

UNTYING GORDIAN KNOTS

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Contents

Preface	3
Audiation and Preparatory Audiation	4
Tonality, Keyality, and Key Sign	5
Meter, Macrobeats, and Microbeats	6
Movement, Breathing, and Dance	7
Content and Context	8
Music Aptitude and Achievement	9
Memorization, Imitation, and Memory	10
Measure, Time, and Meter Signature	11
Simple and Compound	12
Sameness and Difference	13
Individual Differences	14
Improvisation and Creativity	15
Five Music Vocabularies	16
Notation	17
Listening	18
Reading and Writing Music Notation	19
Language and Music	20
Music Learning Theory	21
Sequential Music Curriculum	22
Tonal and Atonal Music	23
Intricacies of Meter and Tempo	24
Transfigured Macrobeats and Doubly Combined Meter	25
Tonal Solfege	26
Rhythm Solfege	27
Signs and Symbols	28
Instrumental Readiness	29
Group and Private Lessons	30
Timbre and Range Preferences	31
Early Childhood Music	32
Criterion Referenced and Norms Referenced Tests	33
Measurement and Evaluation	34
Normative and Idiographic Evaluation	35
Rating Scales	36
Method, Techniques, and Objectives	37
Music Theory	38
Criterion Measure	39
Research	40
Bibliography	41
Index	46

Preface

Gordian knot: Intricate knot tied by King Gordus of Phrygia and cut by Alexander the Great with his sword after hearing an oracle promise whoever could undo it would be the next ruler of Asia.

Though I am attempting to undo various dilemmas associated with two types of Gordian music knots in forthcoming essays, I, unlike Alexander, have no illusion of becoming a sovereign or solving all impasses. Simply, I am, and expect to remain, a music educator, one trying to set the music record straight. The first type has to do with conundrums associated with understanding music. The second is allied to apprehensive mentors who resolutely resist causes of ambiguity being opened to scrutiny. Not a psychiatrist, my primary concern is inevitably with the first type. Perhaps music teachers and students, after reading, will unwrap troubling partiality by themselves. Whether or not the case, responses are welcome. You should know in advance, however, I use the words “the” and “that” sparingly. They are not unintended omissions.

Although order of the brief monologues has no special significance, those deemed to comprise fundamental information are positioned toward the beginning. When providing interdependent explanations, they are clustered. Contents and Index will be of assistance, however, in locating topics of initial interest and cross referencing.

My rationale is to stimulate contemplation by engaging you in thoughtful dialogue as you silently consider the monologues, presuming conciseness will contribute to your focusing on and contemplating salient concepts. They are mainly modified snippets taken from my books, monographs, research articles, and test manuals. The hope is a few paragraphs committed to a subject may entice you to consult relevant sources in the Bibliography comprised of my and other’s more inclusive writings. Because of interrelatedness of topics, some monologues supplement one another. If you are unfamiliar with particular terminology, glossaries will prove helpful.

It is no secret all musicians are or will become music teachers in one capacity or another. I trust forthcoming clarifications and implications will contribute to easing unwarranted burdens of both music teachers and learners. If I can at least create more music comprehensible audiences rather than singularly directing my attention to building individual concert stage careers, my efforts will be realized.

Audiation

Sound itself is not music. Sound becomes music through audiation. Audiation occurs when musicians assimilate and generalize in the mind sound of music they have just heard performed or have heard performed sometime in the past. They also audiate when assimilating and comprehending in the mind familiar or unfamiliar music they may or may not have heard but are reading in notation, composing, or improvising. Aural perception happens when sound is heard the moment it is produced. Sound becomes music and is audiated only after it is perceived aurally. Hearing is to perceive. Listening is to audiate.

Compared to what is often called music imagery, audiation is a more insightful process. Music imagery simply suggests a vivid or figurative picture of what sound of music might represent. It does not require assimilation and generalization of sound of music, as does audiation. Musicians may audiate while listening to, recalling, performing, interpreting, creating or composing, improvising, reading, or writing music. Listening to music with comprehension and listening to speech with comprehension involve similar processes. There are eight types and six stages of audiation.

Audiation, as opposed to imitation, which is the first step in learning to make best use of potential for audiation, are often confused. Imitation, sometimes called inner hearing, is a product, whereas audiation is a process. It is possible, and unfortunately too often the case, for one to perform music by imitation without engaging in audiation. It is not possible to imitate and to audiate simultaneously. Learning by rote is not the same as learning through understanding, whether the subject is history, mathematics, or music. Students cannot be taught to audiate. It comes naturally. Audiation is a matter of music aptitude. By providing students with appropriate knowledge and experiences, however, they can learn how to audiate, that is, how to use their audiation potential to maximize music achievement.

Audiation of music notation is called notational audiation. If a student is able to hear sounds of music and give contextual meaning to what is seen in music notation before performing it, before someone else performs it, or as it is being written, the student is engaging in notational audiation. Regrettably, many read or write notation without audiating music it represents. Knowing what music sounds like before one performs it improves intonation and audiation. A musician who can audiate is able to bring music meaning to notation. A musician who cannot audiate can only take theoretical meaning from notation.

Preparatory audiation includes three hierarchical types of learning. Acculturation, imitation, and assimilation. There are seven stages within those three types of learning. They follow the same natural path of learning as acquisition of language. Without expansive listening experiences in acculturation and ability to imitate, a child will be limited in assimilating and coordinating breathing and movement when learning how to audiate.

Tonality, Keyality, and Key Signatures

In common practice music theory, tonality is defined as either a name given to a key signature (for example, Eb) or a combination of a name given to a key signature and a tonality (for example, Eb major). Tonality is what is usually called mode, not simply a key signature. Mode does not pertain only to what is traditionally called modal music, such as Dorian or Mixolydian. Major and minor are also modes.

It is constructive to consider tonality and keyality apart from each other as well as apart from key signature. Although most music is in both a tonality and keyality, it is sense of tonality, not keyality, that provides a primary basis for audiating context in music. Tonality is defined by its tonal center (for example, do) which is called resting tone. A keyality has a pitch center (for example, C) which is called tonic. Keyality is emphasized particularly in instrumental music primarily for purposes of teaching reading of music notation. That would be acceptable if tonality and keyality were taught at the same time. Tonality requires more complex audiation than keyality.

A key signature is a symbol. It is seen in notation. Keyality is a sign. It is audiated. Any number of tonalities and keyalities may be associated with a key signature. For example, one sharp may indicate major tonality and G keyality, harmonic minor tonality and E keyality, Dorian tonality and A keyality, Mixolydian tonality and D keyality, and so on. Therefore, it is not possible to know keyality of music simply by seeing a key signature. Music needs to be audiated before its key signature can be assigned keyality and tonality.

When students are aware through audiation music is in major tonality, they have a sense of major tonality, and when in harmonic minor tonality, they have a sense of harmonic minor tonality. After students develop a sense of two or more tonalities, they audiate and perform a tonal pattern differently according to its unique relation to context of a tonality. Students without a sense of tonality usually imitate and perform a tonal pattern the same way regardless of tonality. Awareness of keyality does not necessarily contribute to a sense of tonality.

Meter, Macrobeats, and Microbeats

Rhythm has three components: macrobeats, microbeats, and rhythm patterns. They are audiated concurrently to establish rhythm context. Macrobeats are fundamental for audiating microbeats. Microbeats are fundamental for audiating rhythm patterns. Thus, microbeats and rhythm patterns are superimposed on macrobeats in audiation.

Microbeats are shorter than macrobeats and derived from equal division of macrobeats. When macrobeats are divided into two microbeats of equal length, the result is usual duple meter. When macrobeats are divided into three microbeats of equal length, the result is usual triple meter. When some macrobeats are divided into two microbeats and others into three microbeats, regardless of sequence of groupings, the result is usual combined meter. In usual combined meter, all macrobeats are of equal length but all microbeats are not. Rhythm patterns, in addition to rests, ties, and upbeats, may include macrobeats, microbeats, divisions, and elongations of macrobeats and microbeats.

Unusual meter is determined by how macrobeats are grouped in a rhythm pattern. It is number and relative lengths of macrobeats in a grouping that determine which type of unusual meter is audiated. When macrobeats are paired in a rhythm pattern, meter is unusual paired. It is paired because there are two macrobeats in a grouping and unusual because lengths of macrobeats are not equal. When all macrobeats are not paired, meter is unusual unpaired. It is unpaired because not all macrobeats in a grouping are paired and lengths of macrobeats are unequal. Although some macrobeats form pairs in unusual unpaired meter, one or more macrobeats go unpaired in a rhythm pattern. The listener, performer, or conductor subjectively decides through audiation which macrobeats, regardless of lengths, are paired and which one or more macrobeats go unpaired.

A macrobeat the length of one microbeat is an intact macrobeat. It is found in only unusual meter. Because an intact macrobeat is heard simultaneously with itself as its only microbeat, the two are concurrent in audiation and performance. Intact macrobeats can be divided into only divisions of microbeats. When at least one intact macrobeat is in a rhythm pattern, the rhythm pattern is intact. A rhythm pattern is in unusual paired intact meter when there are only paired macrobeats in a pattern and one or more macrobeats are intact. A rhythm pattern is unusual unpaired intact meter when not all macrobeats in a pattern are paired and one or more macrobeats are intact.

Intact macrobeats are always found in combination with longer macrobeats in a rhythm pattern divided into twos and threes or into only twos or only threes. A macrobeat may be paired with any other macrobeat, including another intact macrobeat or it may not be paired. It is decided subjectively in audiation which macrobeats are paired and unpaired.

Movement, Breathing, and Dance

Time, often thought of as counting and tempo, is given special attention in conventional rhythm instruction. Other dimensions of rhythm, however, are equally or even more important. For example, good rhythm requires coordination, deep breathing, freedom, flow, weight, relaxation, and balance. As they perform, seasoned musicians feel rhythm they are audiating as coming out of them. Rhythm is not forced onto or into music through arithmetic, counting, or notation. Jaques-Dalcroze referred to weight and flow as energy, sometimes as tension or plasticity. Rudolf Laban used time, space, weight, and flow to explain how we move and most naturally and musically perform macrobeats, microbeats, and rhythm patterns. In translation of Rudolf Laban's terms, time is sustained or quick. Space is flexible, indirect or direct. When sustained and flexible movements are combined, free flowing, continuous movement is a natural result. In contrast, when quick and direct movements are combined, as in stylized dance instruction, movement becomes time directed, indicative of rigid tempo.

Both weight and flow bear on music expression and interpretation. Weight is light or strong. Flow is free or bound. Marches evoke strong and bound movement, inducing tension whereas the blues elicits light and free movement, prompting ease. All four effort motions in various combinations with deep breathing play a formidable role in elegant artistic movement. For example, whereas tonal patterns move in irregular linear space toward and away from one or more tonal centers, rhythm patterns move in continuous circular space as they relate to number and groupings of underlying macrobeats. Tempo is allied with straightforward motion. Tonal patterns and rhythm patterns are audiated in nuanced time.

Time, space, weight, and flow interact with one another to create rhythm. As a result, musicians audiate and feel preparation, attack, and prolongation rhythmically. Furthermore, time, space, weight, and flow have special relation to macrobeats, microbeats, and rhythm patterns. Macrobeats are stressed, not accented, according to weight, either strong or light, and audiated and performed as paired or unpaired according to how weight shifts in the body. Also, they are performed in tempo in terms of time, slowly or quickly. Too much weight in performance will slow and too little will rush a tempo. Audiation of weight and continuous flow, in addition to time and space, are necessary to maintain consistent slow tempo, but only time and space are relevant when audiating and maintaining consistent fast tempo. Microbeats and rhythm patterns are performed in terms of both flow and space.

When movement is sustained, free flowing and continuous with complementary diaphragmatic breathing, it gives a feeling of space without time. That is good, because without feeling for space alone, space cannot serve adequately as foundation for time. Space can exist without time, but time is dependent on space. Thus, it makes sense audiation of time would be superimposed on audiation of space. Audiation of time without audiation of space interrupts natural flow of macrobeats, microbeats, and rhythm patterns. Regulated dancing is anathema to spatial free flowing, continuous movement and, thus, not conducive to engendering confident movement.

Content and Context

Language has words, phrases, and sentences. Words, which have uncertain and limited meaning when standing alone, represent content. When words are combined into phrases and sentences, they establish syntax and, thus, impart comprehensive meaning. So it is with music. Although music is not a language, music and language share common learning paths. Words are content in language whereas tonal patterns, rhythm patterns, and harmonic patterns are content in music. Syntax and grammar are context in language. Tonalties and meters are context in music. Pitch letter-names and time-value names of the music alphabet, like letters of the language alphabet, are minutia of content.

Consider a descending minor third, G to E. Though it is the same interval in both major and minor tonalties, it is audiated differently when heard in each tonality and different keyalties. That is, when resting tone is do, so mi has different intentionality than when resting tone is la. Thus, pitch letter names are a fixed system whereas movable do syllables with a do based major, la based minor or Aeolian, re based Dorian, mi based Phrygian, fa based Lydian, so based Mixolydian, and ti based Locrian is a flexible system. It naturally supports audiation of tonal patterns.

Similarly, rhythm solfege based on beat functions is a flexible system whereas time-value names of notes is a fixed system. For example, two eighth notes function differently in usual duple and triple meters. Rather than being referred to arithmetically, chanting du de in usual duple meter and du da in usual triple meter would contribute more to establishing audiation and, thus, musicianship.

When teachers establish tonality in relevant keyality and meter for classroom, choral, and instrumental students by singing tonal syllables and chanting rhythm syllables before a piece of music is performed, students establish context and, thus, content incorporates better intonation and meter. Better yet, students might sing and chant apropos syllables. A resting tone in constant audiation serves as a guide for identifying correct pitches in tonal patterns, and macrobeats and microbeats in constant audiation serve as guides for identifying correct durations and meter in rhythm patterns. Rhythm syllables are indispensable for keyboard and percussion students.

Music Aptitude and Achievement

Music aptitude is potential to learn music. Music achievement is music learned. It is customary to hear and use words such as “ability,” “talented,” “gifted,” and “musical.” They confuse issues by obscuring important distinctions between music aptitude and music achievement.

Audiation is fundamental to music aptitude and consequently to music achievement. Just as no person is void of at least some intelligence, no person is void of at least some music aptitude. More than two thirds of students are average. That is, they have average music aptitude. The remainder have above or below average music aptitude. Very few have exceptionally high or low music aptitude.

Level of music aptitude cannot be predicted accurately according to ancestry. Although genetic makeup is a determining factor in one’s level of music aptitude, it is important not to confuse innateness with heredity. Innate factors and interaction of unique combinations and connections of neurons and genes influence one’s level of music aptitude. There is no evidence, however, to suggest heredity plays a systematic role in determining those factors. Any precise prediction is chance occurrence. Regardless of parents’, grandparents’, or great grandparents’ level of music aptitude, a child may be born with high, average, or low music aptitude.

Before music aptitude stabilizes at about age nine, it is ever changing, moving up and down as it develops in association with environmental influences. Children are in the developmental music aptitude stage from birth to approximately age nine, and the stabilized music aptitude stage from approximately age nine onward. It is essential children receive highest quality informal music guidance and formal music instruction when in the developmental music aptitude stage because not only will their immediate level of achievement increase, their overall level of music aptitude, their lifetime potential for music achievement, will increase. Moreover, the younger children are, the more quickly they will profit from a fertile music environment.

The critical age for guidance in music is from birth to eighteen months of age. The sensitive age is sustained until approximately five years old. Children learn more during the critical stage than any other period of life. With appropriate early informal music guidance and formal music instruction, there is reason to believe every child’s level of developmental music aptitude can be brought back toward its birth level, though it is rare and perhaps impossible to bring it back to its exact birth level. Most children, for whatever specific reason or reasons, experience levels of developmental music aptitude that continually fluctuate. Without appropriate guidance and instruction, potential decreases. The extent children’s developmental music aptitude increases or decreases will, of course, ultimately have a profound effect on their formal music instruction and music achievement in and out of school. Most likely, early guidance and instruction will have far more influence on music achievement than formal music instruction received in the upper elementary grades, middle and high school, and even in conservatories, colleges, and universities.

Memorization, Imitation, and Memory

Just as persons can learn to say nonsense syllables, such as ah va di, or repeat a sentence in a foreign language and not give meaning to what they are saying, children can learn to sing rote songs without giving them music meaning; that is, without understanding context or content of the songs. Those children are, of course, imitating but not audiating.

Imitation is learning through someone else's ears. Audiation is learning through one's own ears. Students imitate when they repeat what they heard just a few seconds ago, which is immediate imitation, or when they repeat what they heard a while ago, which is delayed imitation. In either case, they are reactive responses and have only initial and limited value for learning because, unless students audiate what they have imitated, it soon vanishes.

When students audiate, they retain, instantiate, and "think about" what they heard seconds, minutes, hours, days, weeks, months, or even years ago. Audiation is an active response. When students imitate they know what to perform next in familiar music by remembering what was just performed. It is a process of looking backward. When students audiate, however, they know what to perform next, without negating memory, by anticipating in familiar music and predicting in unfamiliar music what is to come. It involves forward thinking. What is audiated plays a formidable role in how students learn. What students audiate is not forgotten. It becomes a component of more complex audiation.

Like imitation, memory (not memorization) and recognition are part of audiation processes. Alone, however, they are not audiation. Persons can recognize music even when it is performed with some incorrect pitches and durations and still not be able to audiate it. They might be aware of at most only its melodic contour and rhythm. Many persons who recognize "Happy Birthday" are unable to sing its resting tone, to identify and move to its fundamental beats, to hear its tonality and meter, or to specify chord progressions underlying its melody. Recall the last time you heard a radio commercial with an ordinary person singing, a group of waiters and waitresses singing in a restaurant, or fans singing the national anthem at a sports event. Without words used as support, rhythm would have been even more disturbing than intonation.

Most students and probably many musicians memorize music without audiating contextually. Memorizing music on an instrument is primarily related to fingering and other technical matters, not to audiation. There are persons who can play a melody on an instrument but are unable to sing what they played; play a variation of the original melody; play the melody in a different keyality, tonality, meter; play the melody with alternate fingerings; or demonstrate with body movement phrases of the melody? If they cannot do these things they are not audiating what they have performed. It is as if they were reciting words they had memorized without ascribing meaning to them.

Measure, Time, and Meter Signatures

A measure signature is not a meter signature. It does not indicate any one specific meter. Nor is it a time signature. It does not indicate a specific time or tempo. Because measure signatures are enrhythmic, different measure signatures may be used to notate the same meter and the same measure signature may be used to notate different meters. Meter of music is most appropriately determined through body movement and audiation rather than inadequate and misleading definitions.

Numerals in a measure signature refer to macrobeats or microbeats but not simply to beats. For example, numerals used to notate usual duple meter relate to macrobeats, as in $2/4$, where 2 indicates two macrobeats in a measure and 4, a quarter note, represents a macrobeat. Numerals used to notate usual triple meter relate to microbeats, as in $6/8$, where 6 indicates six microbeats in a measure and 8, an eighth note, represents a microbeat (dotted quarter notes representing macrobeats). Numerals used to notate unusual meters relate to microbeats. In $5/8$, for example, 5 indicates five microbeats in a measure and 8, an eighth note, represents a microbeat (quarter notes and dotted quarter notes representing macrobeats). Of course, an eighth note may also indicate an intact macrobeat. When $2/4$ is used to notate unusual paired intact meter or unusual unpaired intact meter, numerals in a measure signature do not automatically represent either macrobeats or microbeats.

Measure signatures used today have little in common with signs and signatures used during the Renaissance. Unfortunately, history accords little information about development of mensural signs and signatures used during that period. There is even less knowledge about the transition period from 1650 to 1800 when notational practices changed from mensural signs and signatures to new signs which evolved into present day measure signatures. Initially, in the 13th century, rhythm was notated in terms of set rhythm patterns called rhythmic modes. Trochaic mode included only one notated triplet grouping (for example, a half note followed by a quarter note), and anapestic mode included two notated groupings (for example, a quarter note and a half note followed by a dotted half note). Although both must have been audiated in usual triple meter, they were notated differently, possibly as a directive device for performers to engage in different stylistic interpretations. Perhaps trochaic became associated with $3/4$ and anapestic with $6/8$ during the transition, and arbitrary associations may have eventually led music theorists and historians to imagine music notated with different measure signatures was intended to represent different meters. In any case, it is unfortunate history of meter and rhythm must be based on arcane notational practice rather than original performance practice and audiation.

Simple and Compound

Simple duple, compound duple, simple triple, and compound triple, defined in terms of measure signatures, are often used to explain meter. Students are taught meter of music is determined by number of beats in a measure. How macrobeats are divided or grouped is ignored. For example, students learn music in $2/4$ is simple duple meter and music in $6/8$ is compound duple meter. Duple and triple can be audiated and demonstrated in movement but simple and compound cannot because their meaning hinges entirely on arithmetic associated with notation of measure signatures. Thus, it is curious the words “simple” and “compound” are used with abandon or even at all to attempt to define meter.

Further, students are taught music in $3/4$ is simple triple meter. This results from the mistaken belief note values indicate whether a note functions as a macrobeat or microbeat. Note values do not indicate types of beats. For example, a quarter note may be a macrobeat and an eighth note a microbeat in $2/4$, a dotted quarter note may be a macrobeat and an eighth note a microbeat in $6/8$, and a dotted whole note may be a macrobeat and a half note a microbeat in $6/4$. That $3/4$ and $6/8$ are claimed to represent different meters belies the fact underlying macrobeats and microbeats are audiated the same way. Just as two key signatures can be enharmonic, two measure signatures, such as $3/4$ and $6/8$, can be enrhythmic.

Music written in $9/8$ is commonly said to be in compound triple meter. Considerations about simple versus compound notwithstanding, it is important to understand in $9/8$, three dotted quarter notes together equal one macrobeat, because a dotted quarter note represents a microbeat, not a macrobeat, and eighth notes represent divisions of a microbeat. One measure of nine eighth notes in $9/8$ is audiated as if it were written as one measure of $3/4$ written with three eighth note triplets or as half a measure of $6/8$ written with three sixteenth note triplets. Three measure signatures— $9/8$, $3/4$, and $6/8$ —may be, and usually are, enrhythmic. All typically represent usual triple meter.

In performance, as expressed by a performer and heard by listeners, $6/8$, $3/4$, $9/8$, and $12/8$ do not symbolize different meters. Composers typically use $3/4$ and $9/8$ to simplify notation in usual triple meter including rhythm patterns with divisions of divisions of microbeats. For example, it is simpler to read and write a rhythm pattern of four sixteenth notes in $3/4$ than a rhythm pattern of four thirty second notes in $6/8$. Similarly, it is simpler to read and write a rhythm pattern of three eighth notes in $9/8$ than a rhythm pattern of sixteenth note triplets in $6/8$.

To complicate the problem, students are often taught music written in $4/4$ is called simple quadruple and music written in $12/8$ is called compound quadruple. That suggests a difference between music written in $2/4$ and $4/4$ and between music written in $6/8$ and $12/8$. Music written using one measure of $4/4$ is usually audiated as either two measures of $2/4$ or as one measure of $2/2$, all being usual duple meter. Music written using one measure of $12/8$ is usually audiated as two measures of $6/8$, both being usual triple meter.

Sameness and Difference

When repetition is emphasized and students continue to repeat what they have already been taught, learning becomes compromised. It is called overlearning. Wide ranging research indicates, regardless of whether 100% (allocating the same amount of time to relearn as it took to learn), 50% (allocating the half amount of time to relearn as it took to learn), or 25% (allocating one quarter amount of time to relearn as it took to learn), overlearning does not enhance learning.

The brain is a pattern making system. It looks for sameness because it is easier to recognize sameness than identify difference. Learning involves competition between stored patterns in students' brain and what they are actually encountering environmentally. Encouraging identification of difference rather than passive recognition of sameness is important in music education at all levels of instruction. Contradictory and strange as it may seem, the best way to make students aware of difference is to teach sameness, and the best way to make them aware of sameness is to teach difference.

Becoming familiar with literature in different tonalities, meters, styles, and interpretations stimulates awareness of difference. The more difference students attend to, the better they learn to understand sameness; that is, the more they gain additional music insight into individual pieces of familiar music. Furthermore, inherent in responsiveness to difference is making comparisons and inferring relationships. Such comparisons and relationships are naturally generalized and contribute significantly to gaining broad music intuition.

Students in elementary and secondary schools are not professionals. They are in learning modes, and that is why they are considered students. If and when few become professional performing musicians, flawlessness may take on importance. If, however, students have gained familiarity with many pieces of music, need to memorize to achieve precision in performance decreases, perhaps becoming nonexistent. Because students can audiate as a result of having had experience with various compositions, memorization renders itself unnecessary. When audiating, the mind is in control. When memorizing, fingers, hands, and arms are in control.

An example of sameness being a dubious educational goal is evidenced when a teacher performs an excerpt and advises a student to imitate exactly the interpretation, expression, dynamics, and tone quality of what was heard. It would be more advantageous if students heard multiple performances of the same piece of music, discerned relationships, made comparisons, and then choose with good reason for themselves one that made most sense musically. Another example of instruction that requires rethinking is practice of having students listen to a jazz artist's recorded performance and transcribe it note for note. Besides marginalizing improvisational dexterity, it raises sameness and conformity to a high standard. The more teachers attempt to make students into technicians, the more students' musicianship becomes limited and restrained.

Individual Differences

With few exceptions, students enrolled in classroom music in elementary and secondary schools are taught as if all have average potential to learn music. The situation is essentially the same for large instrumental music ensembles, first through last chairs notwithstanding. Prospective music teachers best learn early on music aptitude, which is potential to achieve in music, like intelligence and all other human capacities, is normally distributed. In any group of 30 or more, approximately two-thirds of students have average potential to achieve, approximately one-sixth above average or exceedingly high potential to achieve, and approximately one-sixth below average and extremely low potential to achieve. Teachers and professors alike are shocked by research findings indicating difference in music potential between highest and lowest scoring students in second grade is greater than difference between average scoring students in second grade and average scoring students in sixth grade. It is unconscionable to teach all students alike. Learning is improved when group music instruction is adapted to students' individual music needs and differences.

When instruction is adapted to students' individual music needs and differences, less able students do not become frustrated nor do more capable students become bored. All students experience success at their own level of potential. At the same time, when students are taught together in a heterogeneous class, students of lesser music aptitude learn better by listening to their more competent peers than from instruction by a teacher alone. Likewise, more able students profit by assisting others. Just as we learn what something is by learning what it is not, so we learn what and how to do something by learning what not to do and how not to do it.

Students with high music aptitude need as much individual attention as those with low music aptitude. It would be misguided to assume students with high music aptitude are capable of teaching themselves and learning all they need to know without much assistance. Although students in the high aptitude group may appear to understand and learn quickly, they must not be given less attention than the remainder of students in a classroom. Unless students with high aptitude are taught and evaluated in terms of their potential to learn, they will achieve less and less, and in time lose motivation to achieve at all. If neglected, they are ones who most likely will discontinue participation in school music activities. Ironically, a majority form or join "garage" bands and attain acclaim among peers.

Improvisation and Creativity

The word “improvisation” is embedded in Latin *improvisus*. It means not provided or not foreseen. Many professors believe improvisation can be taught academically. It cannot. Experience performing with a group of jazz and classical musicians is indispensable, not formal instruction. Mistakes must be made in performance among compassionate friends before imaginative improvisation can become secure.

There are various ways to improvise in singing and instrumental performance. Three popular approaches are: 1) performing variations of a melody in the same or different styles, 2) performing scale patterns associated with chord symbols, and 3) performing original melodies superimposed on a progression of harmonic patterns or performing a progression of original harmonic patterns that support a melody. In the first approach, variations of a melody are performed without necessarily being conscious of the progression of harmonic patterns that forms foundation of the melody. In the second approach, melodic fragments are performed based on scales associated with chords. In the third approach, a melody is improvised over a progression of harmonic patterns in much the same way it was done using figured bass during the Baroque, so progressions of harmonic patterns direct performers in improvising a melody, or a melody directs performers in improvising progressions of harmonic patterns. The harmonic pattern approach requires audiation whereas the other two require simple imitation or memorization.

Research findings indicate readiness to improvise has progressive characteristics. From least to most readiness is 1) not knowing a chord change has occurred, 2) knowing a chord change has occurred but not knowing the nature of the change, 3) knowing a chord change has occurred and also knowing the nature of the change, and 4) knowing a chord change has occurred, knowing the nature of the change, and also predicting what chords might logically follow in the progression. There is a special case of a lack of readiness to improvise harmonically. It is when a student knows a chord change will occur but does not know when in music time it will occur. Though a teacher may believe that represents a tonal problem, it does not. The difficulty resides with rhythm, particularly a student's inability to move in a free flowing, continuous manner in space. A student who displays this type of incapacity generally has low rhythm aptitude.

The main difference between creativity and harmonic improvisation is, whereas a composer creates a composition with specific, unique logic of its own, a performer improvises a melody based on standard progressions of harmonic patterns. Position or inversion is irrelevant to the context in which it belongs. To improvise harmonically, students first learn some basic harmonic patterns. They do not initially learn to improvise harmonic patterns; rather they learn to improvise rhythm patterns and tonal patterns separately and then combinations of tonal patterns and rhythm patterns (melodic patterns) over harmonic patterns. After students become familiar with some harmonic patterns, they are ready to improvise using familiar and unfamiliar tonal patterns and rhythm patterns in relation to those familiar harmonic patterns.

Five Music Vocabularies

Music literacy comprises more than reading and writing music notation. It includes listening, performing, and improvising. Of the five sequential music vocabularies, largest is listening, then performing, then improvisation, then reading, and finally writing. Without large and comprehensive music listening, performing, and improvisation vocabularies, students have little opportunity to acquire even limited music reading and writing vocabularies.

Just as preschool children develop a foundation for listening and speaking vocabularies very early in life, so must they develop a foundation for listening and singing and chanting vocabularies long before they enter school. Without developmental preliminary language vocabularies, children are limited in their ability to learn to understand, speak conversationally, read, and write language. Similarly, without comparable music vocabularies, they are equally disadvantaged in learning how to listen to, perform, improvise, read, and write music.

In language, children stop imitating when they are able to think and speak familiar words in familiar and unfamiliar order and ask and answer questions. In music, they stop imitating when they are able to audiate and perform familiar tonal and rhythm patterns in familiar and unfamiliar order and conceive music of their own choosing. Both thinking and improvisation vocabularies are predicated upon creativity. It would be unconscionable not to expect children to develop a thinking vocabulary. However, it appears to be acceptable by society for persons to go through life without developing an audiation vocabulary. The extent students learn how to audiate depends not only on their music aptitude but also on size of tonal pattern and rhythm pattern vocabularies.

Just as words are basic units of meaning in language, so tonal and rhythm patterns are basic units of meaning in music. It is words, not individual letters, that make possible our understanding of language. The more words students have in their listening, speaking, and thinking vocabularies, the better able they are to comprehend what is said to them and make and draw conclusions of their own. In music, patterns of sound, not individual pitches or durations, make practical audiation possible. An individual pitch or duration has only possibilities for meaning. The more tonal patterns and rhythm patterns students have in their listening, performance, and improvisation vocabularies, the better they will conceptualize from and form generalizations about music they hear or produce. Students who have limited listening and performance vocabularies are likely only to imitate and not audiate. Thus, it is more important for students initially to be familiar with many patterns even if they are not able to read many if any of them than it is to be familiar with a few patterns and be able to read all of them.

Pauses and breaths between a teacher's performance and students' repetition are crucial when teaching tonal patterns. The pause blocks imitation and the deep breath inspires audiation. When students are audiating macrobeats and microbeats, pauses are unnecessary when teaching rhythm patterns.

Notation

Knowledge of change in music pedagogy undertaken around 1800 can diligently affect how music is currently taught as well as musicianship of those who are teaching. Some methods used two hundred years ago still have value. Startling as it may seem, most important elements of music, those surrounding interpretation, cannot be put into music notation. Good musicians are able to audiate all they see in music notation but all they audiate cannot be put into music notation.

Nuances in music notation underwent constant alteration into the 17th century until the end of the 18th century. Symbols had ambiguous meanings. For example, from 1650 until 1800, what are justly called measure signatures had a variety of meanings during that transition period from old to new signs. Also, articulation ciphers, dots, ties, slurs, and accents were interpreted in ways significantly different from how they are defined today. Differences in timbres and tone qualities were prevalent as was instrumentation. Just as no 17th century violinist could have done justice to Brahms, contemporary violinists are rare indeed who can render a valid performance of repertoire composed during the Renaissance.

Importance of competently interpreting music notation for performing complex compositions cannot be denied. The compelling issue, however, has to do with improvisation. It is no less important than reading. Unrestrained improvisation was ubiquitous until the end of the 18th century, and such artistry was expected. It was indigenous of music practice. In the 17th and 18th centuries, a so-called adagio player improvised freely and embellished a composer's work. Many composers supplied only outer parts, middle parts to be imposed through improvisation by performers. Moreover, some staves were left blank with that in mind. Thorough bass was a type of shorthand that guided an improviser in anticipating harmonic flow of a piece of music. Certainly, what performers were to play was not always strictly spelled out in music notation. Cadenzas are a good example. It is well to remember 2nd endings were not always intended as repeat signs. It was assumed adagio players, being familiar with what they had already heard, would improvise an exciting counterpart rather than repeat phrases and bore listeners.

Except for competent jazz, reggae, bluegrass, and country musicians along with performers of other styles of popular music, improvisation has become dormant among most performers who are considered classical musicians. All but a few who do improvise overlook harmonic progressions. They tend toward variations of a melody while juxtaposing stylistic renditions. Prospective music educators are taught to perform precisely what is seen in notation and to accomplish that with anticipated, flawless technique. They would become more reasonable and artful teachers if they learned to improvise and graciously passed on that ability to students.

Listening

Attention span of young children is brief, perhaps no longer than a few seconds. Thus, it is best to play short sections of music, or music with frequent shifts in dynamics, timbre, and tempo, to encourage children to continually redirect their attention to music. Performances by large ensembles are preferable to small chamber groups or soloists because it tends to be more varied and dramatic. Music with inordinate repetition is least preferable. It is not possible to harm children by allowing them to listen to too much music. However, just as it cannot be expected babies can learn a language by listening to recordings, it is not likely they can learn to audiate by listening to recordings without being sung and chanted to on a one to one basis.

It is best not to force children to listen to music, nor should it be discontinued when they are not attending to it. There is little doubt young children derive as much benefit from listening to music when they appear to be inattentive as when captivated. In fact, listening experiences can be just as great or greater when children are moving around a room (active listening) as when sitting and quietly listening to music (passive listening). Of greatest value to young children is when they have as much opportunity as possible to consciously and unconsciously absorb sounds of music around them. Well informed parents and teachers do not force children to move, nor do they move children's arms, legs, or any other parts of the body for them, not even when children seem to enjoy it. However, parents and teachers may move with children, rhythmically tap them, or hold them in their arms as they themselves are moving.

It is advantageous for parents, teachers, and other adults to portray confident facial expressions, exuding warmth and approval, as they make young children aware of sound quality of a singing voice (in contrast to sound quality of a speaking voice) and body movement. Also constructive is hearing other children sing and chant and watching them move. Short songs and chants with repetition and sequence are best when performed without words because that is critical for focusing on music, not language. One, two, or three syllables (such as "bum," "bah," "ma," "ta," and "da") performed with music inflections are ideal. These syllables emanate from front of the mouth where babies initiate their sucking and vocalizations and, thus, quickly identify with another's articulation. After students are able to perform a song or chant without words, text might be added as an accompaniment for enjoyment.

The same syllables need not be used over and over again for the same song or chant and, of course, different syllables may be used with different songs and chants. If a teacher or parent finds it necessary on occasion to use words, it should be to give older children directions for participating in activities, such as movement, and, if necessary, to regain interest of children. However, parents and teachers must take care so children do not attempt to learn to associate specific words with a song or chant.

Reading and Writing Music Notation

Learning to read and write music notation helps students better grasp what they can already audiate. Unfortunately, when students are not taught how to audiate, they tend to force an alphabet on music notation, focusing on individual pitch letter-names instead of series of pitches (tonal patterns) and individual time-value names instead of series of durations (rhythm patterns). They depend on decoding notation because they cannot audiate. For students who can audiate, notation becomes a picture of what they are audiating. In Chinese, which has no alphabet, logographs or logograms (picture words) are read and written as complete words. Individual parts of a picture are not given consideration. Similarly, all students enthusiastically learn to read and write music notation when tonal patterns and rhythm patterns are taught as picture words. Just as children learn to read language aloud before they begin to read silently, they gainfully learn to read music notation by singing and chanting what they read before they begin to read silently. If reading becomes a mechanical matter of decoding and writing becomes a tedious matter of copying, notation cannot “sing” to students.

Accomplished musicians likely audiate everything they see in notation, but because of imprecision of notation, they are not expected to put into notation everything they audiate. Unless musicians audiate music they read and write, it is not probable notation will impart imbedded music meaning. Many young pianists who cannot audiate use piano keys the way they do pitch letter-names and time-value names, as just another set of music meaningless symbols that activate the decoding process. Without audiation, notation can reveal little. Notation assists only in recalling what has been already audiated. Recalling in audiation familiar patterns seen in unfamiliar music allows musicians to engage successfully in what is mistakenly called sight reading.

Sight is involved in reading both familiar and unfamiliar notation. If students can read, they can sight read because they are always using eyes when reading. One either reads or does not read, and no matter how many times a piece of music has been read, if it is being audiated, something new is being seen and given back each time. Are students asked to sight read a book they have not seen before? No, they are simply told to read it.

Many teachers find it easier to teach notation because unlike audiation, it is concrete. It is seen. And perhaps tonal and rhythm dimensions of music receive more attention in notation than other dimensions because they are more tangible. Even when properly developed, reading music notation is more difficult for most students to learn than reading language because spaces between words as well as punctuation provide clues to the reader. There are no similar hints in music notation. Certainly concepts of up, down, high, and low are abstractions whether or not associated with notes on the staff.

Language and Music

Currently there are approximately 6,000 spoken languages throughout the world but about only 200 are written. Because unwritten languages have no prescribed grammar, they are more flexible and can easily change and be expressive. Similarly, in countries bereft of music theory and notation, performance is audiated and improvised. Nevertheless, it may not be as complicated in harmony, rhythm notwithstanding, as written music. Both audiation and notation have a place in music education. It is sequence, however, in which they are taught that is of incontestable consequence. Audiation provides readiness for artfully reading and writing music notation.

During Renaissance activity, and probably before, artist musicians were adept at improvisation, which naturally incorporated audiation. Unfortunately, in the late 1800s, music reading and music theory for various dubious reasons became dominant over audiation, culminating in writings of a professor of musicology who taught at University of Leipzig in Germany. He, Karl Wilhelm Julius Hugo Riemann, arbitrarily established artificial rules of music theory and rituals for music notation, still observed today in many if not most universities, colleges, and conservatories.

A parallel situation existed a century earlier in England with regard to the English language. Rules of grammar based on Latin and Greek were formalized by Robert Lowth in 1762 and Lindley Murray in 1794. As a result of all this, advantages and disadvantages for both music and language accrued. Vocabularies increased, writing became standardized, and great composers' works could be preserved. However, language became less spontaneous and writing developed forms of rigidity. The same is the case for music with regard to regrettable disenfranchisement of audiation and improvisation. Many formally unschooled performers of popular music, with benefit to all, primarily still persevere the aforementioned two attributes.

Value of singing and chanting tonal patterns and rhythm patterns to young children cannot be overestimated. Consider language. Linguists estimate at one time or another there were around 30,000 languages spoken throughout the world. Only 6,000 still exist. In fact, 300 were spoken by native Americans. Why does a language disappear? The reason is parents do not speak the language to their children. If one generation of adults does not acculturate babies of the next generation to a language, that language is forgotten. Only one skipped generation is all it takes for a language to vanish. Languages are learned with ease and unconsciously by babies, but by age thirteen or so, it is learned mechanically and poorly through force. Much of the same may be said for music. Unless babies are acculturated to tonal patterns and rhythm patterns by capable adults, quality of music declines. Unfortunately, that is becoming more and more the case.

Music Learning Theory

The word “education” is closely associated with music learning theory and the word “educe.” To educe is to draw or bring out, to elicit, and the primary goal of education is education of learning. A teacher’s role is to guide learning according to each student’s individual capability. That is most efficiently accomplished when teachers understand how students learn. Possessing that knowledge is more important than being well informed about various methods of teaching. Music learning theory is an explanation of how students learn music. It is not intended to be interpreted as a theory of teaching. Thousands of methods of teaching music may be spawned from music learning theory. Learning is concerned with a teacher understanding needs of each student, whereas teaching is concerned with all students understanding a teacher.

Two generic types of learning are discrimination and inference, discrimination serving as readiness for inference. In discrimination learning, students are taught familiar tonal patterns and rhythm patterns along with related knowledge and information. As a consequence of discrimination learning, in inference learning students teach themselves by making generalizations about what they have been taught to discriminate and what they have learned inferentially; that is, what they already know and are continuously teaching themselves. Teaching is from the outside in. Learning is from the inside out.

The aural part of aural/oral is listening and the oral part is singing tonal patterns and chanting rhythm patterns. Verbal association is application of solfege to the familiar sounds of tonal patterns and rhythm patterns. In partial synthesis, students associate contexts of tonality with tonal patterns and contexts of meter with rhythm patterns. Symbolic association is when students begin to read and notate familiar tonal patterns and rhythm patterns. The final level of discrimination learning, composite synthesis, occurs when students not only read and write music notation, they do so contextually. Given a background in discrimination learning, students have readiness to make inferences and identify unfamiliar tonal patterns and rhythm patterns by recognizing familiar pattern counterparts. That happens in generalization in terms of its sublevels. Next is creativity/improvisation which also has sublevels. Last is theoretical understanding with its sublevels; it is popularly referred to as music theory.

There is also a tonal learning sequence and a rhythm learning sequence. Tonal and rhythm content and context is combined with skills for music learning to take place. There are principles for combining tonal learning sequence with skill learning sequence and for combining rhythm learning sequence with skill learning sequence.

A special attribute of music learning theory is its sequential structure. It guides rational learning. For a variety of circumstances, however, students do not always learn as intended. When that occurs, reinforcement is imperative. Forward movement from level to level is reversed. By going backward in sequential order, it can quickly be discovered which level of learning needs review or has been inadvertently skipped.

Sequential Music Curriculum

Even though they do not incorporate sequential objectives, many textbooks written for teachers are commonly referred to as methods books because they include teaching techniques for classroom music or performance techniques for teaching instrumental music. Audiation is considered only indirectly if at all. Some music books include objectives ordered according to students' chronological age, physical and social maturity, and personality characteristics. In others, objectives are ordered in terms of holidays and literary or biographical factors associated with music and composers. Some, illogically planned as they may be, are based on music notation and music theory. Ignored in such books is the sequential ordering of objectives based on how music skills interact with one another; how tonalities, meters, tonal patterns, rhythm patterns, and harmonic patterns interact with one another; and how music context and content interact with each other.

Discussions of timbre, dynamics, and abstractions, such as high/low, up/down, long/short, and even/uneven are mistakenly highlighted. Explanations of form and style along with folk dancing and programmatic storytelling evade fundamentals. Overall, a majority of classroom music instruction represents transitions from informal music guidance at home to inappropriate formal music instruction in school. Differences among them are found in techniques offered, quality of music literature, and extent to which dance is taught and instruments are used.

Traditional beginning instrumental books have similar boundaries. Development of instrumental technique and objectives are based principally on a combination of personal experience of authors and teachers who use them. That is, authors expect teachers to teach the way they themselves were taught. Even though performance might be taught before reading, imitation and memorization rather than audiation predominate. Contrary to what many believe, it is rare for comprehensive audiation to be acquired simply by learning to play an instrument or by learning to read notation.

Despite pith and significance of method based on music learning theory, importance of teaching techniques cannot be underestimated because inadequate ones may prevent a sequential objective from being met even when instruction follows music learning theory. Nevertheless, without appropriate method, techniques and teaching inevitably lack direction. Adroit techniques and material may contribute to student interest, but appropriate method based on audiation is fundamental to student motivation.

A teacher may initiate students' interest in music but interest will soon dissipate if students are not motivated by success in learning. Students are ensured success when sequential objectives are formulated in terms of skill development, and when tonalities, meters, tonal patterns, rhythm patterns, and harmonic patterns are taught sequentially using techniques enhancing audiation.

Tonal and Atonal Music

In unitonal music, one objective tonality is sustained throughout. Multitonal music includes at least two, though usually more, objective and subjective tonalities. The fewer tonalities in multitonal music, the greater possibility each will be audiated objectively. Even if a composer's purposeful intent is to write music bereft of tonality, a listener with a sense of tonality who is giving meaning to music will most likely impose one or more subjective tonalities on the music as it is being audiated. A composer controls to a limited extent what a listener audiates. Meaning is ultimately given to music by listeners.

In music learning theory, music commonly referred to as atonal is called multitonal. Multitonal is preferable because so called atonal music is not without tonality. Extensive multitonal music includes many rapidly changing tonalities, usually in association with many rapidly changing keyalities. Thus, music probably sounds atonal only to persons who cannot audiate rapid changing tonalities and keyalities. That atonal has been misunderstood and misused is attested to even by Schoenberg, the composer credited with having developed the twelve tone system.

Music can be unikeyal and multikeyal as well as unitonal and multitonal. In unikeyal music, one objective keyality is sustained throughout. Multikeyal music includes at least two though usually more objective and subjective keyalities. It is most common and easiest to audiate unitonal and unikeyal music. Music may be unitonal and multikeyal, multitonal and unikeyal, and multitonal and multikeyal. Most persons find it more difficult to audiate multitonal and multikeyal music than either unitonal and multikeyal music or multitonal and unikeyal music.

Monotonal, polytonal, monokeyal, and polykeyal relate to music having two or more simultaneously sounding parts as opposed to unitonal, unikeyal, multitonal, and multikeyal which refer to music having only one part. Music described with prefixes uni and multi moves horizontally. Music described with prefixes mono and poly moves both horizontally and vertically. Two or more simultaneously sounding parts in monotonal music are in the same tonality. Two or more simultaneously sounding parts in monokeyal music are in the same keyality. Two or more simultaneously sounding parts in polytonal music are in two or more tonalities. Two or more simultaneously sounding parts in polykeyal music are in two or more keyalities. One or both parts in polytonal music may be unitonal or multitonal, and one or both parts in polykeyal music may be unikeyal or multikeyal.

When audiating polytonal music, only one of two or more objective and subjective tonalities seems to emerge as compelling, though a compelling tonality in polytonal music usually changes as tonalities alternate. Similarly, when audiating polykeyal music, only one of two or more objective and or subjective keyalities seems to emerge as compelling, though a compelling keyality in polykeyal music usually changes as keyalities alternate.

Intricacies of Meter and Tempo

Music is called unimetric when only one usual or unusual meter is used throughout a piece of music. When two or more meters are used, music is called multimetric. When only one tempo is used throughout a piece of music in usual meter, music is called unitemporal. When two or more tempos are used in a piece of music in usual meter, music is called multitemporal. Because music in unusual meter includes macrobeats of different lengths, it is always multitemporal, regardless if it is unimetric or multimetric.

Unimetric and unitemporal patterns collectively become multimetric and multitemporal in music in usual meter when meter, tempo, or both change throughout the piece. To be considered multimetric, music includes at least one meter modulation, such as usual duple meter moving to unusual unpaired meter, and to be considered multitemporal, music in usual meter includes at least one tempo modulation, such as slow moving to fast. When music in usual meter is both multimetric and multitemporal, it includes at least one meter modulation and at least one tempo modulation, such as usual triple meter in fast tempo moving to usual combined meter in slow tempo.

Music in usual meter is considered multimetric or multitemporal when it includes meter modulations or tempo modulations with or without changes of measure signatures. Music in usual meter becomes multitemporal when tempo markings and metronome markings change or when notes of the same value maintain the same duration when a change of meter takes place. Again, music in unusual meter is always multitemporal. Although much multimetric music is multitemporal, music may be multimetric without being multitemporal. That occurs when different meters constituting a piece of music are all usual, each in extended sections (so not possibly to be confused with usual combined meter), and when all macrobeats are performed at the same tempo. A piece of music may be multitemporal without being multimetric when it is in any one of the unusual meters, or when it is in any one of the usual meters with one or more tempo changes.

Polymetric, polytemporal, monometric, and monotemporal music includes at least two rhythm patterns sounding at the same time. In monometric music, all simultaneously sounding patterns are in the same meter whereas in monotemporal music, all simultaneously sounding patterns may be in usual duple, usual triple, usual combined meter, or in any combination of the three, so long as all are performed at the same tempo. In polymetric music, all simultaneously sounding patterns are in different meters. Music is both polymetric and polytemporal when it includes both polymetric and polytemporal patterns, though one or both parts in polymetric music may include unimetric patterns or multimetric patterns. One or both parts in polytemporal music may include unitemporal patterns or multitemporal patterns. As a result of different lengths of macrobeats, music in one or more unusual meters automatically becomes polytemporal when all simultaneously sounding parts are in the same meter. If one or both simultaneously sounding parts are multimetric, music becomes polymetric, and if one or both of the simultaneously sounding parts are multitemporal, music is polytemporal.

Transfigured Macrobeats and Doubly Combined Meter

When two macrobeats are audiated in place of one expected macrobeat, as in a quintuplet, the two macrobeats are called transfigured. With a septuplet, three transfigured macrobeats are audiated in place of one macrobeat. For example, in $5/4$, unless intact, there are five microbeats (quarter notes) and two macrobeats (half note and dotted half note) in a rhythm pattern. In $7/4$, unless intact, there are seven microbeats (quarter notes) and three macrobeats (two half notes and dotted half note) in a rhythm pattern.

Another form of transfiguration occurs when fewer macrobeats than expected are audiated, for example, when a quarter note triplet is written in $2/4$, and only one macrobeat is audiated. Of course, $2/4$ does not preclude the possibility of unusual meter. A sextuplet is not audiated in terms of transfigured macrobeats but rather as comprising two underlying macrobeats, each including two groupings of three microbeats, or as three underlying macrobeats, each including three groupings of two microbeats, not to be confused with divisions of microbeats in terms of triplets and duplets.

Doubly combined meter, often found in multimetric and polymetric music, occurs when two or more groupings of three microbeats are superimposed on underlying macrobeats of different lengths in conjunction with at least one grouping of two microbeats superimposed on an underlying macrobeat of any length, or when two or more groupings of two microbeats are superimposed on underlying macrobeats of different lengths in conjunction with at least one grouping of three microbeats superimposed on an underlying macrobeat of any length. Because macrobeats are necessarily of different lengths, doubly combined meter is audiated as unusual meter regardless of how it is notated. A sixteenth note triplet, written in $2/4$, $5/4$, or $7/4$, would not introduce doubly combined meter because it is typically audiated as a division of an underlying microbeat.

Tonal Sofege

There are various tonal systems for associating names with pitches in tonal patterns and various rhythm systems for associating names with durations in rhythm patterns. Commonly known tonal systems include 1) pitch letter-names, 2) pitch interval names, 3) numbers, 4) immovable-do, otherwise called fixed-do, in which C is always do regardless of keyality, and 5) movable-do, in which placement of do changes in accordance with keyality. There are two versions of the movable-do system.

Movable-do with a la based minor patently offers most advantages of all tonal systems. Not only is do movable, as is 1 in the number system, to correspond to keyality, but name of the syllable changes to correspond to tonality. This change is indispensable to development of audiation which in turn affects reading and writing skills. Regardless of keyality, with do audiated as resting tone, tonality is major; with la, harmonic minor or Aeolian; with re, Dorian; with mi, Phrygian; with fa, Lydian; with so, Mixolydian; and with ti, Locrian. In the movable-do system, ascending chromatic syllables are di, ri, fi, si, and li. Enharmonic descending chromatic syllables are te, le, se, me, and ra.

There are other advantages to the movable-do system with a la based minor. 1) Provision is made for chromatics with logically related but independent syllables which provides for si in the fundamental tonality of harmonic minor as well as chromatic patterns in all tonalities. 2) Typical modulations in multitonal and multikeyal music can be performed without technical difficulties. 3) There are no consonant syllable endings. 4) Syllables remain logically consistent within tonality regardless of keyality. For example, although syllables in the pattern do mi so have relatively the same sound relation regardless of tonality or keyality in which they are found, they also have benefit of relating to varied content, such as tonic in context of major tonality or dominant in context of Lydian tonality. Thus, audiation of tonal patterns is consistent within tonality regardless of keyality.

Despite these advantages, the movable-do system with a la based minor is not perfect. Because there are no syllables for a raised third and lowered fourth, they are performed using the enharmonic syllables fa and mi. Enharmonics for the raised seventh and lowered tonic are do and ti. Moreover, there is an illogical reversal dating back to Guido where, consistent with descending chromatic syllables, ra should actually be called re. Stated the other way around, consistent with diatonic syllables fa and la, re should be called ra. If tradition were not an imposing factor, an ideal restructure would be to rename the scale sequence do ra mi fa so la ti do. Finally, other than for modulations in which the same key signature is shared, as in Eb major and C minor, different pitches are performed using the same syllable.

Rhythm Solfege

There are various rhythm systems for associating names with durations in rhythm patterns. Commonly known rhythm systems include 1) time-value names of notes, 2) syllables and names based on time-value names of notes, 3) words related to eurhythmic activities and mnemonics, including 1-e-and-a time keeping scheme, 4) syllables based on beat functions, such as macrobeats and microbeats, and 5) fusion approach. With specific regard to music learning theory and development of audiation, the beat function system is most advantageous. They are described below.

* Different syllables are used for macrobeats and microbeats in all meters. Thus, patterns within a meter as well as patterns in different meters, including both usual and unusual, are distinguished by use of different syllables logically related and easily generalized. Numbers are not used.

* Different syllables are used for successive microbeats in usual triple meter depending on their placement in a pattern, not in a measure.

* Regardless of meter in which they are found, macrobeats are always associated with the same syllable. Thus, macrobeats of different lengths in unusual meters, compared to usual meters, and those found within each unusual meter, share the same syllable. Further, the same syllable is used for all macrobeats regardless of placement in a measure. Thus, need for counting is eliminated and tempo remains stable and consistent.

* Because the same syllable is used for all macrobeats in a measure and a different syllable is used for each microbeat, with syllables for microbeats changing to indicate different meter, students are guided in distinguishing between macrobeats and microbeats in all meters and among meters themselves. Just as students demonstrate a sense of tonality when they audiate do as resting tone in major tonality and la as resting tone in harmonic minor tonality, they demonstrate a sense of meter when they audiate microbeats in different meters using different syllables and audiate microbeats with unique syllables in unusual meters. Thus, they distinguish length and groupings of macrobeats.

* The same syllable is used for division of a microbeat into two parts regardless of meter and placement of divisions in a pattern or measure.

* In the case of an elongation, be it of a macrobeat, microbeat, or division of a microbeat, the same syllable is sustained throughout. Most important, it is continued without imposing dynamic accents for consecutively connected macrobeats or microbeats.

* Syllables given to durations in a pattern are also audiated (chanted silently) for rests corresponding to beats and divisions of beats. Therefore, rests naturally become a functional part of the pattern they precede, follow, or both.

* Syllables used for complete patterns are also used for upbeat patterns, each phrased in association with the first macrobeat of the complete pattern it precedes.

Signs and Symbols

Signs and symbols are not synonymous. Signs are sounds of pitches and durations heard whereas symbols are written notes seen as representations of those sounds. Signs present and symbols represent. Signs are audiated; they are not meant to be read. When read, they immediately lose their value as signs and inadvertently are transformed into symbols. For example, when syllables are spelled visually for students to read, they no longer serve as sounds (signs) and so circularly become symbols representing themselves. Neither a sign nor symbol can serve as both. Each must function as either sign or symbol because it either is something or is symbolic of something.

If students cannot audiate syllables, reading syllables is irrational. Furthermore, they find it difficult and wearisome to read standard notation, and will probably not learn notational audiation. Meanwhile, trying to teach students to read notation with aid of pre-reading techniques, such as numbers, lines, dots, and creative pictures (often referred to as iconic devices), is an impediment to progress. Students learn to read and write notational symbols naturally and quickly when they audiate what they see using solfege. No other transitional scheme is necessary.

Tonal syllables and rhythm syllables are signs because they are combined with sound of pitches in tonal patterns and sound of durations in rhythm patterns. Signs connect logically with music whereas symbols need not have any logical relation to signs they represent. When students give names to sounds they audiate, sounds (pitches and durations) and names (syllables) in a tonality or meter seem inseparable, combining into one sign. Only when students audiate broadly are they ready to move on to connecting (written) symbols with (audiated) signs they represent.

As students learn to audiate and perform tonal patterns in a tonality using tonal syllables and rhythm patterns in a meter using rhythm syllables, they are also learning about form, style, phrasing, dynamics, and tone quality, as well as how to connect those music ideas with names. Performance of tonal patterns and rhythm patterns is typically associated with one or more of those dimensions because they are integral to artistic performance.

Instrumental Readiness

Secondary school students are influenced primarily by their band, orchestra, and choral directors to become directors of similar ensembles in elementary, middle, and secondary schools. After they graduate and achieve their goals, they largely imitate and follow the same teaching procedures they experienced as middle and high school students. In many ways, that is commendable. They fail to realize, however, estimates of between 75% and 90% of beginning instrumental music students discontinue study by end of the second year. The problem is students lose interest because they lack readiness to begin study of a music instrument. Therefore, motivation wanes by way of lack of progress.

It is well understood by psychologists most students are capable of learning only one concept or one skill at a time. If effective learning is expected to occur, a single concept or single skill is solidified before another to be combined with it is introduced. As knowledge of the written page is being acquired, students are usually concurrently taught instrumental fingerings; that is, they learn where to place fingers on keys and a fingerboard or which valves to push on the instrument they are playing as they read music notation. There are no fingerings for time value-names but, nevertheless, pitches must be performed with accurate rhythm. That is ordinarily no simple endeavor even for students who demonstrate advanced theoretical music knowledge. The complete task is extreme for most students, and one wonders whether it is all worth the fuss.

Playing with appropriate intonation and rhythm requires more than learning to read instrumental music notation, its complexity exacerbated by simultaneous development of instrumental technique, notwithstanding. It is ability to audiate that is vital. It has to do with performing pitches with suitable intonation and note values with a sense of meter and tempo. Just as one thinks about what will be said before saying it, good intonation and rhythm are a result of audiating before performing.

Preliminary beginning instrumental music guidance and instruction can be effective as a constituent part of elementary school regular classroom music, or special 10-15 minute or shorter sessions may be scheduled two or three times a week. Longer periods result in diminished returns. Of course, time constraints and other restraints may prevent offering a full regimen described herein. If only listening along with singing and chanting can be introduced and sustained, both will go a long way in preparing students to begin learning constructively to play a music instrument. Neither of those two vocabularies, especially the first, can be over taught. As a matter of fact, musicians, regardless of professional status, are constantly, naturally, and necessarily enlarging their listening and performance skills. Music maturity is a never ending process.

Group and Private Lessons

Regardless of individual differences, which can be successfully accommodated, beginning instrumental music instruction is rightfully available to all students who wish to take lessons. Students profit from learning under conditions similar to those musicians typically encounter in ensemble performance, because they adapt to one another musically and naturally audiate. When students who play different instruments are taught together, results are even better than if all are playing the same instrument. In a heterogeneous instrumental ensemble, each student makes constant adjustments not only in pitch and rhythm but also blend of tone quality and various expressive nuances. Merely making necessary technical adjustments in a homogeneous ensemble is quite different. Though an ensemble including a variety of instruments may be more difficult to teach because technical problems associated with specific instruments are different, ultimately students will develop overall musicianship more rapidly. Private lessons are best given to advanced students who also participate in small ensembles or large performing groups in and out of school. That is true for both vocal and instrumental private lessons because in private lessons, emphasis is on developing students' familiarity with solo literature and instrumental or vocal technique rather than audiation.

Students usually do not learn to play an instrument in tune any better than they can sing and audiate tonally, nor do they learn to play in consistent tempo with appropriate meter any better than they can move and audiate rhythmically. Contradictory as it may seem, there are persons who perform without good intonation but are acutely aware of poor intonation of others. The reason is while performing they are not audiating context. They are closely concentrating on notes and other content. When listening, however, they are not preoccupied with fundamentals and, thus, are able to comfortably audiate context. Of course, regardless of students' tonal audiation, intonation is not a problem when they perform on a fixed keyboard instrument. Although the same is true to some extent for wind instruments with valves and keys, students who cannot audiate will only approximate correct pitches. They tend not to adjust pitches to blend with others in ensemble playing. The problem is more obvious with string players who do not audiate. Unfortunately, when dealing with those students, some teachers affix markers on finger boards and misguidedly rationalize it as an adequate alternative to audiating.

Timbre and Range Preferences

Lack of music readiness to learn to play a music instrument, though foremost, is not the only deterrent to success in instrumental music instruction. Another is a student's aversion to sound and range of the music instrument he or she is learning to play. Results of several experimental investigations indicate approximately 50% of students as well as some professional musicians do not have preference for the sound and range of the music instrument they are learning or have learned to play. Another research finding is, when students begin to learn to play an instrument for which they have timbre and range preference, dropout rate after two years is reduced to between 10% and 20% as compared to approximately 90% for all students. Moreover, their performance achievement and skill in reading music notation is significantly higher than for their peers.

Though many persons are of the opinion physical characteristics and coordination are important when choosing an instrument for a student to learn, there is no evidence to support that belief. In fact, many fine professional musicians defy most if not all physical attributes supposedly necessary for high level accomplishment. Furthermore, there is no correct chronological age to begin to take instrumental music lessons. There is, on the other hand, a correct music age. Given proper music readiness, at least an introduction to tonal and rhythm audiation skills and a music instrument akin to timbre and range preference, even children of preschool age will prove to be able learners. Of course, some half or three quarter size instruments may be required to complement a young child's physical stature.

Instrumental music teachers might consider the following research results. More than 75% of elementary school students in third and fourth grades acknowledge preference for synthesized sounds that represent timbre and range of actual music instruments. Also, a minority of students demonstrate two or three preferences for dissimilar as well as similar sounding brass, woodwind, and string instruments, though there is an overriding choice for woodwind instruments. When students appear to be making little progress and have multiple preferences, astonishingly they display remarkable achievement when given another music instrument for which they have a timbre and range preference. Unfortunately, for whatever reason or reasons, only 25% of students agree to learn to play a music instrument suggested by their teacher as indicated by test results. When that finding was investigated, it was discovered many students chose music instruments to study because they were allowed to bring them on school buses.

Early Childhood Music

To be successful in school music, children enter kindergarten or first grade with at least substantial music listening, singing, and chanting vocabularies. Unless they experience rich and varied exposures to music during the critical period from birth to approximately two years of age, they become primarily preoccupied with language acquisition. Music becomes less important even in later life. Moreover, children who have been deprived of appropriate early music development are able to learn only about music, not music itself, when they begin to receive school music instruction. By then, there is little doubt they will find it difficult to comfortably participate in making music.

There are two periods of importance in young children's music development. The critical period, as explained, is from birth to approximately age two. The sensitive period is from birth through approximately age five. Children's loss of opportunity during the time primary foundations for learning music are established cannot be amended. Only compensatory, not remedial, instruction may be offered when they are older. What children did not develop early in life cannot be developed in later life to the extent that it could have been earlier. Although compensatory instruction is possible, a teacher can only assist children in progressing to the extent their early music learning keystones will allow.

Although children hear music through media, and may even hear live music on occasion, adults need to sing to them using pleasant and approving facial expressions as means of teaching them to use their singing and chanting voices in the same way speaking to them provides a model for use of their speaking voice. Just as all children can learn to use their speaking voice, so all children can learn, by listening to models, to use their singing and chanting voices. Whether they learn to audiate and perform artistically (and to speak intelligently) depends on quality and quantity of structured and unstructured informal guidance and formal instruction they receive.

Preschool children are not approached as if they are young adults or even kindergarten children. Young children learn as much, and possibly more, by themselves and from one another than from adults. Nevertheless, adults rarely sing tonal patterns and chant rhythm patterns to or for young children to assist them in developing a music listening vocabulary. When they do, however, toddlers are not expected to participate (babble) or learn to sing tonal patterns or chant rhythm patterns. Emphasis is on acculturation and acquisition of a music listening vocabulary so children may later develop singing and chanting vocabularies using labial syllables, those formed with tongue and lips in front of the mouth, such as "ba," "da," and "ma."

Typically, not enough time is spent in establishing a music listening vocabulary. To expect children to learn to sing songs, preferably without words, before listening to and then singing tonal patterns and chanting rhythm patterns, is as unreasonable as expecting them to recite poems before they can speak individual words, phrases, and sentences.

Criterion Referenced and Norms Referenced Tests

Norms referenced tests are designed to yield scores that can be objectively compared, subjectively evaluated, and interpreted in terms of standard scores, such as a percentile ranks. A criterion referenced test is not designed to yield norms. Rather, it incorporates a predetermined criterion in terms of a raw score (the number of questions answered correctly) a student must attain in order to pass a test. It can serve only in evaluation, not measurement. Mediocrity among students prevails because minimum achievement becomes the maximum. Thus, a better description of a criterion referenced test reduces to criterion referenced grading. As explained, a teacher who uses a criterion referenced test is concerned with assigning students pass or fail status or grades. In contrast, a teacher who uses a norms referenced test is more concerned with improvement of instruction than grading. In addition to its diagnostic value, a well constructed norms referenced test provides students with educational learning experiences.

Some teachers determine scores necessary to receive a specific grade before a test is administered. For example, contemplating a criterion test, they might decide scores from 90 to 100 equal A; from 80 to 89, B; from 70 to 79, C; from 60 to 69, D; and 59 and below, F. This is not prudent because if grades are to be valid and instruction adapted to students' individual music differences, they are determined on the basis of the distribution of scores after a norms referenced test has been scored.

When a student passes a criterion referenced test, his or her score is measured against skewed criteria, not against scores of other students. So, if a student attains the criterion score, the student passes. How is the criterion score determined? When it is designed properly, the criterion, ironically, must be established by a norm based directly or indirectly on results of a norms referenced test. A criterion referenced test or criterion referenced rating scale deals directly with evaluation and has no firm foundation in objective measurement. A norms referenced test and norms referenced rating scale deal directly with objective measurement and provide firm foundation for appropriate subjective evaluation.

If a criterion referenced test could make provision for adapting instruction to students' individual music differences, there would be less practical difference between criterion referenced and norms referenced tests; that is, unless ample comparative information is available for evaluating students' music strengths and weaknesses, a teacher is limited in adapting instruction to individual music differences among students. A criterion of pass or fail can be determined easily from a norms referenced test after it is scored and norms are derived, but for a teacher to adapt instruction to address students' music weaknesses and enhance their music strengths, more information than mere pass or fail is necessary. With results from a norms referenced test, a teacher can distinguish between a student who barely meets a criterion and one who meets the criterion with ease and between a student who almost meets the criterion and one who does not even understand what is being asked.

Measurement and Evaluation

All tests are measures but not all measures are tests. A student takes a test and receives a score, but a teacher can measure a student's personal attitudes and physical characteristics and may or may not give the student a score. Thus, a student's test score represents measurement, which is an objective standard, whereas a teacher's interpretation of that test score represents evaluation, which is subjective. Be cautious of the word "assessment" when examining students' achievement. It means to estimate. Unfortunately, when used as a substitute for measurement, evaluation, or both, it causes undue confusion and misdirection among educators and distorts understanding of and attitudes toward analysis.

Because evaluation is necessarily subjective, it should be based on objective measurement. For example, a criterion test score of 85 may be interpreted according to some predetermined standard worthy of B or as indication of satisfactory achievement. But suppose 85 were highest score in the class. Should a score of 85 then be considered worthy of A? And if lowest score in the class were 80, might that suggest a different interpretation of 85 than if lowest score were 40? To answer these questions with confidence is doubtful without development and use of objective measurement techniques supporting and leading to credible subjective evaluation procedures.

The words "objective" and "subjective" are used to emphasize differences between measurement and evaluation. Nevertheless, all tests regardless of their degree of objectivity are subjective to some extent. For example, a multiple choice test is considered a good example of an objective test because its administration and scoring is completely objective. Factors contributing to bias have no effect on scores students receive. Nonetheless, determination of content of such a test is often subjective. On the other hand, if only one teacher writes, administers, and scores an essay test, both content of the test and procedures for administering and scoring it are subjective.

Like developmental music aptitude, students' music achievement is measured in continuous terms at various times during the year, and in summary terms at the end of a semester or year to diagnose change and record and academic progress. Stabilized music aptitude is measured only once during students' school career. Teacher-made tests along with rating scales and standardized tests may be used for measuring music achievement in learning sequence, classroom, and performance activities. Achievement tests may be either norms referenced or criterion referenced. Only standardized norms referenced tests are used for measuring music aptitude.

Normative and Idiographic Evaluation

Grading, which is a type of evaluation, may be normative, idiographic, or both. When a student's work is evaluated normatively, a grade is based on the student's achievement as it compares with achievement of all other students in the class. When evaluated idiographically, a grade is based on students' actual achievement as it compares with potential to achieve. Another way to evaluate students idiographically is by comparing their past achievement with current achievement.

For example, there are students with low music achievement but high music aptitude. If they were to receive a normative grade A and an idiographic grade C, they would be better aware of expectations of a teacher and school. Or, when students whose music aptitude and music achievement are both low receive a normative grade C and an idiographic grade A, they might be encouraged and better motivated to learn and continue their good attitudes in class. An idiographic grade of A informs students with low music aptitude and low music achievement a teacher is aware they are working up to potential, and for that reason alone, they deserve to be proud.

Space on a complete report form provide for evaluating individual students both normatively and idiographically on several sequential objectives and two comprehensive objectives as they might be stated in a curriculum for each period of instruction. The comprehensive objective includes all relevant sequential objectives. A teacher writes titles of a sequential and comprehensive objectives on the report form, and each student is given a composite grade representing a student's achievement in terms of a comprehensive objective. Corresponding idiographic grades may be based on music aptitude or past music achievement. To assist parents and students in interpreting a normative grade, distribution of normative grades for a class is included on a report form. For example, knowing how many A's, B's, C's, D's, and F's were given in a class enables students and parents to understand more precisely value of a given grade. For most effective evaluation, each report form is discussed in conference with a teacher, student, and one or both parents.

Rating Scales

Emblematic approaches for measuring achievement of music soloists and ensembles are highly subjective. Often a scale of 1 to 5 or 10 is used without precise description of meanings of numbers. The difference between 4 and 6, for instance, is vague. Perhaps the best example of this is the manner in which one or more adjudicators at music contests and festivals make judgments about quality of performances. Lacking overall objectivity and notorious unreliability, judges pay subjective attention particularly to technique, memory span, and intonation. Objective rating scales are one superb alternative. Not all teachers will find or take time to use rating scales, but students of those who do will gain vast benefit as will teachers. An insightful advantage is students' specific music strengths and weaknesses will become apparent and, thus, teachers are able to attend swiftly to students' individual music needs.

In a continuous rating scale, except, of course, for the first, a student or ensemble does not achieve a given criterion unless the previous criterion is achieved. For example, it is not expected the third criterion will be achieved unless the second is achieved, and so on through five criteria. Another type of rating scale is an additive (non-continuous) one in which criteria are independent. Different types of rating scales give rise to different degrees of reliability. All types, nevertheless, are more reliable than dichotomous evaluations of whether students simply do or do not meet an unclear standard.

To obtain highest levels of objectivity in measurement and evaluation of students' solo performances, each student's performance on each dimension is recorded. As a result, performances may be heard as many times as necessary to provide for precise and accurate measurement. Moreover, it is known teachers tend to be stricter in awarding ratings when hearing the first few performances and more lenient when hearing the final ones. Thus, when given opportunity to rehear students who performed initially or those who performed toward close of a session, ratings may be adjusted accordingly. To facilitate even more equality in procedures for awarding ratings, teachers might be provided with samples of good, average, and poor performances of students in a specific group for each dimension before they actually begin to do their own rating of those students. Bias is seldom a problem when teachers do not rate their own students.

It is of utmost importance teachers be directed to listen to and rate every student's performance on only one dimension before they listen to any student's performance on any other dimension. If a student's performances on all dimensions are listened to continuously, one directly after the other, rating for one dimension unfortunately affects ratings given for each successive dimension. Separate rating sheets for every dimension are recommended, with prominent places for numbers, not names, of each student written the same way, and with names of dimensions on each sheet. When time permits, order of students' performances on a recording is randomly changed for each dimension. That is easily accomplished using digital technology.

Method, Techniques, and Objectives

Various music educators consider the words “method” and “technique” to be interchangeable, as if they were synonymous. They are not. Method is properly used to describe order in which sequential objectives are introduced in a curriculum to accomplish a comprehensive objective, a goal. Technique is a teaching aid employed to achieve one or more sequential objectives. Method refers to why we teach what we teach and, most importantly, when (sequentially) we teach it. Technique refers to how we teach. When these distinctions are not acknowledged, prospective teachers simply are taught how to teach. How students learn is virtually ignored.

For example, when tonal syllables are used for teaching students how to audiate tonally, they become a technique to teach series of sequential objectives students phase through as they progress toward a comprehensive objective of overall tonal literacy. However, the actual method followed might bear on whether students learn tonal audiation before letter names of notes, read songs in major tonality before those in harmonic minor tonality, or learn songs in major and harmonic minor tonalities concurrently before any other tonality.

A comprehensive objective includes at least two sequential objectives. Series of sequential objectives become method. Order of sequential objectives distinguishes appropriate method from inappropriate method. Music learning theory offers guidance and direction for development of appropriate method, because music learning theory is initiated with a sequential objective of audiation and leads to a comprehensive objective of enjoyment of music through understanding. Enjoyment and understanding become a seamless blend. Logical order of sequential objectives is structured in terms of stages of audiation to achieve comprehensive objectives associated with types of audiation.

When a sequential objective in a particular method is found to be too complex, it best becomes a comprehensive objective separated into a series of sequential objectives. As students progress in school from grade to grade, every comprehensive objective for a given grade in a curriculum becomes a sequential objective in preparation for the next more advanced curriculum in the following grade.

Sequential and comprehensive objectives constituting method along with techniques and materials represent important components of a sequential curriculum. Measurement and evaluation represent others. Ironically, many teacher preparation courses in music education include little more than compilations of techniques associated with anthologies of material. Often techniques and materials are not supported by or linked to sequential and comprehensive objectives. Thus, realistic goals are not met nor do they adequately determine students’ progress. When students do not understand the purpose of what they are doing, they become increasingly unreceptive and, thus, teachers become more and more reliant upon clever techniques. Techniques for teaching without foundation of method are dubious for teaching students to respond in an evocative music manner.

Music Theory

Young musicians can learn to intelligently audiate, listen to, perform, read, write, create, and improvise music without studying music theory. Common practice music theory, as typically taught, is as necessary to pragmatic musicians as theory of electricity is to competent electricians. Neither musicians nor electricians need to know or how to use information theory provides. In the case of music, that is because music theorists typically define, offer rules for, and label what is seen in notation rather than what is heard in audiation. Many students do not learn how to audiate and, thus, usually cannot create, improvise, or even perform with proper intonation and rhythm. Countless students are taught to take whatever meaning they can from notation so as to function as contributing members of a music ensemble. Yet, for those students to be introduced to music theory before they can audiate, sing with good intonation, and move with good rhythm makes little or no sense. Contrary to what some music teachers believe, particularly instrumental music teachers, music theory cannot serve adequately as readiness for music reading. The opposite is the case. As a matter of fact, ability to improvise is best readiness for learning to read music notation.

Outlined below are a potpourri of misunderstandings associated with music theory.

* Confusing to many is what is called hemiola. Consider 6/8 with two groups of three eighth notes in one measure and three groups of two eighth notes in the following measure. That is traditionally taught as a change from triple meter in the first measure to duple meter in the next. Yet, mature musicians audiate both measures as multitemporal in usual triple meter. The dotted quarter notes in the first measure are audiated as underlying macrobeats, and in the second measure, the dotted half note is audiated as the only macrobeat. Quarter notes are audiated as underlying microbeats and eighth notes as divisions of microbeats.

* Tonal and rhythm patterns are fundamental for developing audiation skill whereas scales are more useful for acquiring instrumental and vocal skills.

* Measures with signatures of 5/4 and 7/4 are usually explained incorrectly. In 5/4, there are two macrobeats (a quarter and dotted quarter note) in a measure. One macrobeat is typically divided into two microbeats and the other into three microbeats. In 7/4, there are three macrobeats (a dotted quarter and two quarter notes) in a measure. Two macrobeats are typically divided into two microbeats and the other into three microbeats.

* What is conventionally taught as relative tonalities are actually is multitonal/multikeyal. Parallel tonalities are actually multitonal/unikeyal.

* Memorizing melodic intervals is misdirected. Good intonation results from continuously audiating a resting tone and comparing a pitch being performed with that resting tone. Vertical audiation rather than horizontal audiation is the compelling factor.

* Foot tapping to keep time distorts time because it introduces tension. Better would be heel tapping which incorporates weight.

Criterion Measure

Most graduate students in social sciences are poorly educated or under-educated in research techniques even though required to take one or more courses in statistics. Unfortunately, even vast knowledge of statistics cannot compensate for use of a faulty criterion measure. If as much time were spent on studying qualities of acceptable criterion measures to compliment research problems as is dedicated to studying statistics, masters theses and doctoral dissertations could be a decisive factor in improving music education practices in elementary, middle, and senior high schools. Ironically, courses titled design and analysis typically neglect design of criterion measures.

Disregarding artificial dichotomies of qualitative and quantitative research, accuracy of research results and conclusions rests directly on validity of one or more criterion measures. That is, research results and conclusions can be no more valid than validity of the criterion measure used to derive results and conclusions. When researchers construct their own criterion measure, it represents an important creative dimension of their research. Many researchers, however, use not their own but existing published and unpublished tests, checklists, questionnaires, and rating scales to serve as criterion measures which may or may not be valid for intended use.

By being knowledgeable about past research and current availability of measurement instruments, it becomes clear if what exists is suited to research presently under consideration or whether construction of a unique measure is obligatory. Use of a developed criterion measure has advantages and disadvantages. From a theoretical point of view, it would seem to have more advantages than disadvantages. However, although an existing criterion measure might have been objectively authenticated in terms of concurrent and predictive validity, it might lack subjective validity in terms of content and psychological constructs for a specific purpose the researcher wishes to use it. In contrast, although most unpublished measures have not had extensive use nor render developed norms, and therefore, offer few if any guidelines for interpreting results they yield, from a practical point of view they may prove to be more advantageous. Whatever, serious consideration must be given to selecting a criterion measure to serve as an important component of research responsibility. Realistically, professors of statistics cannot be expected to be well versed in subject matter of a variety of academic disciplines. Thus, it would be well for music professors to offer supplementary courses in choice and design of criterion measures.

Research

Empirical - Relying on or derived from observation or experiment. Guided by practical experience or theory.

In contrast to laypersons commonly depending on empirical knowledge to guide ordinary activities, empirical evidence has routinely been dismissed for centuries by academics as unworthy of consideration and undeserving of respect. It was not until 18th century philosophical enlightenment movements challenged deductive reasoning and replaced it with new scientific inquiry, called inductive reasoning. It has prevailed to the present. Nonetheless, before so-called progress in designing research and analyzing data, humans for centuries relied on empirical evidence to guide quotidian activities. They learned what and what not to do based on experience. They came to understand acquired information is not new. It is simply rediscovery of eternal truths.

Inductive reasoning has spawned elaborate and intricate research designs in the social sciences. It is heavily saturated with elaborate statistical analyses and tests of probability touted as ideal for comparing, for example, resultant differences among students who are exposed to different methodologies. Although they look good and appealing on paper, without large numbers of students and willing capable teachers, practicable possibilities of using recommended methods are remote. One reason is without large numbers of students to assure randomness or stratified random samples of smaller numbers of students to whom results are to be generalized, it is pointless to pursue such research. Results will be inconclusive. Another reason is when comparing various methods, all teachers must be equally competent and well versed in one or more methods they are teaching, and that condition rarely, if ever, met. Though impractical and thus only rarely satisfied, the need to engage more than one teacher to instruct students using each method is a necessity.

To further exacerbate the situation, statistical analyses, such as t-tests, F-tests, and Chi-square tests associated with analysis of variance, analysis of covariance, and multivariate analysis are used to examine data to determine if derived differences are statistically significant or simply attributable to chance. Textbook technicians forewarn all these tests have assumptions that must be affirmed. For example, individual students, not classrooms of students, should be randomly selected and assigned to a specific method, all groups should begin at the same average level of academic accomplishment related to what is being studied and to criteria used to determine if differences do in fact exist after instruction, and each group should have a normal distribution of students in terms of high, average, and low achievers in the subject being taught. It is easy to understand why and how most or all of these requirements are unrealistic and, thus, violated.

Researchers in music education might direct attention to benefits of empirical research and its few limitations compared to research dependent on inferential statistics. To that extent, teaching and learning music in elementary, middle, and high schools would become more practical and effective.

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Index

Ability 9
Accents 7
Acculturation 32
Adagio player 17
Age 31
Alphabet 8, 19
Ancestry 9
Anticipation 10
Arithmetic 12
Assessment 34
Assumptions 40
Atonal 23
Attention 18
Audiation 4, 8-10, 13, 16, 19, 20, 22, 26
Aural perception 4

Beat functions 27
Birth level 9
Brain 9, 13
Breathing 7, 16

Chanting 20
Chanting voice 32
Chants 18
Comparisons 13
Compelling 23
Compensatory 32
Compound 12
Content 8, 21, 22
Context 5, 6, 8, 10, 21, 22, 30
Coordination 7, 31
Counting 7
Creativity 15, 16
Criterion measure 39
Critical age 9, 32

Dance 7, 22
Deductive 40
Diagnosis 34
Difference 13
Discrimination 21
Divisions 6

Doubly combined 25
Durations 16, 19, 28

Early childhood music 32
Empirical 40
Energy 7
Enharmonic 12
Enjoyment 37
Enrhythmic 11, 12
Environment 9
Evaluation 33, 34
Expression 28

Fixed system 8
Flow 7

Generalization 16, 21
Genetics 9
Gifted 9
Grading 33, 35, 36
Grammar 8, 20
Guidance 9

Harmonic improvisation 15
Harmonic patterns 8, 15
Harmonic progressions 15, 17
Hearing 4
Hemiola 38
Heredity 9
Heterogeneity/homogeneity 14, 30

Identification 13
Idiographic 35
Imitation 4, 5, 10, 13, 15, 16, 22
Improvisation 13, 15-17, 20
Individual differences 14, 30, 36
Inductive 40
Inference 21
Innate 9
Inner hearing 4
Instruction 9
Instrumental music 14, 22, 29, 30
Intact meter 6, 11
Intelligence 9
Interest 22
Intervals 38

Intonation 4

Jazz 11, 15

Key signature 5

Keyality 5, 8

Keyboard 8, 30

Language 8, 16, 20

Lessons 30

Listening 4, 16, 18, 32

Logograms/logographs 18

Macrobeats 6, 8, 11, 12, 25

Meaning 4

Measure signature 11, 17

Measurement 33, 34

Media 32

Melodic patterns 15

Memorization 10, 13, 15, 22

Memory 10

Mensural signs 11

Meter 12, 22, 24

Meter signature 11, 12

Methods 21, 37

Microbeats 6, 8, 11, 12

Modal 5

Mode 5, 11

Model 32

Motivation 14, 22

Movement 7, 11, 15

Music achievement 4, 9

Music aptitude 4, 9, 14, 16, 34

Music imagery 4

Music learning theory 21, 22

Music literacy 16

Music notation 4, 17, 19

Music theory 20, 38

Musical 9

Normative 35

Notation 38

Notational audiation 4

Notes 28

Objective 23, 34

Objectives 22, 35, 37
Overlearning 13, 17

Pauses 16
Pedagogy 17
Percussion 8
Performing 16
Physical characteristics 31
Pitch letter-names 8
Pitches 16, 19, 28
Prediction 10
Preferences 31
Preparatory audiation 4
Preschool 32
Probability 40
Programmatic 22
Psychology 29

Qualitative 39
Quantitative 39
Quintuplet 25
Range 31

Rating scales 36
Readiness 15, 20, 29
Reading 16, 19, 20, 22, 28
Recognition 10, 13
Recordings 18
Relationships 13
Relative/parallel 38
Remedial 32
Reports 35
Research 39, 40
Resting tone 5, 8
Rests 6
Rhythm 6
Rhythm learning sequence 21
Rhythm patterns 6, 8, 15, 16, 20, 38
Rote 4, 10

Sameness 13
Schedule 29
Sensitive age 9, 32
Septuplet 25
Sequential curriculum 22
Sextuplet 25

Sight reading 19
Sign/symbol 5, 17, 28
Silence 19
Simple 12
Singing 20
Singing voice 18, 32
Skill learning sequence 21
Solfege 8, 26, 27
Songs 18
Sound 4
Space 7
Speaking voice 18, 32
Statistics 39
Style 11, 13
Subjective 23, 34
Syllables 26-28
Syntax 8
Synthesized sounds 31

Talented 9
Technique 10, 22, 29, 37
Tempo 7, 24
Tests 33, 34, 39
Thinking 16
Ties 6
Timbre 31
Time 7
Time signature 11
Time-value names 8
Tonal learning sequence 21
Tonal patterns 8, 15, 20, 38
Tonality 5, 8, 23
Tonic 5
Transfigured 25

Understanding 37
Uni, multi, mono, poly 23, 24
Unusual meter 6, 11
Upbeats 6
Usual meter 6, 11

Vocabularies 16, 32

Weight 7, 38
Words 8, 18
Writing 16, 19