating to about 1500. The result was that some intervals were considerably more in tune than others. Well-tempered tuning came into use during the 17th century. In this system, all of the fifths are tempered almost exactly the same, with the minute differences in the tuning making some keys darker or brighter than others without rendering them as out of tune as mean-tone tuning. By the 1850s, a system called equal temperament had become the standard and remains so to this day. In this system, each of the fifths is tempered to exactly the same degree. Instead of representing a 3:2 ratio, the fifths are two-hundredths of a semitone flat, a condition to which we have become completely accustomed.

The equal-tempered system divides the octave into 12 equal semitones and represents a balance between melody and harmony based on the overtone series. Because it divides the octave into 12 equal divisions (12 semitones), the chromatic collection is what we call a symmetrical collection: It is divisible into equal segments by factors of two, three, four, and six. More importantly, the equal-tempered system allows the building of any diatonic

mode starting on any one of the 12 different pitches. Based on the Ionian (major) and Aeolian (minor) modes, this means 12 different major collections and 12 different minor collections, with each collection beginning on another of the 12 different pitches of the chromatic.

A major collection has an intervallic profile of whole tone–whole tone–semitone–whole tone–whole tone–whole tone–semitone (T–T–S | T–T–T–S) [***Piano example****: C-major scale*.] In theory and in practice, we can build a major collection starting on any pitch of the chromatic, providing we progress by the formula of: T–T–S | T–T–T–S. Thus, a major collection starting on the pitch D would have the pitches: D–E–F#–G–A–B–C#–D. [***Piano examples:*** *analysis of D-major scale*.] Note that the third scale-degree of a D-major collection is F-sharp (F#), not G-flat (Gb), because the third scale-degree of a diatonic collection that starts on a D will have to be some sort of F. The same is true of the C-sharp (C#) of a D-major collection. [***Piano examples****: conclusion of analysis of D-major scale*.]

The 12 different major pitch collections are, in ascending order:

- C major
- Db major
- D major
- Eb major
- E major
- F major
- F# major/Gb major
- G major
- Ab major

- A major
- Bb major
- B major

The matrix of 12 major and 12 minor pitch collections is an extraordinary system, complex enough to challenge the greatest musical minds yet simple enough (with only 12 divisions of the octave) to be accessible and sonically comprehensible to pretty much anyone. ■

Tonality, Key Signature, and the Circle of Fifths

Lecture 10

A sense of tonality can be achieved through melodic implication, harmonic resolution, or assertion.

Most generally defined, the word "tonality" refers to a tendency for a certain pitch and/or a certain harmony to become the gravitational center of a given section of music. That gravitational center is called the tonic (tonal center). The word "key" refers to a specific tonality. The name of any given key specifies two things: first, the tonic pitch in a given section of music, and second, what sort of collection is built atop that pitch. The sort of pitch gravity that we associate with the word "tonality" can be achieved in a number of different ways: as a product of melodic implication, as a harmonic resolution, or via assertion.

Tonality can be a product of melodic implication. The sum total of the relationships within a tonal melody clearly highlights the tonic pitch, which becomes a point of rest and release—the gravitational center of the melody. More often than not, this is made explicitly clear when, at the end of a phrase or section of music, a melody will come to rest on its tonic pitch. [***Musical selection****: Thomas of Celano,* Dies irae *(c. 1225), phrase 1*.]

Tonality can be achieved via harmonic resolution. A harmony, or chord, is the simultaneous sounding of three or more different pitches, and the movement, or progression, from chord to chord constitutes the art of tonal harmony, as we shall discuss in Lectures 14–16.

As discussed in Lecture 9, the two most important pitches in any diatonic collection are the tonic (the first) and dominant (the fifth) pitches. By extension, the two most important chords are those built on the tonic and dominant pitches—tonic (symbolized as I) and dominant (symbolized as V) chords. The tonic chord, in which the tonic pitch is the root of the chord, represents rest and resolution. The dominant chord (the chord of tension), in which the dominant pitch is the root of the chord, represents unrest and

irresolution. There is no surer way to establish an irrefutably powerful sense of tonal gravity than to play the harmonic progression V–I in any given key.

As we saw in Lecture 9, the chromatic collection allows for the creation of 12 different major keys and 12 different minor keys. The following demonstration of V–I progressions illustrates tonality via harmonic resolution. [***Piano examples****: various V–I progressions*.]

Tonality via assertion is when a single pitch is sustained and/or repeated for so long that it becomes, by sheer dint of its assertion, the gravitational center in a given section of music. In the following excerpt, tonal assertion is achieved by a sustained low F. Such a sustained pitch is called a pedal, pedal tone, or pedal point. [***Musical selection****: Johann Sebastian Bach, Toccata and Fugue in F Major for Organ, BWV 540 (c. 1708–1717), Toccata, opening*.] In the next example, a chord is repeated a total of 212 times! [***Musical selection****: Igor Stravinsky, The Rite of Spring (1912), "Dance of the Adolescents," first half*.]

Not all music features such gravitational centers. Many early- and mid-20th-century composers went out of their way to avoid creating any sense of pitch gravity whatsoever. The so-called atonal music that they produced is something of a misnomer because true atonality is, in reality, almost impossible to achieve. There are some great composers of so-called atonal music, including Arnold Schönberg, Anton Webern, Milton Babbitt, Karlheinz Stockhausen, and Pierre Boulez. [***Musical selection****: Milton Babbitt,* Minute Waltz (or) ¾ ± 1/8 *(1977)*.]

The circle of fifths (see appendices), like the 12 hours of a clock, arrays the 12 different pitches of the chromatic collection around a circle. The pitch C is at 12:00. Moving clockwise, each hour represents another upward fifth. Thus, the pitch G is at 1:00, the pitch D is at 2:00, and so on, until we arrive back at C, after having moved through the 12 different pitches of the chromatic collection.

The second circle of fifths chart in the appendix of this booklet adds sharps and flats. We will examine the order of the sharps first. At the top, with the

key of C major, no sharps or flats have been added, indicating that this key uses only the white keys on the keyboard. Moving clockwise, in the "sharp direction," the next pitch is G at 1:00. G has one sharp in its "pie wedge"—an F#, meaning that the key of G major has one sharp. As we continue to move clockwise around the circle, each successive major key gains an additional sharp, so that by the time we reach the key of F# major, there are six sharps. The addition of sharps is cumulative, not random. Moreover, each new sharp is a perfect fifth above the previous sharp. The order of sharps is: F#, C#, G#, D#, A#, E#. Thus, the sharps create a circle of fifths of their own. The degree to which the perfect fifth lies at the heart of Western music is amazing.

The "flat direction" of the circle of fifths runs counterclockwise. A process similar to that of the sharps is in operation here, too. Each successive key in the counterclockwise direction gains an additional flat in a cumulative process, and each flat is a fifth below the previous one.

Major and minor keys may be closely or distantly related.

Major and minor keys may be closely or distantly related. The Ionian mode encompasses the white keys on the keyboard from a C to a C. [***Piano example****: C-major scale*.] The Aeolian mode encompasses the white keys on the keyboard from an A to an A. [***Piano example****: A-natural-minor scale*.] Thus, both C major and A minor have the same key signature: no sharps or flats. The tonic pitch of A minor (A) lies three semitones, or a minor third, below the tonic pitch of C major (C). Major and minor keys that share the same key signature are called relative keys.

The related minor key lies a minor third below the major key. For example, A minor lies a minor third below C major. The third circle of fifths chart (see appendices) adds the minor keys by identifying the keys that share key signatures: C major and A minor, G major and E minor (sharing F#), D major and B minor (sharing F# and C#), and so on.

A key signature is a notational device that tells us which key we are in. It is written across the staff at the beginning of a movement, immediately

before the time signature. Keys that share key signatures are called relative keys. For example, A minor is the relative minor of C major; C major is the relative major of A minor. Relative major and minor keys are those that share the same pitches but have a different tonic, while parallel major and minor keys are those that share the same tonic but have different key signatures. The keys of C major and C minor are an example of parallel major and minor keys.

Any given key has three other keys that are considered as being closely related to it. They are the two like keys that lie on either side of the given key in the circle of fifths and the given key's relative major or minor. Taking C major as an example, the two like keys—the two major keys—on either side of C major in the circle of fifths are G major to the right (sharp side) and F major to the left. (flat side). [***Piano examples**: C-major, G-major, F-major scales*.] C major has six pitches in common with both G major and F major. C major's relative minor, A minor, has virtually the same pitches as C major. [***Piano example**: A-minor scale*.]

The most distantly related keys are those "six hours" apart in the circle of fifths. For example, C major and F# major have only one pitch in common (B); Eb major and A major have only one pitch in common (D). Those most distantly related keys on opposite sides of the circle of fifths have tonic pitches that are the interval of a tritone away from each other. The tritone—an augmented fourth or diminished fifth—is the single most dissonant, least stable interval in the tonal system. Octaves and unisons are as consonant as can be. [***Piano examples**: C–C^{1} (octave) and C–G (perfect fifth)*.] The tritone has six semitones or three whole steps. [***Piano example**: F–B (repeated)*.] The tritone needs to resolve. [***Piano example**: tritone F–B resolving to E–C*.] During the Middle Ages, the tritone was dubbed *diabolus in musica* ("the devil's music"), and its use was prohibited.

The simultaneous use of key areas a tritone apart creates a spectacular effect. Stravinsky's ballet *Petrushka* tells the tale of the magical puppet Petrushka, who has the heart of a man. Stravinsky uses keys a tritone apart to superb effect to project the weirdness of a scene entitled "Chez Petrushka," which describes Petrushka's puppet-like motions, while bitonality of the tritone

also depicts Petrushka's personality. [***Piano example and musical selection****: Igor Stravinsky,* Petrushka *(1911), opening ("Chez Petrushka").*] This use of unresolved tritones was not the common practice of music in the 17th through 19th centuries. [***Piano examples****: consonant chords and tritones*.] ■

Credits: Minute Waltz by Milton Babbitt.

Intervals Revisited and Expanded

Lecture 11

The ancient Greeks defined intervals in terms of the numerical ratio between two vibrating bodies and, indeed … the phenomena of blended and non-blended intervals, of consonance and dissonance is rooted in physical reality: Increasingly complex numerical ratios between vibrating bodies yield increasingly complex intervallic relationships.

In this lecture, we learn how intervals (seconds, thirds, fourths, fifths, sixths, and sevenths) are constructed and how they are modified, as perfect, or minor, or major, or diminished, or augmented intervals. When we identify an interval, we are actually providing two different pieces of information: An interval is identified by both its name or size and its modifier. When identifying the name (size) of an interval, the first pitch counts as "one." For example, counting upward from middle C (one) to the D directly above it is a second. [***Piano example****: C–D (a second)*.] From C to E is a third, and so forth. [***Piano examples****: C–E, etc*.]

Modifiers identify the kinds of seconds, thirds, fourths, and so on. The process requires us to count semitones, starting our count on the first semitone above the starting pitch. (See semitone and keyboard charts in the appendices of this book.) For example, from C to D is some sort of second. From C up to Db is the distance of one semitone. [***Piano example****: C–Db. From C to Db is a minor second—a semitone from C to Db*.]

Like every interval except the tritone, there are 12 different minor seconds possible in an equal-tempered tuning system. We can start on any one of the 12 different pitches of the chromatic and play a minor second on it. [***Piano example****: C–Db/C#, Db/C#–D, D–Eb/D#, Eb/D#–E, etc*.] When we hear music with a lot of semitones in its melodic profile, we often describe that music as being chromatic. For example, the fourth and final movement of Mozart's String Quartet, K. 464, is characterized by three falling minor seconds. [***Piano example****: E–D#–D–C#.* ***Musical selection****: Wolfgang Mozart, String Quartet in A Major, K. 464 (1785), movement 4, opening*.]

One of the oldest musical clichés is a bass line descending in minor seconds, a gesture that has traditionally represented death. [***Piano example****: C–B–Bb–A–Ab–G (repeated)*. ***Musical selection****: Gustav Mahler, Symphony no. 2 in C Minor (*Resurrection*, 1894), movement 1, conclusion*.] From C to Db is the interval of a minor second; from C to D is the interval of a major second, which is also known as a whole tone. [***Piano examples****: minor and major seconds*.]

One of the oldest musical clichés is a bass line descending in minor seconds, a gesture that has traditionally represented death.

There are 12 different major seconds possible in an equal-tempered tuning system. The whole-tone collection divides the octave into six equal segments and a whole-tone scale ascends and descends by major seconds, or whole tones. The whole-tone scale consists of six consecutive major seconds (or whole tones), before returning to the C on which it started. [***Piano example****: C–D–E–F#–G#–A#–C*.] The interval from A# to C is not, technically, a major second, because the distance between an A and a C is some sort of third. [***Piano example****: A#–B–C*.]

A third consisting of only two semitones is called a diminished third. A diminished third, like an augmented octave and other such fringe intervals, is more a notational construct than an aural event. When we actually hear a diminished third [***Piano example****: A#–C*], what we usually perceive is a major second (a whole tone). What is notated on the page does not always correspond to what we actually perceive.

The sound of a whole-tone collection is very exotic. Without any perfect fifths or fourths, it lacks a sense of harmonic urgency. It is a sound that the French composer Claude Debussy was particularly enamored with and used to great effect. [***Musical selection****: Claude Debussy, Preludes, book 1, no. 2 (1910), measures 1–14*.] The jazz pianist Thelonious Monk played whole-tone scales constantly. [***Piano example****: descending whole-tone scale*.]

The pitches of an interval can be heard in succession (a melodic interval) or simultaneously (a harmonic interval), which puts their relationship into high relief. Melodic intervals are only rarely perceived as being either consonant or dissonant. [***Piano example****: B–C, C–B, B–C*.] However, when heard harmonically (simultaneously), both major and minor seconds are perceived as being dissonant. [***Piano examples***.]

Pythagoras divided his monchord into halves, thirds, and quarters, producing sonic manifestations of 1:1, 2:1, 3:2, and 4:3. [***Piano examples****: unison, octave, perfect fifth, and perfect fourth*.] Continuing this process, we next divide the string into fifths. We compare the sound created by one-fifth of the string to that created by one-quarter of the string, thereby creating the sonic equivalent of a 5:4 ratio. [***Piano examples****: C above middle C, E above the previous C (repeated)*.] That is a major third (an interval four semitones in width). Finally, we divide the string into sixths. We compare the sound created by one-sixth of the string to that crated by one-fifth of the string, thereby creating the sonic equivalent of a 6:5 ratio. [***Piano example****: E an interval of a tenth above middle C (one-fifth of the string) and G above the previous E (one-sixth of the string)*.] That is a minor third (an interval three semitones in width).

The first partials or overtones of the overtone or harmonic series, in order of increasing complexity, are unison, octave, perfect fifth, perfect fourth, major third, and minor third. Certain instruments, such as the bugle, are only capable of playing these pitches (a single harmonic series). [***Piano example****:* Taps.] A very famous piece of music begins by outlining, in increasing order of complexity, the first six partials of the harmonic series. [***Piano example****: C below middle C, middle C, G above middle C, C a perfect fourth above that G, a major third above that C (E), and a minor third above that C (Eb).* ***Musical selection****: Richard Strauss,* Also Sprach Zarathustra*, op. 30 (1896), opening*.]

To review: a major third is four semitones in width. [***Piano example****: C–E and C/E*.] A minor third is three semitones in width. [***Piano example****: C–Eb and C/Eb*.] Like major and minor seconds, there are 12 different major thirds and 12 different minor thirds, starting on any one of the 12 different pitches of

the chromatic collection. Unlike major and minor seconds, major and minor thirds are consonant harmonic intervals. [***Piano example**: C/E and C/Eb*.] Perfect fourths (five semitones in width) and perfect fifths (seven semitones in width) do not come in major and minor as the other intervals do.

When perfect intervals are modified, we say that they are either augmented or diminished. Augmented and diminished intervals are not the same thing as major and minor. A major second and a minor second both sound like seconds. [***Piano example**: C/D and C/Db*.] Conversely, an "augmented unison" is not a separate, identifiable interval on its own, because it is the same intervallic distance as a minor second. Thus, we almost always perceive it as a minor second.

A perfect fifth sounds like a perfect fifth. [***Piano example**: C/G*.] Unless it is contained within an extremely unusual harmony called an augmented chord, we do not perceive an augmented fifth as being a separate, identifiable interval on its own. Rather, as it is the same intervallic distance as a minor sixth, we almost always perceive such an interval as a minor sixth. [***Piano example**: augmented fifth (C/G#) and minor sixth (C/Ab)*.] Likewise, a perfect fourth sounds like a perfect fourth. [***Piano example**: G/C*.] But a diminished fourth is the same intervallic distance as a major third. Again, we almost always perceive such an interval as a major third. [***Piano example**: G/Cb (diminished fourth) and G/B (major third)*.]

A diminished fifth and an augmented fourth are both six semitones in width. In reality, this interval sounds neither like a fifth nor like a fourth. It sounds like a tritone. A tritone will be notated either as a diminished fifth or as an augmented fourth, but it is so dissonant and harmonically unstable that it stands alone as an interval unto itself. [***Piano example**: F/B*.]

There are 12 different perfect fourths and fifths possible in a well- or equal-tempered tuning system, but only six different tritones are possible in such tuning systems. A tritone is six semitones in width. Starting with a C, we will see what happens when we build a tritone on each pitch of the chromatic collection. [***Piano examples**: tritone 1: C to F#; tritone 2: C# to G; tritone 3: D to G#; tritone 4: D# to A; tritone 5: E to A#; tritone 6: F to B; tritone*

7: F# up to a C.] This seventh tritone is the same tritone in inversion that we heard when we built the first tritone. Thus, the six tritones built on the remaining six pitches of the chromatic collection duplicate the tritones built on the first six pitches of the chromatic collection. For this reason, only six tritones are possible in the chromatic collection.

Because a tritone divides the octave in half and a tritone stacked on itself adds up to an octave, we do not perceive those two complementary tritones as being different; rather, we perceive them as being the same, just with the pitches reversed. In terms of stability, the octave and tritone are the polar opposites that define the extremes of consonance and dissonance in Western music. [***Piano example****: octave Cs and tritone (C–F#).*] Yet moving from any one pitch up or down by two consecutive tritones—C up to F# and F# up to C, for example—produces an octave.

Any given major key contains only one tritone: the interval between the fourth and seventh scale-degrees. Because there are 12 different major keys and only six different tritones, the tritones are doubled up: The same tritone serves two different major keys. For example, the key of C major shares a tritone with the key of F# major, the key farthest away from C major. Keys a tritone apart will share the same tritone.

A minor sixth is eight semitones in width, for example, from C up to Ab. A major sixth is nine semitones in width, for example, from C to A natural. Both major and minor sixths are considered consonant intervals.

The distance of 10 semitones produces the interval of a minor seventh. [***Piano example****: C–Bb and C/Bb.*] From C to a B natural is the distance of 11 semitones (a major seventh). [***Piano example****: C–B and C/B.*] Sevenths, both major and minor, exhibit no harmonic blend whatsoever and are defined as being dissonant intervals.

Each interval has a complement, another interval that when stacked atop the first adds up to an octave. There are four families of intervals that are defined by their complements. The first complementary intervallic family is the tritone; six semitones plus six semitones equals 12 semitones: an

octave. This intervallic family is perceived as being dissonant. The second complementary intervallic family comprises perfect fourths and fifths. They make an octave when added together. This intervallic family is perceived as being consonant. The third family comprises thirds and sixths. A minor third and a major sixth are complementary intervals. Together, they add up to an octave. A major third and a minor sixth also add up to an octave. This family is perceived as being consonant. The fourth family comprises seconds and sevenths. A minor second and a major seventh add up to an octave, and likewise, a major second and minor seventh add up to an octave. This family is perceived as being dissonant.

Compound intervals are those that are more than an octave in width: ninths, tenths, elevenths, and twelfths. These intervals are called compound because they consist of an octave plus a smaller interval. For example, a ninth is an octave (an eighth) plus a second. A major ninth above a C, for example, is simply the D an octave and a major second above that C. A tenth is an octave plus a third. An eleventh is an octave plus a fourth. A twelfth is an octave plus a fifth. Compound intervals are rarely used outside of jazz harmony and analysis, because the nomenclature is unnecessarily confusing. It is much easier to say "an octave and a minor sixth above a given pitch" than to say "a minor thirteenth above a given pitch." ■

Melody

Lecture 12

Every human culture has created word-based folk music (logogenic music). We are hardwired to sing.

To fully understand melody, we must familiarize ourselves with the hierarchy of pitch, by which a composer can build motives from single pitches and create thematic melodies from motives. The word *melody* is a contraction of two Greek words: *melos* ("song") and *ote* ("words" or "poetic order"). *Melogenic* music is that in which the melodic and verbal aspects are of equal import, as in opera arias and art songs. It was during the Middle Ages that the Latin word *melodia* came into common use and assumed the specifically musical meaning that it retains to this day: "any succession of sounds."

The word *theme* is usually understood to mean the principal melodic idea of a given section or movement of music. A thematic melody, like a thematic idea, is a melodic idea that becomes the essential subject matter of the music being performed. But a theme is often something other than a melody. For example, a theme can be a rhythm. [***Musical selection****: Ludwig van Beethoven, String Quartet in F Major, op. 59, no. 1 (1806), movement 2, opening*.] A theme can be a harmony. [***Musical selection****: Igor Stravinsky,* The Rite of Spring *(1912), "Dance of the Adolescents," opening*.] A theme can be almost anything.

Our melodic investigation will be built around perceiving four different types of thematic melody: word melody, vocal melody, vocally conceived instrumental melody, and instrumental melody. We begin with word melody, in which the actual melody itself is entirely a product of, and secondary to, the words being sung.

One example of word melody is medieval plainchant, which constitutes the single largest body of repertoire in the Western musical tradition. An example of psalm tone or monotone plainchant is the following setting of Psalm 110

(*Dixit dominus domino meo*). The great bulk of this monotone plainchant is set on the pitch of A, the Bb directly above it, and the G directly below it. [***Piano example****: A below middle C, Bb–G–A*.] Rhythmic articulation and change of pitch are strictly a function of the text: Everything in this music grows from and serves the word. [***Musical selection****: Plainchant,* Dixit dominus domino meo *(Psalm 110)*.] The plainchant *Victimae paschali* has a considerably more active melody. Set in Dorian mode, it is one of only five medieval plainchants that have been retained in the liturgy and appear in modern books of chant. Despite its relatively active melodic profile, rhythmic articulation and pitch contour are still strictly a function of the text. [***Musical selection****: Wipo,* Victimae paschali *(c. 1040)*.]

Renaissance vocal music, which accounts for the overwhelming bulk of music created between 1400 and 1600, was preeminently about the word. Early Baroque opera consisted almost entirely of word melody. The Florentines, who invented opera in the last years of the 16th century, believed that they were recreating, in "modern" guise, the theatrical art of the ancient Greeks, an art they believed had been sung or, at least, chanted. Early Florentine operas were called "dramas with music," implying that drama (the word) came first and music second. Jacopo Peri's opera *Euridice*, based on the legend of Orpheus and Eurydice, was first produced in 1600. In the excerpt played here, Orpheus responds to the news that his fiancée, Eurydice, is dead. This passage—and the entire opera—is composed in a style that has come to be known as recitative. It is a sort of speech-song, in which the rhythms of the melody and the rise and fall of the voice are completely tied to the articulation and expressive meaning of the words. [***Musical selection****: Jacopo Peri,* Euridice *(1600)*.]

Historically and spiritually, melody springs from the voice, although the vocal associations of melody transcend purely vocal music. With vocal melody, the words and music approach equal balance. The music intensifies the meaning of the words far beyond the power of the words themselves. As it developed, opera was increasingly not just about the word, but about the feelings beneath and beyond the word.

The 17th century was a great age of opera and experimentation, including the cultivation of a new sort of melody that deepened and crystallized the expressive meaning beneath the words. In terms of its contour, phrase structure, and harmonic structure, this kind of melody can stand alone, without words. Such a melody is what we call a tune. By the mid-17th century, this cultivation of song to a level completely new in European music had led to the invention of the aria: a self-contained composition for solo voice that occurred in a dramatic work, such as an opera, oratorio, or cantata.

The aria became one of the two basic elements of operatic dramaturgy: Recitatives were used to express real-time events (such as dialogue and action), while arias became the operatic equivalent of a theatrical soliloquy, which reveals the inner life and emotions of a character. The music written for these operatic arias created an entirely new, enriched melodic vocabulary. The excerpts exemplify vocal melody in which words and music are of equal import. [***Musical selections**: Stephen Foster,* I Dream of Jeanie with the Light Brown Hair *(1854); Giuseppe Verdi,* Rigoletto *(1851), act 3, "*La donna è mobile.*"*]

A theme can also be a rhythm, or a harmony, or even an expressive state.

The great tradition of instrumental music as we know it today began to flower only during the Baroque Era (17th century). Paradoxically, it was the invention of opera that led to the explosion of instrumental music during the late 17th century because the dramatic situations portrayed on the opera stage forced composers to experiment with musical materials that could, on their own, create expressive states. Opera laid the foundation for the evolution of instrumental music by significantly expanding the expressive, melodic, and harmonic vocabulary available to composers.

The great bulk of instrumental melody composed to around 1900 continued to betray its vocal ancestry. By definition, a vocally conceived instrumental melody is one that displays a melodic quality called lyricism, a word directly associated with the lyre. Not all vocally conceived instrumental melodies can actually be sung, but they are all characterized by a rise and fall of phrase and a sense of breathing, as in the example of Italianate lyricism from

Bach. [***Musical selection**: Johann Sebastian Bach, Orchestral Suite no. 3 in D Major, BWV 1068 (1731), movement 2*.]



Library of Congress, Music Division, LC-USZ62-87246.

Wolfgang Amadeus Mozart.

Wolfgang Mozart (1756–1791) was almost unfailingly lyric in his conception of melody. Listen to a vocal interpretation of a piano sonata by Mozart. [***Musical selection**: Wolfgang Mozart, Piano Sonata in A Major, K. 331 (1781–1783), movement 3*.] No one ever made the piano sing better than the great Polish composer Frédéric Chopin (1810–1849). [***Musical selection**: Frédéric Chopin, Impromptu no. 4 in C# Minor, op. 66 (1835)*.] Peter Ilyich Tchaikovsky (1840–1893) composed overtly lyric music. In our excerpt, the solo violin is treated as a prima donna. [***Musical selection**: Peter Ilyich Tchaikovsky, Violin Concerto in D Major, op. 35 (1878), movement 1, theme 1*.]

To properly discuss instrumental melody, we need to build a vocabulary that we can apply to the melodies we have examined and will use to address the instrumental melodies that we will examine in Lecture 13. The building blocks of most thematic melodies are compact melodic ideas called motives: a brief succession of notes out of which a larger melody grows through the processes of repetition, sequence, and transformation. Motives constitute the skeletal underpinning of most thematic melodies, and repetition, transformation, and sequence together make up the syntax of motivic manipulation. The next excerpt provides an example of this syntax. [***Musical selection**: Ludwig van Beethoven, Symphony no. 5 in C Minor, op. 67 (1808), movement 1, theme 1*.] Beethoven's motive consists of four notes: three fast, repeated notes, followed by a longer note a third below. [***Piano example**: G–G–G–Eb (repeated)*.] Beethoven did not choose to merely repeat this

motive but, rather, to sequence it downward. [***Piano example**: G–G–G–Eb | F–F–F–D*.]

The second version of the motive is called a sequence because it repeats the original motive on different pitches. As the theme proceeds, Beethoven continues to sequence the motive. [***Piano example**: Ludwig van Beethoven, Symphony no. 5 in C Minor, op. 67, movement 1, measures 6–13*.] Then he slightly alters the motive. [***Piano example**: Ludwig van Beethoven, Symphony no. 5 in C Minor, op. 67, movement 1, measures 14–21*.] Beethoven continues to sequence and slightly alter the motive for the remainder of the theme. [***Musical selection**: Ludwig van Beethoven, Symphony no. 5 in C Minor, op. 67 (1808), movement 1, theme 1*.]

A hierarchy of pitch from the single pitch to the full-blown thematic melody begins at the lowest level with what amounts to a sonic subatomic particle: a single pitch. That pitch is imbued with timbre and duration, creating a sonic atom: a note. A small number of notes are clumped together to create a musical molecule: a motive. Motives are repeated, sequenced, and metamorphosed to create a melody. ■

Melody, Continued

Lecture 13

Devoid of its words, does this music, does [“*La donna è mobile*”] make sense unto itself, divorced from its words? … What, are you kidding? It’s only one of the most memorable melodies of all time! Which rightly begs the question: Why? … One, the clarity of its small-scale and large-scale phrase structure. … Two: … its crystal clear motivic usage, which gives it substance and meaning above and beyond its words.

We now examine word melodies, vocal melodies, and vocally conceived instrumental melodies in terms of the degree to which they are characterized by motivic usage. Word melody tends, by definition, not to feature a clear and consistent motivic profile. [***Musical selection****: Jacopo Peri,* Euridice *(1600), Orpheus’s response*.] The melodic material by itself does not feature the sorts of structural elements that would make it memorable on its own: motives, motivic repetition, sequence, and transformation. Typical of word melodies, Orpheus’s response is “through composed”: It changes as it goes, dependent, entirely, on its words to give it meaning and substance.

Vocal melody, on the other hand, does make sense unto itself. [***Musical selection****: Giuseppe Verdi,* Rigoletto *(1851), act 3, “*La donna è mobile*.”*] Verdi’s vocal melody is memorable—stands alone—partly because its small-scale, even phrases imbue it with crystalline clarity and those small-scale phrases clump together to make four large-scale phrases, creating an A–A–B–C structure. [***Piano examples****: Giuseppe Verdi, “*La donna è mobile*,” motive, four short and four large phrases*.] Its crystal-clear motivic usage contributes mightily to this melody’s memorability.

Verdi’s basic motive is six notes in length and consists of three repeated notes, followed by an upward leap, followed by a downward step, followed by a downward leap. [***Piano examples****: Giuseppe Verdi, “*La donna è mobile*,” motivic segments and entire motive*.] This opening motive is then sequenced and transformed in a process that constitutes the large-scale phrase A, and

the entire phrase A is repeated. [***Piano examples**: Giuseppe Verdi, "*La donna è mobile*," sequences and transformation of motive in large-scale phrase A*.] In the large-scale phrase B, the opening six-note motive is transformed again. [***Piano examples**: Giuseppe Verdi, "*La donna è mobile*," original motive and transformed motive, and phrase B*.] Finally, in the large-scale phrase C, all that remains of the original motive is an upward leap alternating with a downward step, which leads, eventually, to a graceful closing melodic lick. [***Piano example**: Giuseppe Verdi, "*La donna è mobile*," phrase C*.] By building his melody on a single recognizable motive and by then repeating, sequencing, and progressively transforming that motive in a series of clear phrases, Verdi's melody takes on a coherence, an evolving inner logic, and a completeness all its own. It does not need words to explain it.

Most composers who were writing operas and opera-like religious music in the late 17th century began composing instrumental music, as well. In these early instrumental works, composers employed techniques borrowed directly from the opera house. Among the first fruits of this opera-inspired instrumental experimentation was the invention of the concerto during the 1670s. At the same time, these composers of early instrumental music encountered a problem that operatic practice could not solve: the problem of musical coherence in the absence of words. The solution was motivic manipulation: repetition, sequence, and transformation. This solution would be used by the next generation of composers as the basis for their development of melodic syntax.

The techniques of motivic repetition, sequence, and transformation quickly found their way from early instrumental music back into vocal music, and from the late 17th century onward, vocal music and instrumental music evolved together symbiotically. The principal melody of the first movement of Tchaikovsky's violin concerto is another illustration of the degree to which motivic manipulation characterizes and renders sensical this otherwise abstract instrumental melody. [***Musical selection**: Peter Ilyich Tchaikovsky, Violin Concerto in D Major, op. 35 (1878), movement 1, theme 1*.] This lengthy thematic melody features two distinct motives. [***Piano examples**: theme 1, motive 1, sequenced and transformed slightly*.] Motive 2 steps upward, falls back, and is immediately repeated. [***Piano examples**: theme 1, motive 2*.]

Motive 2 is then embellished with triplets and sequenced downward. [***Piano example****: theme 1, motive 2, embellished version*.] In its fourth and final iteration, motive 2 is further embellished as it is sequenced upward. Note that the backward fall that concludes the motive is preceded by a long-short rhythm. [***Piano example****: theme 1, motive 2, fourth iteration (repeated)*.] Finally, in a process called thematic liquidation, Tchaikovsky isolates the dotted (long-short) rhythm and backward fall that characterized the very end of the last iteration of motive 2. Sequencing it downward, he brings this first large phrase of the theme to its conclusion. [***Piano examples****: theme 1, phrase 1 (motives 1 and 2).* ***Musical selection****: Peter Ilyich Tchaikovsky, Violin Concerto in D Major, op. 35 (1878), movement 1, theme 1, phrase 1 (motives 1 and 2)*.]



The Teaching Company Collection.

Peter Ilyich Tchaikovsky.

Instrumental melody is characterized by principal melodies that exploit particular instrumental characteristics and, therefore, lack the quality of lyricism. What constitutes an instrumental melody, as opposed to a vocal melody, is a subjective distinction. [***Musical selections****: Wolfgang Mozart, Symphony in G Minor, K. 550 (1788), movement 1, theme 1; Ludwig van Beethoven, Symphony no. 5 in C Minor, op. 67 (1808), movement 1, opening*.] These two principal melodies have much more in common than not. Composed just 20 years apart, they are first-movement opening melodies in minor-mode symphonies. They are roughly the same tempo. Both display a clear motivic profile. However, Mozart's melody is lyrical. [***Piano example****: Wolfgang Mozart, Symphony in G Minor, K. 550 (1788), movement 1, theme 1, opening*.] Conversely, Beethoven's melody is an amalgam of four-note motives and is not lyrical. [***Piano example****: Ludwig van Beethoven, Symphony*

no. 5 in C Minor, op. 67 (1808), movement 1, opening.] Beethoven's melody was inspired by, and constructed for, the orchestra.

Similarly, two other works by Mozart and Beethoven illustrate this distinction between lyricism, represented by Mozart's music, and instrumental melody, represented by Beethoven's music. [***Musical selections****: Wolfgang Mozart, Piano Sonata in C Major, K. 545 (1788), movement 1, theme 1; Ludwig van Beethoven, Piano Sonata in C Major, op. 53 (*Waldstein*, 1804), movement 1, theme 1.* ***Piano examples****: Wolfgang Mozart, K. 545, movement 1, melody, measures 1–4; Ludwig van Beethoven,* Waldstein *Sonata, movement 1, melody, measures 1–13*.] The pitch E that begins Beethoven's sonata is repeated 13 times, and the pitch D that follows when Beethoven sequences the entire opening phrase downward by a whole step is then repeated 14 times. [***Piano example****: pitch E, pitch D repeated*.] Beethoven's thematic melody is not lyric, not vocally conceived. At his core, Beethoven was a non-vocal–style composer. Although his catalog is filled with lyric tunes, he generally preferred thematic melodies built from compact motives with which he could construct the remainder of the movement. It is this constructive, instrumental approach to melody and motivic development that give Beethoven's music its pureness and power.

Perhaps the most glaring exception to these categories as we have defined them has to do with the assumption that all vocal music is, by its nature, vocally conceived.

Perhaps the most glaring exception to these categories as we have defined them has to do with the assumption that all vocal music is, by its nature, vocally conceived. A lot of vocal music of the 20th and 21st centuries creates neither word melody nor vocal melody. An example of such music comes from the expressionistic and experimental music of the 20th century—Arnold Schönberg's *Pierrot Lunaire*, composed in 1912. Schönberg's piece, which is scored for female voice and chamber ensemble, is a setting of 21 poems describing the trials and tribulations of Pierrot, the white-faced clown common in European culture and variously known as Punch, Pulcinella, and Petrushka. Schönberg employs a non-lyrical

vocal technique adapted from German cabaret music, something he called *Sprechstimme* ("speech-voice"), a sing-songy technique that complements the weird stories evoked by the poetry. [***Musical selections**: Arnold Schönberg,* Pierrot Lunaire*, op. 21, no. 16 ("Vulgarity"*—Gemeinheit*), and no. 12 ("Gallows Song"*—Galgenlied).]

Another type of melody, accompanimental melody, can be categorized into four different types. After the theme itself, the bass line is the most important melody line in any given piece of music. [***Piano example**: Peter Ilyich Tchaikovsky, Violin Concerto in D Major, op. 35, movement 1, bass line*.] Played by itself, such a musical foundation sounds absolutely poverty-stricken. When we hear it along with the melody it supports, its importance comes into sharp focus. [***Piano examples:** Peter Ilyich Tchaikovsky, Violin Concerto in D Major, op. 35, movement 1, outer voices*.] In the musical background are those accompanimental parts that are built around articulating the harmony.They may do this by playing clearly secondary melodies that outline harmonies. [***Piano example**: Peter Ilyich Tchaikovsky, Violin Concerto in D Major, op. 35, movement 1, solo part and 'cello*.] They may articulate the harmony by simply sustaining notes that provide harmonic support. [***Piano example**: Peter Ilyich Tchaikovsky, Violin Concerto in D Major, op. 35, movement 1, solo part and sustained upper strings*.]

Countermelodies are secondary melodies that momentarily share the foreground with thematic melodies. In Tchaikovsky's violin concerto, roughly halfway through the first phrase of theme 1 of the first movement, the orchestral violins play a countermelody that echoes the theme being played by the solo violin. [***Piano examples**: Peter Ilyich Tchaikovsky, Violin Concerto in D Major, op. 35, movement 1, countermelody; thematic melody and countermelody together*.] The ability to write and properly deploy a good countermelody is one of those skills that separates the amateur from the professional composer.

We now take a look at periodic melody. A musical period is a self-enclosed section of music with a clear beginning, middle, and end. [***Musical selection**: Wolfgang Mozart, Piano Quartet in G Minor, K. 478 (1785), movement 1, opening*.] At no time were such crystalline musical periods cultivated

to a greater degree than in the perfectly balanced antecedent/consequent melodies of the Classical Era. An antecedent/consequent melody is one in which the antecedent phrase ends on the dominant chord and the consequent phrase ends on the tonic, thus bringing the period to its conclusion. [***Musical selection**: Wolfgang Mozart, Piano Quartet in G Minor, K. 478 (1785), movement 1, opening, antecedent and consequent phrases*.] The excerpts that follow are also examples of antecedent and consequent. [***Musical selections**: Wolfgang Mozart, Piano Sonata in D Major, K. 576 (1789), movement 1, opening; Wolfgang Mozart, Symphony in C Major, K. 551 (Jupiter, 1788), movement 1, opening*.] It is just these sorts of antecedent/consequent melodic periods that put the "Classic" in the Classical Era, with its view of melody and melodic clarity as being an archetype for beauty and balance.

At the opposite end of the melodic spectrum was the 19th-century composer Richard Wagner with his use of continuous melody. Wagner believed that melody was a metaphor for conscious and unconscious thought and feeling. To serve this concept, Wagner's melodic surfaces are often continuous, with none of the sorts of antecedent and consequent melodies so common in earlier times. [***Musical selection**: Richard Wagner,* Götterdämmerung *(1874), "Siegfried's Rhine Journey."*] ■

Texture and Harmony, Part 1

Lecture 14

It wasn't until the 10th and 11th centuries that Western musicians—and I'm not quite sure we would want to call them *composers*, not yet—began experimenting with two-part polyphony, primarily by adding a second voice to a preexisting plainchant. This seemingly simple act changed the nature of Western music forever.

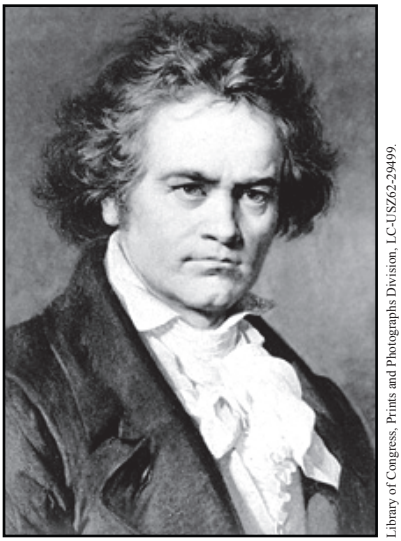
Texture" in music refers to the number of different melodies present in a given section of music and the relationship between those melodies. There are four basic musical textures: monophony, polyphony, homophony, and heterophony. "Monophony" means "one sound"—a single, unaccompanied melody line, of which plainchant is the classic example. [***Musical selection****: Wipo,* Victimae paschali *(c. 1040)*.] "Polyphony" means "many sounds" and consists of two or more simultaneous melodies, each of equal importance. Synonymous with the words "polyphony" and "polyphonic" are the words "counterpoint" and "contrapuntal."

There are two basic types of polyphony: imitative and non-imitative. Imitative polyphony features melodic parts that play or sing the same or nearly the same melody in such a way as to overlap each other. In a canon, or round, all the constituent voices sing exactly the same tune but not at exactly the same time, so that at any given moment, two or more different pitches are being heard. *Row, Row, Row Your Boat* is an example of strict imitative polyphony. Most imitative polyphony is of the non-strict variety, meaning that the voices will indeed imitate each other, but not so that they get caught in the circular, dog-chasing-its-tail groove that is characteristic of most canons. The following excerpt is an example of non-strict imitative polyphony. [***Musical selection****: Johann Sebastian Bach, Two-Part Invention no. 8 in F Major, BWV 779 (c. 1723)*.]

Non-imitative polyphonic texture is one in which two or more different melodies of equal importance are heard simultaneously. Non-imitative polyphony is unusual and is most typically reserved for climactic moments

of a composition, at which point previously heard themes come together to be heard simultaneously. As an example of non-imitative polyphony, we turn to New Orleans jazz. In the excerpt, the cornet plays the thematic melody, while the clarinet and trombone weave their improvised lines under, over, and around that theme, creating, in effect, a wonderful bit of three-part, non-imitative polyphony. [***Musical selection**: "King" Oliver,* Alligator Hop *(1923), opening*.]

"Homophony" means "alike" or "blended sounds." A homophonic texture is one in which we perceive a single principal melodic part, with all the other parts perceived as being accompanimental. The accompaniment can be as minimal as a bass line. [***Piano example**: Wolfgang Mozart, Variations on* Ah, vous dirai-je, maman*, K. 265, theme*.] The accompaniment can be a chordal harmonization of the principal melody. [***Piano example**: Ludwig van Beethoven, Piano Sonata no. 8 in C Minor, op. 13 (*Pathétique*, 1799), opening*.] The accompaniment can feature a countermelody. In this excerpt, the theme, played by the violas and 'cellos, is underlain by a rich and singing bass line in the basses and is further accompanied by a countermelody in the bassoons. [***Musical selection**: Ludwig van Beethoven, Symphony no. 9 in D Minor, op. 125 (1824), movement 4, Ode to Joy theme*.]



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Ludwig van Beethoven.

It is also possible and not unusual to have a hybrid texture consisting of both homophonic and polyphonic elements. In the following example, the cornet, clarinet, and trombone play their characteristically New Orleans–style, non-imitative polyphony, while being accompanied by a banjo, bass, and drum. [***Musical selection**: "King" Oliver,* Alligator Hop

(1923), opening.] In another example of a polyphonic episode supported by a homophonic-style accompaniment, the orchestral strings engage in a dramatic four-part, imitative polyphony, while accompanied by winds and horns playing sustained notes that fill in the harmonies. [***Musical selection****: Wolfgang Mozart, Symphony in G Minor, K. 550 (1788), movement 4, development section*.]

"Heterophony," meaning "other" or "different sounds," can be understood in two ways. A heterophonic texture can be one in which the different parts are perceived as creating a single composite melody, such as in Indonesian gamelan music. It can also be a texture in which we hear a melody accompanied by an ornamented version of itself, as in much Near and Far Eastern vocal music. Heterophony is rarely encountered in Western music.

When Western musicians began experimenting with two-part polyphony in the 10th and 11th centuries, they added a second decorative voice to a preexisting plainchant. This seemingly simple act changed the nature of Western music forever. Adding the second voice involved making decisions on how to relate the two parts intervallically. [***Piano example****: plainchant,* Alleluia justus ut palma.] We can add the second voice above the plainchant, which is what the earliest polyphonists tended to do. We can make the new voice move in rhythmic lockstep with the plainchant in order to articulate the words of the plainchant with the same degree of clarity as the plainchant itself. A decision has to be made concerning what harmonic intervals should define the relationship between the voices. [***Piano examples****: minor seconds and major sevenths above the plainchant* Alleluia justus ut palma.]

By what standards should we declare that, harmonically, those two new voices sound too hard on the ears? By the standards of the overtone series: Seconds and sevenths are dissonant harmonic intervals. Thus, the early polyphonists chose to use perfect intervals, unisons, octaves, fifths, and fourths, with the slightest smattering of thirds and sixths. [***Piano examples****: plainchant* Alleluia justus ut palma*, original plainchant, new melody, two voices combined, and identification of intervals*.] As polyphonic music grew in importance and complexity during the 12th, 13th, and 14th centuries, the harmonic relationship between the voices became increasingly complex. In

the 12th and 13th centuries, composers began experimenting with three-voice textures and, by the 14th century, with four-voice textures.

In adding a third voice, the big decision centered on which intervallic relationship to exploit that would still be considered consonant by the standards of the day. Again, the answer lies with the overtone series. After the unison, octave, perfect fifth, and perfect fourth come the major and minor thirds, which represent the fifth and sixth partials of the overtone series and add a richness to the mix. [***Piano examples****: sequence of first, second, third, fourth, fifth, and sixth partials, forming a major triad*.]

The major triad is the basic building block of the Western tonal harmonic system. The triad consists of three different pitches. By definition, a triad in its basic root position will consist of two thirds, one stacked upon the other. There are four types of triads: major, minor, diminished, and augmented. The pitches of a C-major triad are, counting up from the root, or bottom, of the chord: C, E, and G. [***Piano examples****: C–E and C/E (major third); E–G and E/G (minor third stacked on top)*.] The distance between the lowest and highest pitches, C and G, is a perfect fifth.

There are 12 possible major triads, and we can build one on any one of the 12 different pitches of the chromatic collection. [***Piano example****: 12 major triads in chromatic order, starting on C*.] A minor triad reverses the order of thirds as witnessed in a major triad. Counting up from the root, the pitches in a C-minor triad are C, Eb, and G. [***Piano examples****: C, Eb, and G; C–Eb and C/Eb (minor third); and Eb–G and Eb/G (major third stacked on top)*.] There is a perfect fifth between C and G. There are 12 possible minor triads that we can build on any one of the 12 pitches of the chromatic collection. [***Piano example****: 12 minor triads in chromatic order, starting on C*.] Major and minor triads contain only consonant intervals. [***Piano example****: cadences in major and minor*.]

The diminished triad consists of two minor thirds, one stacked on top of the other. The pitches in a C diminished triad, counting up from the root, are: C, Eb, Gb. [***Piano example***.] The distance between the lowest and highest pitches of a diminished triad is a diminished fifth (a tritone!). There are 12

possible diminished triads that we can build on any one of the 12 pitches of the chromatic collection. [***Piano example****: 12 diminished triads in chromatic order, starting on C*.]

An augmented triad consists of two major thirds stacked one atop the other. Counting up from the root, the pitches in a C augmented triad are: C, E, and G#. [***Piano example***.] The distance between the lowest and highest pitches of an augmented triad is an augmented fifth. There are only four possible augmented triads. Diminished and augmented triads both contain dissonant intervals. In the case of a diminished triad, the dissonance is a tritone. In the case of an augmented triad, the dissonance is an augmented fifth. As dissonances, both diminished and augmented triads are considered chords of tension that need to be resolved.

During the 15th century—the early Renaissance—the first composed homophony appeared. In homophony, chords and the motion from chord to chord (a progression) are, by themselves, interesting and sophisticated enough to provide a coherent musical accompaniment to a principal melodic part. Homophony saw its first great flowering with the invention of opera in and around the year 1600. It continued to evolve side by side with polyphony through the 16th century. What both 15th- and 16th-century homophony and polyphony had in common was the growing reliance on triadic harmony—that is, the tonal system of harmonic tension and rest—for coordinating melodic parts and organizing large-scale form and structure.

We now examine what sorts of triads naturally occur in major and minor. The triad built on the tonic pitch of a major collection, the tonic triad (symbolized as I), is a major triad. [***Piano example****: C–E–G and C/E/G*.] The triad built on the second degree of a major collection, a triad called the supertonic (symbolized as II), is a minor triad. [***Piano example****: D–F–A and D/F/A*.] The triad built on the third degree of a major collection, a triad called the mediant because it is halfway between the tonic and dominant pitches (symbolized as III), is a minor triad. [***Piano example****: E–G–B and E/G/B*.] The triad built on the fourth degree of a major collection, a triad called the subdominant (symbolized as IV), is a major triad. [***Piano example****: F–A–C and F/A/C*.] The triad built on the fifth degree of the major collection, a triad called the

dominant (symbolized as V), is a major triad. [***Piano example**: G–B–D and G/B/D*.] The triad built on the sixth degree of the major collection, a triad called the *submediant* (symbolized as VI), is a minor triad. **Piano example**: A–C–E and A/C/E. Lastly, the triad built on the seventh degree of a major collection, a triad called the leading tone (symbolized as VII), is a diminished triad. [***Piano example**: B–D–F and B/D/F*.]

In a major collection, there are three naturally occurring major triads (I, IV, and V), three naturally occurring minor triads (II, III, and VI), and one naturally occurring diminished triad (VII). The following are triads that occur in Aeolian mode, or natural minor: The tonic, or I chord, is minor. [***Piano example**: C–Eb–G and C/Eb/G*.] The II chord is diminished. [***Piano example**: D–F–Ab and D/F/Ab*.] The III chord is major. [***Piano example**: Eb–G–Bb and Eb/G/Bb*.] The IV chord is minor. [***Piano example**: F–Ab–C and F/Ab/C*.] The V chord is minor. [***Piano example**: G–Bb–D and G/Bb/D*.] The VI chord is major. [***Piano example**: Ab–C–Eb and Ab/C/Eb*.] The VII chord is major. [***Piano example**: Bb–D–F and Bb/D/F*.]

In a natural-minor collection, there are three naturally occurring minor triads (I, IV, and V), three naturally occurring major triads (III, VI, and VII), and one naturally occurring diminished triad (II). Any of the three pitches that make up a triad can be the lowest pitch.

All the triads we have examined have been in root position, that is, with the pitch on which the chord is based being the lowest pitch. [***Piano example**: root position of the C-major chord, with C as the lowest pitch*.] A triad in first inversion is one in which the third degree of the chord is in the bass. In the case of a C-major triad, the pitch E is in the bass. [***Piano example**: E/G/C (C major, first inversion)*.] First-inversion chords are also called 6/3 chords because the intervallic distance between the bass note and the upper chord tones is a sixth and a third. A triad in second inversion is one in which the fifth degree of the chord is in the bass. In the case of a C-major triad, the pitch G is in the bass. [***Piano example**: G/C/E (C major, second inversion)*.] Second inversions are also known as 6/4 chords because the intervallic distance between the bass note and the upper tones is a sixth and a fourth. Inversions provide for good voice leading.

A bass line consisting of chords that are all in root position is not musical. This progression yields a bass line of: C–G–C–D–C–G–C. If some of these chords are inverted, we can create a bass line that is as smooth and musical as the soprano voice. [***Piano examples***.] This progression yields a bass line, a genuine bass melody, of C–D–E–F–G–G–C.

Harmony is indivisible from melody. Chords do not exist as entities unto themselves. [***Piano example****: randomly spaced triads*.] Maintaining melodic connections between chords is called voice leading, and nothing is as important as good voice leading. In the following example, we will connect the disembodied series of chords we just heard so that each of the constituent voices of the chords (soprano, alto, tenor, and bass) connects to create four distinct melody lines. [***Piano example****: I I6 IV #IV I6/4 V I*.]

Johann Sebastian Bach's chorale harmonizations constitute the bible of four-voice writing.

Johann Sebastian Bach's chorale harmonizations constitute the bible of four-voice writing. The chorale is the congregational hymn of the Lutheran Church, in which Bach was a member born and bred. Chorales are melodies set to religious texts; they come from a wide variety of sources. By definition, a chorale harmonization is homophonic in texture. The principal theme is heard in the soprano voice, while the lower three voices provide a proper harmonic accompaniment to that hymn melody. Bach's chorale harmonizations display a virtually perfect balance between harmonic imagination and voice leading.

The chorale melody entitled *O Haupt voll Blut und Wunden* (*O Sacred Head Now Wounded*) was composed by Hans Leo Hassler sometime in the late 16th century. It began its life as a popular song entitled My Piece of Mind Is Shattered by a Tender Maiden's Charms. Bach harmonized Hassler's melody five times, each in a different key, in his *St. Matthew Passion*. [***Piano example****: Johann Sebastian Bach,* O Haupt voll Blut und Wunden *melody and the beginning of a Bach harmonization*.] To ensure maximum melodic connectivity between adjacent harmonies, Bach adds passing tones here and there. These are scale-steps that connect adjacent chord tones. [***Piano***

***example**: Johann Sebastian Bach, St. Matthew Passion, BWV 244 (1727),* O Haupt voll Blut und Wunden*, phrase 1 (Bach's entire harmonization)*.] Voice leading between the harmonies ensures that, accompanimental though they may be, each of the three lower voices has a distinctly lyric character unto itself. ■

Harmony, Part 2—
Function, Tendency, and Dominance
Lecture 15

The harmonic system that dominated Western music for roughly 500 years, from the 15th century through the early 20th century, is generally referred to as functional tonality. Although this tonal system continued to evolve and change over that period, certain ground-line aspects of functional tonality remained consistent across that span. Chief among these ground-line aspects is that the functional tonal system creates individual tonal centers, individual keys, that become points of departure and return during the course of a movement or a piece of music. These key areas are established, departed from, and returned to through a process of harmonic motion, which is itself a product of something called harmonic function.

The tonal system is a magnificent metaphor for our lives and environment. At its essence, the tonal system is about complementary opposites that balance and frame our very existence: rise and fall, tension and release, activity and inactivity, struggle and repose, the turmoil of life and the eternal rest of death. At the heart of the tonal system are two pitches (tonic and dominant) and the harmonies built atop those pitches, one representing rest (tonic) and the other, tension (dominant). [***Piano examples****: tonic and dominant chords*.] The pitch and chord of tension lie a perfect fifth above a given tonic pitch. In the key of C, these would be G and the harmony built atop G. [***Piano example***.] The dominant chord, as a chord of tension, seeks release and repose by resolving to the tonic. [***Piano examples***.] The function of a tonic triad is to represent and articulate the gravitational center of a given section of music and, in doing so, create a sense of rest and repose.

The seventh chord is one in which an additional third is stacked on a triad, creating a chord that consists of four different pitches and spans the width of a seventh. [***Piano examples****: C-major triad: C, E, G—plus B on top*.] In traditional functional tonality, the seventh is considered a dissonance. In jazz,

the seventh chord is the basic, consonant harmonic unit. Seventh chords that play a dominant function are dominant-seventh chord, diminished-seventh chord, and half-diminished-seventh chord.

The triad built on the seventh degree of a C-major collection is a B diminished triad, consisting of the pitches B, D, and F. [***Piano example***.] Because it outlines a tritone, a diminished triad is perceived as extreme dissonance; it must resolve. [***Piano example****: leading-tone triad in C major: B–F and B/F*.] This tritone wants to resolve inward by a semitone to the lower two pitches of a C-major triad (C and E). The B of the tritone wants to resolve upward by a semitone to a C. The F of the tritone wants to resolve a semitone downward to an E. [***Piano example****: B–F and F/B; F–B resolving to E–C*.] If we flip the tritone and put the F below the B, the tritone wants to resolve outward by a semitone to an E and a C. [***Piano examples***.]

The leading-tone (diminished) triad has a dominant function because it wants to resolve to the tonic triad. [***Piano examples****: B diminished chord, C-major progression, and B diminished chord*.] If we add one more pitch below that chord, we will give it a new root, by adding the G below the B, creating a chord consisting of a G, B, D, and F. [***Piano example***.] We have just created the dominant-seventh chord of the key of C. A dominant-seventh chord consists of a major triad—in the key of C major, this is a G-major triad—with a minor third added above. In the key of C major, this is an F. [***Piano example****: G-major triad and G-major triad plus F*.] The chord spans a minor seventh from the root to the top pitch of F. [***Piano example****: G and F; G–F and G/F*.] When we combine the descending perfect fifth of a dominant-to-tonic progression with the resolution of the incorporated tritone to a tonic, we get the most familiar and powerful of all harmonic progressions in tonal music. [***Piano examples****: G7–C major; dominant-seventh-to-tonic progressions*.]

There is only one tritone in any given major key and, therefore, only one dominant-seventh chord in any major key. The function of the seventh degree of a major collection is quite specialized. The seventh degree is called the leading tone because it wants to resolve upward by a semitone to the tonic pitch. [***Piano example***.]

We now examine the melodic minor and the harmonic minor modes. The distance in a major collection between the seventh scale-degree, or leading tone, and the tonic pitch above it is one semitone. [***Piano example****: B–C*.] That semitone distance creates the desire to resolve upward. It is a tendency that is intensified when the leading tone and the tonic pitch are incorporated into a dominant chord and a tonic chord. [***Piano example****: G7–C major*.] In the Aeolian mode, however, there is a whole step between the leading tone and the tonic pitch directly above it. [***Piano example***.] This whole step creates almost no harmonic tendency whatsoever. [***Piano examples***.]

To imbue the minor mode with harmonic tendency, we raise the leading tone so that the distance between the leading tone and the tonic pitch directly above it is only one semitone. As a result, we have three different forms of minor, each one to be deployed when the occasion demands: natural minor, melodic minor, and harmonic minor. Natural minor (Aeolian mode) has, when compared to major, a lowered third, sixth, and seventh degree. [***Piano example****: C-natural minor scale*.] Natural minor works well for plainchant and music in which melodic and harmonic tendency are unimportant or even antithetical to the spirit of the music. But we rarely hear pure natural minor used in music after the 15th century.

We rarely hear pure natural minor used in music after the 15th century.

Melodic minor evolved for use in tonal melodies and is the most commonly used form of minor. Melodic minor is two collections in one: In descent, the seventh and sixth degrees are lowered as they are in natural minor. In ascent, the sixth and seventh degrees are raised, as in major mode, so that the leading tone is a semitone distant from the tonic. In both versions, the third degree of the collection is minor. [***Piano examples****: descending and ascending C melodic minor*.]

The following excerpt illustrates a G melodic-minor collection. [***Piano example***. ***Musical selection****: Hector Berlioz,* Symphonie fantastique *(1830), movement 4 (“March to the Scaffold”), theme 1 (descending melodic-minor collection)*.] Berlioz inverts this theme. [***Piano example***. ***Musical selection****: Hector Berlioz, Symphonie fantastique (1830), movement 4 (“March to the*

Scaffold"), theme 1 (ascending melodic-minor collection).] Note that if the sixth degree were not raised as well, an augmented second would be created between the sixth and seventh degrees of the collection, which sounds exotic and is, therefore, not necessarily a desired effect. [***Piano example**: C–B–Ab–G.*]

Harmonic minor is more a procedure than a specific construct, as natural and melodic minor are. It refers to the harmonic treatment of the dominant chord and the leading tone in the minor mode. Again, the leading tone is raised by one semitone to create harmonic tension without altering the dark, expressive color that is the essence of the minor mode.

At this point, we need to properly identify the intervallic structure of the five different types of seventh chords. A major-seventh chord consists of a major triad with a major third stacked on top. [***Piano example**: analysis of C-major seventh chord*.] A dominant-seventh chord consists of a major triad with a minor third stacked on top. [***Piano example**: analysis of dominant-seventh chord*.] A minor-seventh chord consists of a minor triad with a minor third stacked on top. [***Piano example**: analysis of C-minor seventh chord*.] A half-diminished-seventh chord consists of a diminished triad with a major third stacked on top. [***Piano example**: analysis of half-diminished-seventh chord*.] A diminished-seventh chord consists of a diminished triad with a minor third stacked on top. [***Piano example**: analysis of diminished-seventh chord*.] The diminished-seventh chord is the most dissonant harmony in the traditional tonal system as it contains two tritones. [***Piano example**: C diminished-seventh chord, spelled out as: C, Eb, Gb, Bbb (same pitch as A).*] Between the root of the chord (C) and the fifth of the chord (Gb) is a tritone and between the third of the chord (Eb) and the seventh of the chord (Bbb, or A) is another tritone. [***Piano examples**: C–Gb and C/Gb; Eb–Bbb (A) and Eb/Bbb (A).*]

Any diminished-seventh chord can resolve to eight different keys, depending on which tritone resolves and in which direction. [***Piano example**: C diminished-seventh resolving to Db major, Db minor, G major, G minor, Bb major, Bb minor, E major, and E minor*.] Because they can resolve to so many different keys, composers will often use diminished-seventh chords to

effect sudden modulations to entirely unexpected keys, as we shall see in the next lecture.

The most common use of the diminished-seventh chord is as a leading-tone-seventh chord in minor that plays a dominant function—a seventh chord built on a raised leading tone of a minor key. For example, in the key of C minor, the raised leading tone is a B-natural. [***Piano example****: root position, diminished seventh built on B-natural: B, D, F, Ab*.] This B diminished-seventh chord plays a dominant function in C harmonic minor by resolving to a C-minor triad. The leading-tone B in the bass resolves upward by a semitone to a C; the D and F converge on an Eb, and the Ab resolves downward to a G. [***Piano example****: analysis of a B diminished-seventh chord in C minor*.] The raised leading-tone-diminished seventh affords an extra-intense dissonance. [***Piano example****: Ludwig van Beethoven, Piano Sonata in C Minor, op. 10, no. 1, measures 1–22 with harmonic underpinning identified.* ***Musical selection****: Ludwig van Beethoven, Piano Sonata no. 5 in C Minor, op. 10, no. 1 (c. 1798), movement 1, opening*.] Because a diminished-seventh chord can resolve to so many different keys, it lacks any tonal identity of its own, unlike the dominant-seventh chord. [***Piano example****: G7, G7–C major, D diminished seventh*.] ■

Harmony, Part 3—
Progression, Cadence, and Modulation
Lecture 16

If a composer really wanted to torture us, he or she could, theoretically, never properly resolve a single dominant chord and, instead, sidestep any dominant-to-tonic resolution by a ceaseless use of deceptive cadences. My friends, we've just described the great bulk of Richard Wagner's music drama *Tristan und Isolde*.

"Harmonic progression" refers to the movement from one chord to the next. A cadence is a harmonic progression that occurs at the very end of a phrase, section, or movement. It conveys the impression of either a temporary or a permanent conclusion. It is the musical equivalent of a punctuation mark. There are four types of cadences: closed or authentic cadences; open or half cadences; deceptive or false cadences; and plagal or amen cadences.

Closed or authentic cadences come to rest on the tonic chord. [***Piano example**: I–I6–IV–V7–I.*] A closed cadence is the musical equivalent of a period in written language. In the following excerpt, a closed cadence brings the opening theme of the movement to a convincing if temporary conclusion. [***Piano example**: Ludwig van Beethoven, Piano Sonata no. 1 in F Minor, op. 2, movement 2, measures 1–8.*] A closed cadence that concludes an entire work will usually be more vehement, a vehemence usually produced by cadential repetition—dominant-to-tonic progressions repeated back-to-back. [***Musical selection**: Ludwig van Beethoven, Symphony no. 3 in Eb Major, op. 55 (*Eroica*, 1803), movement 1, opening.*]

An open or half cadence stops, without resolving, on the dominant chord. Like the comma in mid-sentence, an open cadence creates tension that forces the music to continue in search of resolution. [***Piano example**: I–I6–IV–I6/4–V7.*] In the following excerpt, the open or half cadence divides the theme in half in the same way that a comma marks two phrases in a

sentence. [***Piano example****: Ludwig van Beethoven, Piano Sonata no. 1 in F Minor, op. 2, movement 2, opening theme*.] Sometimes, a composer ends a movement with an open cadence that resolves only with the beginning of the next movement in order to create a harmonic connection between those movements. [***Piano example****: Ludwig van Beethoven, Piano Sonata no. 21 in C Major, op. 53 (*Waldstein*, 1804), movement 2, conclusion*.] That dominant harmony resolves only when the third and final movement begins, with a low C. [***Piano example****: low C.* ***Musical selection****: Ludwig van Beethoven, Piano Sonata no. 21 in C Major, op. 53 (*Waldstein*, 1804), movement 2, conclusion, and movement 3, opening*.]

Deceptive or false cadences resolve but not to the tonic harmony where we would expect them to resolve. The following is an example of a closed cadence resolving, as expected, from the dominant seventh to the tonic chord. [***Piano example****: I–I6–IV–#IV–I6/4–V7–I*.] In a deceptive cadence, the dominant-seventh chord resolves to a completely unexpected place. [***Piano example****: I–I6–IV–I6/4–V7–bVI*.] In this example, the leading tone resolves upward to the tonic pitch, but the chord beneath that tonic pitch is not the tonic chord! [***Piano examples****: V7–C; V7–bVI; series of deceptive cadences*.]

The great bulk of Richard Wagner's music drama *Tristan und Isolde* is an amazing exercise in unresolved dissonance and deceptive cadences. The overture begins with a phrase that features a half-diminished- seventh chord. [***Piano example****: Richard Wagner,* Tristan und Isolde *(1859), overture, opening*.] Wagner's use of this chord is so pervasive in *Tristan und Isolde* that it has come to be called the Tristan chord. The half-diminished-seventh chord resolves outward, and the opening phrase pauses on an E dominant-seventh chord, the dominant chord of the key of A. [***Piano example****: Richard Wagner, Tristan und Isolde (1859), overture, phrase 1; E7; E7–A as a suggested resolution, followed by actual, non-resolved phrase 1*.] The opening phrase is subjected to extended sequences with no resolution, ending in a deceptive cadence. [***Piano examples****: opening phrase sequenced and arrival at a deceptive cadence.* ***Musical selection****: Richard Wagner,* Tristan und Isolde *(1859), overture, opening*.]

A plagal or amen cadence consists of the chord progression IV to I (subdominant to tonic). [***Piano example****: C major–F major–C major*.] A plagal cadence will typically follow a closed cadence at the very end of a phrase or passage to prolong the tonic harmony. [***Piano example****: Ludwig van Beethoven, Symphony no. 3 in Eb Major, op. 55 (*Eroica*, 1803), movement 2, opening phrase up to closed cadence (repeated)*.] Beethoven immediately follows the closed cadence with a plagal cadence. [***Piano example and musical selection****: Ludwig van Beethoven, Symphony no. 3 in Eb Major, op. 55 (*Eroica*, 1803), movement 2, opening*.]

A *cadenza* (Italian for "cadence") refers to the solos taken by soloists in a concerto or singers in an aria. Cadenzas have the character of improvisations. By the Classical Era, it had become standard operating procedure in a concerto to interrupt the final cadence of both the first and last movements by allowing the soloist to perform an extended solo. This extended solo was named for the harmonic progression it interrupts, thus, the cadenza. We often read that these cadenzas were supposed to be improvised, but in reality, they were usually carefully prepared before the performance by the soloists, the better to exploit the soloists' particular technical skills.

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The harmonies that constitute the "run up" to a cadenza are a familiar progression. The final cadence in a concerto movement pauses on the third-to-last chord, a harmony called a cadential six-four (6/4). [***Piano examples****: final cadence and I6/4*.] The cadenza then follows and will conclude with a trill built atop the second-to-last chord of the cadential formula—the dominant chord. [***Piano example****: trill*.] The orchestra then reenters, closes the cadence, and brings the movement to its conclusion. [***Musical selections****: Wolfgang Mozart, Piano Concerto in D Major, K. 537 (1788), movement 1, cadenza run-up; conclusion of movement*.]

The subdominant chord bridges the distance between the tonic and dominant in the process of tension and resolution. Tension and resolution lie at the

heart of the tonal system. [***Piano examples****: dissonance and consonance (I–V7–I)*.] The motion from various pre- or subdominant chords that bridges the distance between tonic and dominant may be simple or complex. [***Piano examples****: simple and complex harmonic progressions*.] No matter how complex or simple, these harmonies, collectively, play a subdominant (pre-dominant role) in that they prepare for the dominant chord and for whatever sort of cadence follows.

Modulation is a process by which a piece of tonal music changes key during the course of a movement. If the motion from tonic to dominant and back to tonic [***Piano example***] might be perceived as a "local" departure and return, then modulation should be perceived as "long-range" departure and eventual return. [***Piano examples****: I–V–I (an example of "local" departure and return); modulation from the key of C to the key of A minor*.] Without modulation, a piece of music would seem frozen, no matter how attractive its themes.

There are many different ways to modulate, but what they all have in common is that they must convincingly cadence to the new key. A convincing modulation requires that we introduce the dominant-seventh chord of the new key, then resolve to the tonic chord of the new key. It is not as simple as it sounds to make a convincing modulation. [***Piano examples****: I–I6–IV–V7–I (harmonic progression establishing C major); #II6/5–V (D dominant-seventh chord and resolution to G major); I–I6–IV–V7–I–#II6/5–V (progression to G-major chord)*.] The music does not feel at rest. Our ears never made the switch to G. We have only "tonicized" the G-major triad; we have not modulated to G major.

Tonicization creates only momentary tendency. [***Piano example****: John Philip Sousa,* The Star Spangled Banner.] If we want to convincingly modulate from C major to G major, we have to introduce the dominant-seventh chord of G major and more—we have to obliterate the memory of C major by creating an extended progression to the new key.

One strategy for a successful modulation is to go past the key you are modulating to, then backtrack to where you want to be. [***Piano example****:*

modulation from C major to G major, going past G major on the circle of fifths to D major, then falling back from D major to G major.] The most common modulatory strategy is to move from key to key along the circle of fifths, stepping through closely related key areas as we travel from departure to destination. [***Piano example****: modulation from C major to Ab major through the "flat" side of the circle of fifths*.] We resolve the C dominant-seventh chord to an F-major chord, then turn the F-major chord into a dominant-seventh chord, the dominant chord of Bb major. [***Piano example***.] We continue this process all the way to Db major because we want to swing past our target key, then backtrack. [***Piano example****: modulatory progression in 15 steps from the key of C major to the key of Ab major via the circle of fifths (repeated)*.]

There are harmonic shortcuts we can take, including the use of deceptive cadences. [***Piano example****: C major, C major–Ab major in seven harmonic steps*.] Another shortcut is via a common tone, or pivot modulation, something at which Beethoven was particularly adept. Pivot modulation assumes that one or more pitches common to two different harmonies (and, by extension, two different keys) can be used as a pivot between those two harmonies (and keys). [***Piano example****: C–E–G and C/E/G/B*.] The E and G of a C-major triad are common to an E-minor triad (E, G, B). [***Piano example***.] By pivoting off the E and the G, we can achieve an almost instant modulation from C major to E minor. [***Piano example****: pivot modulation*.] By using just the E as a common tone, we can pivot directly to an E dominant-seventh chord and, in doing so, effect an instant modulation to the moderately distant key of A major. [***Piano example****: pivot modulation*.] We can even use E as a pivot to go directly to an F# dominant-seventh chord and effect an instant modulation to the extremely distant key of B minor. If we want to get somewhere fast, especially in minor keys, all we need do is use a diminished-seventh chord. [***Piano example****: from C minor to the incredibly distant key of F# minor in five chords!*]

These sorts of modulations are so dramatic and the harmonic distance they cover is so great that there is almost no chance that the original key, the key of departure, will still be in our ears once the modulation has taken place. This process of modulation made possible the evolution of large-scale musical

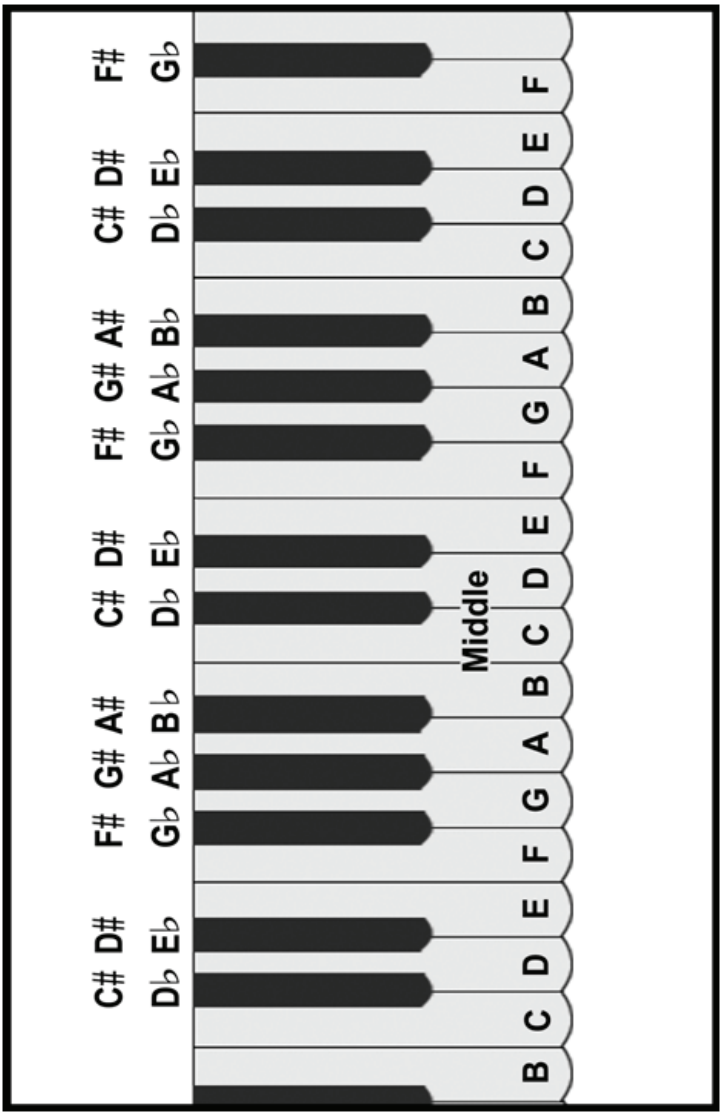
genres and forms, in which tonal contrast is as important a musical element as thematic contrast. Modulation has also allowed composers to differentiate between thematic music—harmonically stable music—and harmonically unstable music, in which constant modulation creates a sense of transitory, even breakneck excitement. ■

Appendix

Semitone Chart

Minor Second:	1 semitone
Major Second:	2 semitones
Minor Third:	3 semitones
Major Third:	4 semitones
Perfect Fourth:	5 semitones
Augmented Fourth (Tritone):	6 semitones
Diminished Fifth (Tritone):	6 semitones
Perfect Fifth:	7 semitones
Minor Sixth:	8 semitones
Major Sixth:	9 semitones
Minor Seventh:	10 semitones
Major Seventh:	11 semitones
Octave:	12 semitones

Keyboard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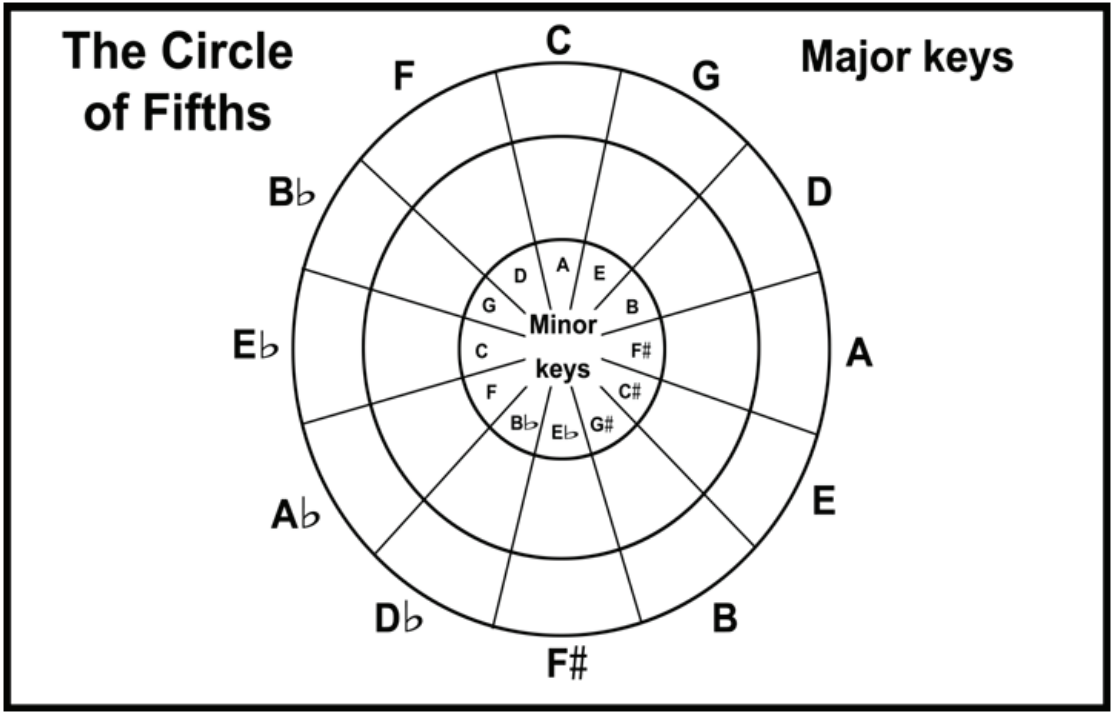
Middle


The Circle of Fifths
Major keys
C
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Minor keys
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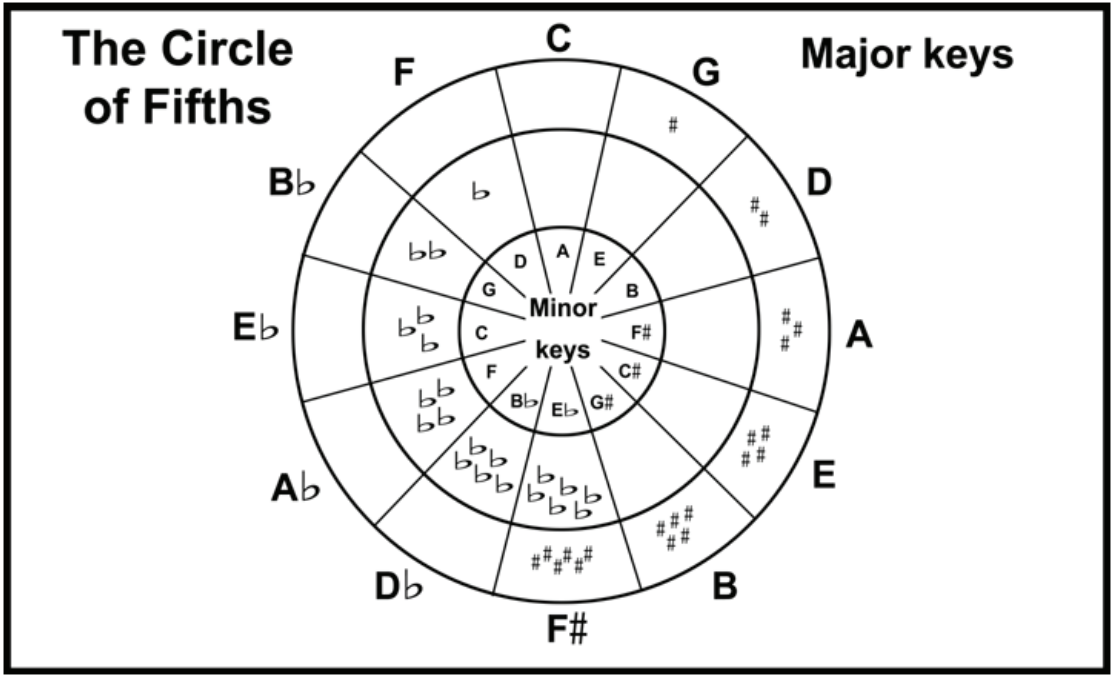
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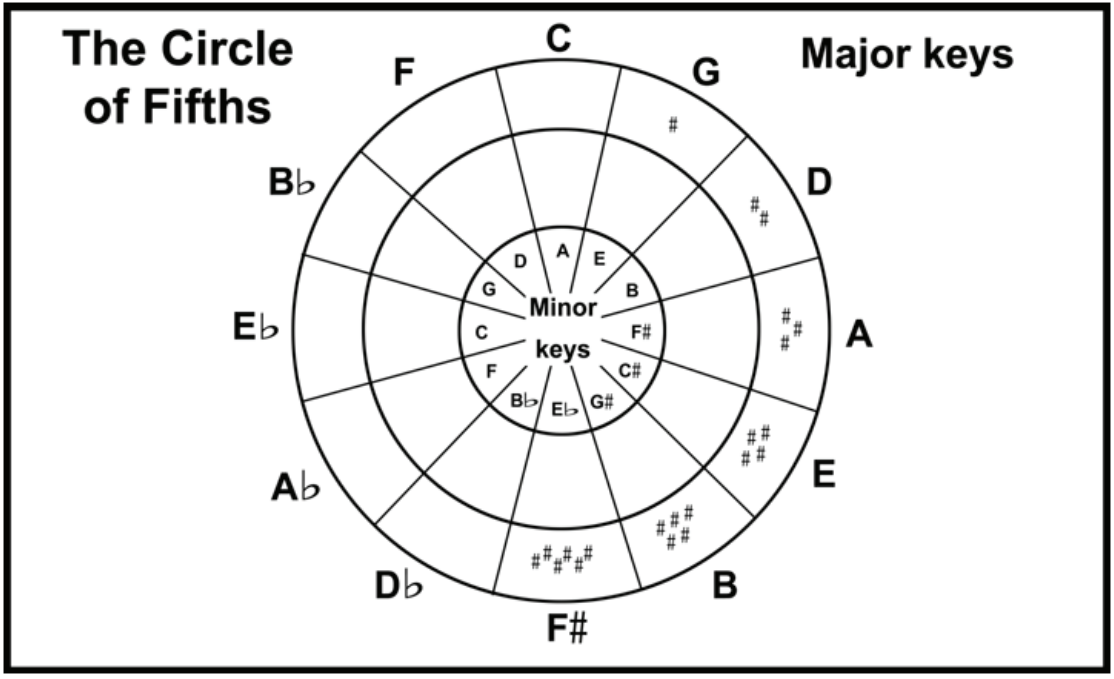
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C
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Timeline

500 B.C.E.	Pythagoras postulates his theory that music is a microcosm of the cosmos and ruled by the same mathematical laws that operate in all of the universe.
320 B.C.E.	Aristoxenus writes his book on harmonic elements.
1100s–1300s	Emergence of three- and four-voice harmonic textures and development of triadic harmony in a polyphonic texture.
1400s–1500s	Emergence of mean-tone tuning and composed homophony.
1596	Tsai-Yu of China describes the principle of equal temperament, though traditionally, Andreas Werckmeister is credited with inventing this concept in 1700.
1500s–1900	Development and cultivation of functional tonality.
1600	Jacopo Peri's *Euridice*, the first complete opera to survive to modern times, heralded the rise of opera. This led to the development of instrumental genres, which in turn, influenced functional harmony.

1600s–1750s ..... The Baroque Era; Johann Sebastian Bach uses well-tempered tuning, the forerunner of equal-tempered tuning; word melody gradually yields to vocal melody, vocally conceived instrumental melody, and instrumental melody.

1600–1900..... Common Practice Period.

1700..... According to conventional Western history, Andreas Werckmeister invents the concept of equal temperament.

1730s–1820s ..... The Classical Era; Beethoven makes unprecedented use of meter and syncopation as the principal thematic material and dominant feature of musical texture.

1820s–1890s ..... The Romantic Era; the limits of functional tonality are increasingly stretched; Hector Berlioz takes the exploration of orchestral timbre to new heights.

1850s..... Equal temperament becomes standard.

1859..... The French recommend the standard or concert pitch of A = 435, by which orchestras should be tuned; Richard Wagner's *Tristan und Isolde*.

1885..... International conference in Vienna recommends adoption of the French standard pitch of A = 435.

1900..... Functional harmony begins to yield to freer concepts of tonality; experimental meters, including asymmetrical meter, additive meter, and syncopation begin to be used on an unprecedented scale.

1910..... Claude Debussy's preludes for piano exemplify his use of the whole-tone collection.

1912..... Igor Stravinsky's *The Rite of Spring* cultivates asymmetrical meter to a degree entirely new in European music; Arnold Schönberg's *Pierrot Lunaire* employs non-lyrical vocal technique and freely atonal music.

1939..... International conference adopts the standard or concert pitch of A = 440.

Glossary

accidental: A notational sign/symbol that modifies a pitch. *See also* **sharp**, **flat**, and **natural**.

additive meter: Some combination of beats grouped in twos and threes.

aria: Originally a song sung by a single voice with or without accompaniment, now taken to mean a lyric song for solo voice usually expressing intense emotion.

asymmetrical meter: Exhibits no particular repeated metric pattern.

atonal/atonality: Music lacking the sense of a central pitch, as opposed to tonal/tonality.

augmented: Major or perfect interval extended by a semitone; e.g., augmented sixth: C–A-sharp.

bar: *See* **measure**.

bar lines: Notational device: two vertical lines that enclose a measure; one metric unit.

beat: Smallest pulse to which we can comfortably move our bodies. *See also* **meter**.

cadence: Harmonic or melodic formula that occurs at the end of a phrase, section, or composition, conveying a momentary or permanent conclusion; in other words, a musical punctuation mark.

cadenza: Passage for solo instrument in an orchestral work, usually a concerto, designed to showcase the player's skills.

canon: Strict counterpoint in which each voice exactly imitates the previous voice at a fixed distance.

chord: Simultaneous sounding of three or more different pitches.

chromatic: Scale in which all the pitches are present. On a keyboard, this translates as moving consecutively from white keys to black keys.

Classical: Designation given to works of art of the 17th and 18th centuries, characterized by clear lines and balanced form.

closed cadence: Equivalent to a period or an exclamation mark; such a cadence ends on the tonic and gives a sense of rest and resolution.

compound meter: Any meter that features a triple subdivision within each beat.

concert A: Pitch to which Western orchestral players tune their instruments before a performance: A = 440.

conjunct: Melodic contour that generally features steps between pitches; such a melody will usually sound smooth and controlled.

counterpoint/contrapuntal textures: From the Latin *punctus contra punctum*, or "note against note"; a style of writing that emphasizes the rhythmic independence of the voices. *See also* **polyphony**.

deceptive/false cadence: Equivalent to a colon or semicolon; such a cadence brings resolution but not to the expected tonic harmony.

diatonic: Greek word meaning "proceeding by whole tones"; a seven-pitch collection.

diminished: Minor or perfect interval that is reduced by one semitone, e.g.: minor seventh, C–B-flat, becomes diminished when the minor is reduced by

one semitone to become C-sharp–B-flat. Diminished sevenths are extremely unstable harmonies that can lead in a variety of harmonic directions.

disjunct: Melodic contour that generally features leaps between pitches; such a melody will usually sound jagged and jumpy.

dominant: Pitch and chord five pitches above a given tonic pitch/chord. The dominant harmony is the chord most closely related to the tonic chord in a given key; the dominant chord will almost always immediately precede an appearance of the tonic chord.

duple meter: Metrical pattern featuring accented beats every two or four beats.

dynamics: Degrees of loudness, e.g., *piano* (quiet), *forte* (loud), indicated in a musical score.

enharmonic: Pitches that are identical in sound but with different spellings, depending on the key context, e.g., C-sharp and D-flat.

equal tempered: *See* **temperament**.

fermata: Pause.

flat: Accidental (sign/symbol) placed to the left of a note indicating that the pitch should be lowered by a semitone.

frequency: Rate of vibration of a string, column of air, or other soundproducing body.

functional harmony: Harmonic usage that was standardized and codified into a fully coherent system during the Baroque period. This method is still used by modern arrangers and orchestrators. The basic concept used in functional harmony is the fact that all harmonic sounds used in music may be classified in three large groups. These groups derive their names from the three important roots of the traditional harmonic system: the tonic,

dominant, and subdominant. In this way, they are comparable to the three primary colors used by the artist: red, yellow, and blue.

fundamental frequency: Rate of vibration of the full length of a sound-producing body and the sound created by that full-length vibration.

graded dynamics: Markings used to indicate a progressive increase in loudness or softness, respectively, *crescendo* ("getting louder") or *decrescendo/ diminuendo* ("getting softer/quieter").

half step: *See* **semitone**.

hemiola: Temporary use of a displaced accent to produce a feeling of changed meter without actually changing the meter.

home key: Main key of a movement or composition. *See also* **key**.

homophonic texture/homophony: Texture in which one melodic line predominates; all other melodic material is heard as being secondary or accompanimental.

interval: Distance between two pitches, e.g.: C–G (upwards) = a fifth.

inversion: Loosely applied to indicate a reversal in melodic direction. Harmonic inversion is a situation in which a chord tone other than the root is in the bass.

just intonation: *See* **temperament**.

K. numbers: Köchel numbers, named after Ludwig von Köchel, who catalogued Mozart's works.

key: Collection of pitches that relate to a specific major or minor mode.

klangfarbenmelodie: Term coined by composer Arnold Schönberg to describe a style of composition that employs several different kinds of tone

colors to a single pitch or to multiple pitches. This is achieved by distributing the pitch or melody among several different instruments.

major: Modern term for Ionian mode; characterized by an intervallic profile of whole tone–whole tone–semitone–whole tone–whole tone–whole tone–semitone (symbolized as: T–T–S| T–T–T–S).

measure: Metric unit; space between two bar lines.

melody: Any succession of pitches.

meter: Group of beats organized in a regular rhythmic pattern and notated in music as a time signature.

minor: Modern term for Aeolian mode; characterized by an intervallic profile of whole tone–semitone–whole tone–whole tone–semitone–whole tone–whole tone (symbolized as T–S–T | T–S–T–T).

modal ambiguity: Harmonic ambiguity, in which the main key is not clearly identified.

mode: Major or minor key (in modern Western usage).

monophonic texture/monophony: Texture consisting of only a single, unaccompanied melody line.

motive/motif: Brief succession of pitches from which a melody grows through the processes of repetition, sequence, and transformation.

movement: Independent section within a larger work.

natural: Accidental (sign/symbol) placed to the left of a note, indicating that the note should not be sharpened or flattened; a white key on a keyboard.

note: Pitch that has been notated.

octatonic scale: Scale of eight pitches per octave, arranged by alternating half steps and whole steps.

open cadence: Equivalent to a comma; such a cadence pauses on the dominant harmony without resolving to the tonic harmony, creating tension and the need to continue.

pedal note: Pitch sustained for a long period of time, against which other changing material is played. A pedal harmony is a sustained chord serving the same purpose.

pentatonic scale: Scale of five tones. It is used in African, Far Eastern, and Native American music. The pentatonic scale has been used in 20th-century Western compositions, as well.

pitch: Discrete sound with the attributes of timbre and duration.

pivot modulation: Change of key achieved via a pitch or pitches common to two chords.

pizzicato: Plucked pitches.

plagal/amen cadence: Generally occurs as a musical postscript following a closed cadence.

Plainchant/Gregorian/Old Roman chant: One of the earliest surviving styles of music in western Europe, attributed to Pope Gregory the Great. In reality, Gregory probably had little to do with the chant we know today, because the chants that survive in manuscripts date from the 11th to the 13th centuries, and Gregory died in the year 604. The surviving chants are modal, with monophonic melodies and freely flowing, unmeasured vocal lines. Most chants belong to the Mass or to the daily offices.

polyphonic texture/polyphony (contrapuntal texture or counterpoint): Texture consisting of two or more simultaneous melody lines of equal importance.

pythagorean comma: Discrepancy between the opening pitch and the last pitch in a circle of fifths, making the final pitch about an eighth of a tone sharp.

recitative: Operatic convention in which the lines are half sung, half spoken.

ritardando: Gradually getting slower (abbreviation: ritard.).

scale: All the pitches inside a given octave, arranged stepwise so that there is no duplication. The pitches of the Western scales were derived initially by Pythagoras and his division of a vibrating string into basic ratios. The names of the chords built on the scale-steps are: tonic, supertonic, mediant, sub-dominant, dominant, sub-mediant, leading tone.

semitone: Smallest interval in Western music; on the keyboard, the distance between a black key and a white key, as well as B–C and E–F.

sequence: Successive repetitions of a motive at different pitches; compositional technique for extending melodic ideas.

sharp: Accidental (sign/symbol) placed to the left of a note, indicating that the pitch should be raised by a semitone.

Sprechstimme: Vocal style in which the melody is spoken at approximate pitches rather than sung on exact pitches. The *Sprechstimme* was developed by Arnold Schönberg.

syncopation: Displacement of the expected accent from a strong beat to a weak beat and vice versa.

temperament: System of tuning in which, by way of compensating for the Pythagorean comma, some of the intervals are altered slightly from their acoustically pure ratios in order to allow instruments to play in most or all keys without undue harshness. Examples: just intonation (Pythagorean), mean-tone tuning, well temperament, and equal temperament (modern Western usage).

tempo: Relative speed of a passage of music.

texture: Number of melodies present and the relationship between those melodies in a given segment of music; they include monophony, polyphony (counterpoint), heterophony, and homophony.

theme: Primary musical subject matter in a given section of music.

timbre: Tone color.

tonal/tonality: Sense that one pitch is central to a section of music, as opposed to atonal/atonality.

tonic: Home pitch and chord of a piece of tonal music. Think of the term as being derived from "tonal center" (*tonic*). For example, if a movement is in C, the pitch C is the tonic pitch and the harmony built on C is the tonic chord.

triad: Chord consisting of three pitches: root, third, and fifth, e.g.: C/E/G, triad of C major.

triple meter: Metrical pattern having three beats to a measure.

tune: Generally singable, memorable melody with a clear sense of beginning, middle, and end.

well tempered: *See* **temperament**.

whole-tone collection: Divides the octave into six equal segments; a whole-tone scale ascends and descends by major seconds, or whole tones.

Biographical Notes

Aristoxenus (c. 364–304 B.C.E.): Greek philosopher and writer on music and rhythm; discovered harmonic elements in 320 B.C.E.

Milton Babbitt (b. 1916): American composer, teacher, theorist, and exponent par excellence of total serialism.

Johann Sebastian Bach (1685–1750): One of the greatest composers who ever lived, Bach's unsurpassed genius graced all genres of Baroque instrumental and vocal music except opera. His music combines intellectual rigor and structural control with exuberant and profuse melodic content. His influence on later generations of composers was profound.

Ludwig van Beethoven (1770–1827): German composer and pianist who radically transformed every musical form in which he worked; considered a key transitional figure between the Classical and Romantic Eras because of his Classical training and technique and Romantic range of expression. His music combined the spirit of the Enlightenment, the spirit of revolution, and the turmoil of the Napoleonic Era with his own personality.

Hector Berlioz (1803–1869): French composer who introduced the concept of an *idée fixe*, a single melody that unites an entire work but is gradually transformed throughout the course of the work. The first composer to closely associate his music with extra-musical programs.

Johannes Brahms (1833–1897): German composer whose compositions synthesize Classical forms with subtle, often highly impassioned expressive content and a propensity for intricate rhythms; considered a master of the German *lied*.

Dave Brubeck (b. 1920): One of the best known jazz pianists and composers, whose compositional output represents some of the finest 20th-century American jazz.

Frédéric Chopin (1810–1849): Polish-born composer who devoted himself almost exclusively to solo piano compositions that are masterpieces of subtlety and expressive nuance, unique in the repertoire. Chopin was the quintessentially Romantic composer, whose music was inspired by, and perfectly tailored to, the newly developed piano.

Claude Debussy (1862–1918): French composer who was the founder and most important representative of the Impressionist Movement in music, marking a significant break with the German musical tradition of his time.

George Frederick Handel (1685–1759): German composer of the Baroque Era whose works are characterized by grandeur and sustained power, simple melodies, and breadth and clarity of harmonic structures. Handel was responsible for the phenomenal popularity of the English-language oratorio.

Franz Joseph Haydn (1732–1809): Austrian composer who is regarded as the father of the symphony and string quartet because he defined and standardized the external and internal structures of those musical genres. His inventive genius, solid craftsmanship, and exuberant wit exerted a profound influence on younger composers, such as Mozart.

Scott Joplin (1868–1917): American composer and pianist whose ragtime music was revived in the movie *The Sting* (1974), bringing Joplin the justly deserved renown he never experienced in his own lifetime.

Ludwig von Köchel (1800–1877): In 1862, von Köchel published a chronological and thematic register of the works of Mozart. It is sometimes known today as the Köchel catalogue, and the so-called *K. numbers* are still used to refer to Mozart's works.

Gustav Mahler (1860–1911): Bohemian composer whose output consists almost entirely of late-Romantic-style symphonies and *lieder*. He used the

Classical forms of sonata and scherzo to frame a highly expressive harmonic and melodic palette, reflecting the *fin-de-siécle* mood of anxiety that took hold of Europe during his era.

Wolfgang Mozart (1756–1791): One of the greatest of all Western composers, Mozart possessed an impeccable sense of form and symmetry that was allied to an infallible craftsmanship and graced with what many have considered a "divine" inspiration. His musical genius produced a prolific number of masterpieces in every genre, representing the Classical style at its zenith.

Modest Mussorgsky (1839–1881): One of the five composers in Balakirev's group inspired by Russian folk melodies and rhythms; his *Boris Godunov* is the pinnacle of Russian opera.

Carl Nielsen (1876–1939): Danish composer whose music took a highly original approach to late musical Romanticism.

"King" Oliver (1885–1938): American jazz cornetist, bandleader, and composer who represents the finest of the New Orleans jazz style. The recordings he made with Louis Armstrong were the most influential of any early jazz recordings.

Jacopo Peri (1561–1633): One of the members of the Florentine Camerata, whose ideas laid the foundations for the evolution of opera. Peri's opera *Euridice* (1600) is the first complete opera to survive to modern times.

Pythagoras (c. 560–480 B.C.E.): Greek philosopher who theorized that music is a microcosm of the cosmos and ruled by the same mathematical laws that operate throughout the universe.

Samuel Scheidt (1587–1654): German organist, composer, and teacher of the late Renaissance/early Baroque Era; a skilled polyphonist who combined polyphony with Italian concerto style.

Arnold Schönberg (1874–1951): Viennese-born composer who developed the concept of *emancipation of dissonance*, through which he attempted to "free" his music from the shackles of traditional tonality. *Pierrot Lunaire* (1912) was the capstone to Schönberg's freely atonal period.

Robert Schumann (1810–1856): German composer, pianist, conductor, and critic. Schumann was noted for his poetic works, which fuse Classical structure with Romantic expression. His songs, particularly his song-cycles, are among the glories of *lieder*.

John Philip Sousa (1854–1932): American bandmaster and composer, known for his brilliant marches, of which *The Stars and Stripes Forever* is the most famous.

Johann Strauss II (1825–1899): Known as the "Waltz King," Strauss was the most renowned member of a family of composers of popular music and light opera; his *Blue Danube Waltz* is one of the most famous pieces of music ever written.

Richard Strauss (1864–1949): German composer who shone in two major areas: tone poem and opera. Almost single-handedly, he carried the Wagnerian opera tradition and the Romantic Lisztian tone poem into the 20th century. He is also one of the great composers of *lieder*.

Igor Stravinsky (1882–1971): Russian-born composer whose works are marked by nationalism and revolutionary use of rhythm and melody. His *The Rite of Spring* (1912) is one of the most extraordinary musical compositions of the 20th century.

Peter Ilyich Tchaikovsky (1840–1893): Widely popularized Russian composer, whose music is characterized by extreme tunefulness and emotional fervor, typical of Romantic musical trends.

Georg Philipp Telemann (1681–1767): German composer who mastered the Baroque German and Italian compositional styles and whose compositions represent the best of Baroque music.

Thomas of Celano (c. 1200–1255 C.E.): Franciscan monk believed to have composed the Catholic plainchant prayer for the dead *Dies irae* around 1225.

Tsai-Yu: Ming dynasty prince who described the principle of equal temperament in 1596, though traditionally Andreas Werckmeister is credited with inventing this concept in 1700.

Giuseppe Verdi (1813–1901): Prolific Italian composer whose career practically constitutes the history of Italian opera between 1850 and 1900. Verdi's style evolved slowly and almost entirely eliminates the differentiation between aria and recitative, elevating the orchestra and favoring characterization and dramatic truth over the vocal prettiness of the bel canto style.

Antonio Vivaldi (1678–1741): Italian composer and violinist. His importance lies in his concertos, for their boldness and originality and for their central place in the history of concerto form.

Richard Wagner (1813–1883): German composer who brought German Romantic opera to its culmination. Some of his most influential musical innovations include *continuous music*, the *leitmotif*, the *Gesamtkunstwerke*, and the development of the orchestra into full partnership with the voices.

Bibliography

Baker, Theodore, and Nicholas Slonimsky. *Pocket Manual of Musical Terms*. New York: Schirmer, 1995. An absolutely indispensable little handbook (inexpensive, too) that contains definitions, pronunciations, elements of music notation, and a biographical list of famous musicians.

Giancoli, Douglas C. *Physics: Principles with Applications*. New York: Prentice-Hall, 2002. Contains a chapter on the characteristics of sound, including pitch and frequency.

Grout, Donald, and Claude Palisca. *A History of Western Music*, 4th ed. New York: W. W. Norton, 1988. The standard academic music history text, it can be purchased with an anthology of all the music discussed in the text as well as a CD set containing recordings of all the music in the anthology.

Schonberg, Harold. *The Lives of the Great Composers*, 3rd ed. New York: W. W. Norton, 1997. Excellent and entertaining vignette-style biographies of "the great composers."

Webster's Seventh New Collegiate Dictionary. Springfield, MA: G. and C. Merriam Company, 1963.