Percussionist

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(PAS)

PURPOSE--To elevate the level of music percussion performance and teaching; to expand understanding of the needs and responsibilities of the percussion student, teacher, and performer; and to promote a greater communication between all areas of the percussion arts.

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In this issue

THE CASE FOR MATCHED GRIP TODAY
By John "Tony" Ruka

ABOUT THE AUTHOR

John "Tony" Ruka is currently traveling with UNAUTHORIZED PERSONNEL, a show-rock unit. The first performing percussion major to graduate from the University of Wisconsin-Milwaukee, he obtained his BFA with honors in 1967. His teachers have included Roy Schneider, the late Al Praefke, Joseph Lapisa, and Michael Rosen. He taught junior high music and private students from 1967-1972 besides freelancing in jazz groups, dance bands, and local musical productions; he also was on-call percussionist with the Milwaukee Symphony from 1965-1972. Tony "hit the road" in 1972.

The controversy rages on: matched vs. traditional grip. After several years of consideration, I'm throwing my hat into the matched grip ring. In fact, I'm going to go one step further and say that the matched grip should be the preferred grip. The mental and physical need for the matched grip on today's musical scene is the topic of this article.

But first, a bit of familiar history . . .

The traditional grip is a carryover from a time when the marching drummer was the only real percussion pedagogist. Despite percussion being the oldest means of non-vocal musical expression, the Western world didn't develop any stable percussion technique except for rudimental drumming until relatively modern times. As the use of percussion solidified in orchestral and popular music, the time-honored rudimental approach and its peculiar grip became the foundations of modern percussion pedagogy (e.g.--The famous Bower System or the Buddy Rich Drum Method).

Now we take a great leap from those early days to today's diverse musical situation. Not only has the trap set become the paramount drum vehicle, but the 'legit' player is expected to handle the mallet instruments, multiple percussion and tympani. As approaches to these instrumental combinations and their musical contexts are investigated, it becomes increasingly apparent that the traditionalist's grip is an oddity and, indeed, often a mental and physical hindrance to today's developing percussionist.

Take trap set playing, for example . . .

A young drummer's instruction in traditional grip encourages him, no matter how dynamic his instructor is, to favor the right hand as the 'work horse' and lead hand while the left hand aids and punctuates. Indeed, the very development of trap set drumming has been influenced and codified in accordance with this mental and physical separation (e.g.--the standard right hand ride beat, the Chapin Independence Book, etc.).

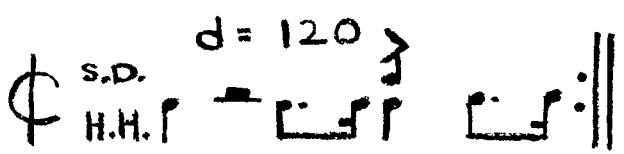
Especially in view of the disparity of today's music (what with all the Mahavishnus, Weather Reports, etc., breaking the barriers), wouldn't it be wiser to be able to do exactly the same thing with either hand? Wouldn't it be better if the young drummer could feel comforta-

ble 'riding' or leading with either hand? Or starting and stopping any roll anywhere with either hand? Or soloing without the nagging suspicion that the right hand is dictating much of the action? The matched grip makes these goals more easily attainable by not unduly emphasizing the natural imbalance of the hands. (In fact, the standard ride beat is *never* played using the left hand, and for good reason -- the traditional grip makes it physically ridiculous!)

The 'legit' orchestral drummer of today is often called upon to jump from one instrument to another during the course of a composition. The xylophone and tympani mallets are held in similar manners. Then comes the snare drum or tom-tom part of the composition and - behold! - an exotic grip for the left hand. Not only that, but the unmatched grip practitioner will lead with his right hand 95% of the time, even though his awareness of a distinction between right and left hand functions is void for the xylophone and timpani parts since his approach and grip for these allows him to switch functions in a manner best suited for both sound and convenience of playing up and down or around the instrument(s). An all-around matched grip approach would obviously make more sense, especially in multiple percussion situations.

Even the marching drummer doesn't really need the traditional grip to sound good. With all the technological alterations and additions in today's marching section, a drummer can comfortably play good looking (albeit untraditional looking) and good sounding rudiments using the matched grip. (Anyone with the intention of being known as an outstanding marching drummer, however, ought to concentrate on the traditional grip because of the beautiful heritage involved and for the simple practical reason that contest judges and marching band instructors expect a full knowledge of the traditional grip discipline.)

As a simple example of problems sometimes created by strict adherence to the traditional grip and its resultant mental and physical division of the hands, study the following pattern:



Now, using EITHER the matched or unmatched grip and playing this pattern in the usual manner (i.e.--right hand crossing over left to play the high hat; left hand playing snare), we find that the hands tend to get in each other's way, especially if the snare part is strongly accented.

But, supposing one were to have been thoroughly schooled in matched grip; so much so that both hands were really equal and not merely "independent". Simply by riding the left hand on the high hat and using the right hand on the snare (Picture 1), one could play this

beat with no chance of entanglement and with as much emphasis on the snare drum as desired. Furthermore, extending this process to the entire set (Picture 2), one finds that soloing against any high hat and bass drum pattern can be much more colorful since all the drums and cymbals are now easily accessible to the right hand.

In sum then, the matched grip is becoming a necessity. Of course, in order for it to achieve respectability and common usage, percussion instructors must give the matched grip more credence; this will only happen gradually since most teachers are, by logic of history, more comfortable with the traditional grip. The changeover is inevitable, however, for more and more percussion artists -- the true pioneers--are finding the matched grip to be the most viable one in this age of multi-percussive activity.

THE USE AND INNOVATIONS OF PERCUSSION IN THE WORKS OF J. S. BACH AND HANDEL

By Gene J. Pollart

About the Author:

Mr. Pollart holds a Bachelor's and Master's Degree from the University of Colorado, and is presently working toward a D.M.A. in performance at the University of Iowa.

By the beginning of the eighteenth century, the timpani had become firmly established instruments of the orchestra. They were used almost entirely for creating a mood of pomp and festivity.

The status of the timpani, as a companion to the trumpet, was high during the productive years of J. S. Bach and Handel. Menke says:

> The function of the trumpets (and the timpani generally associated with them) is to give a festive brilliance to the rest of the ensemble. They were used most of all in "occasional" music such as that composed for council elections, ceremonies in honour of some prince or other, and wedding festivities . . . When the voices sing of praise and glory, they are generally joined by trumpets and drums [timpani]---heightening the brilliance with overpowering effect. (Menke, 129).

The use of the timpani, or kettledrums as they were called in the eighteenth century, by Bach and Handel was founded on the very rigid principle of their constant association with either trumpets or horns. J. E. Altenburg says the trumpet and kettledrum even shared the same technical terms, such as "tonguing." (Altenburg, 25).

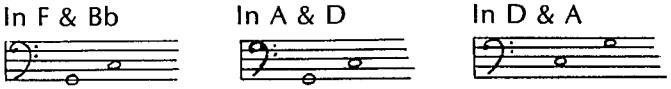
Both Bach and Handel wrote for only two kettledrums. Bach linked a definite association between descriptions of the Kingdom of Heaven, conflict, triumph, etc. with his use of the kettledrum. Handel limited his use of the kettledrum almost entirely to his oratorios, and he was not as adventurous in their use as was Bach.

The use of the kettledrums is found in forty-nine of Bach's works, and they are almost always scored with trumpets.

> In Bach's orchestral music the kettledrums are found only in his *Violin Sonata in D* and the two *Overtures* (Suites III and IV) in that key. They are scored in both of the *Oratorios*, but neither of the *Passions;* in the *B Minor Mass*, but not the four shorter *Masses;* in the *Magnificat, Sanctus in C*, thirty-four church cantatas, and seven secular works; in forty-nine separate compositions. They are associated invariably with seasons of festal mood or public ceremony. (Terry, 50-51).

Bach generally indicated the kettledrums in scores by the term *Tamburi.* However, in the *Cantata No. 100,* he uses the term *Tympelles,* in the D major *Magnificat* he uses the term Tympali, and in the *Cantata No. 191,* the term *Tymp* is used. It is interesting that he never used the German term *Pauken* in any of his scores. He did, however, refer to the *Pauken* in a memorandum addressed to the Leipzig Council in August of 1730. (Terry, 50).

The tuning intervals of the kettledrums were determined by whatever brass instruments with which they were playing. When they were with trumpets, the tuning interval was a perfect fourth; when they were with horns, the tuning interval was a perfect fifth. The use of the perfect fifth interval was an innovation of Bach's, as his predecessors, Lully and Purcell, and his contemporary, Handel, never tuned the kettledrums other than in perfect fourths. A tuning of fifths (tonic up to dominant) was not preferred by most composers of the day, because it diminished the resonance which was more characteristic of the lower pitches. Bach frequently treated the kettledrums as transposing instruments, notating them in the key of C and indicating the actual pitch at the beginning of the work.



Bach's kettledrum parts seldom required much technical skill. His rhythmic patterns were simple and straight forward. He scored for only two drums, and the pitches never changed throughout a composition.. If there was a change of key within a composition, the kettledrums would remain silent until the return of the original key.

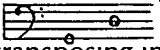
Bach rarely assigned a solo part to the kettledrums. It is interesting, however, that when he did assign a solo part to the kettledrum, it was most frequently at the beginning of a work, and it usually stated the rhythmic and/or melodic motive of the composition. An example of this is his *Christmas Oratorio*. Terry says: "Bach's reticent use of the drums [kettledrums] was largely due to fear lest they should seem overboistrous on an ecclesiastical platform." (Terry, 50-51) He was, however quite aware of their dramatic possibilities, as he joined them together with trumpets on several occasions to add dynamic rhythmical emphasis. Bach also used the kettledrums as an obligato in some of his cantatas as an accompaniment to bass recitatives and arias.

The kettledrum roll was not written to any extent by Bach, but there is no doubt that kettledrummers did roll on long sustained notes, particularly at the end of a composition. Military drummers were usually employed to play the kettledrums, and since they were accustomed to considerable freedom in performance, they would embellish the somewhat uninteresting parts by means of a roll. In a musical document of 1732, Joseph Majer says that in the final cadence the kettledrummer should always make use of the roll, finishing with a strong beat. (Blades, 248) Bach did not actually indicate a roll in his works until he wrote the cantata *Denn du wirst meine Seele nicht in der Holle lassan* (No. 15), where the roll is specified by a tremelo above the sustained note.

It is difficult to establish a specific date when the true roll began to be indicated in scores. Bach notated the roll in many of his works, however, he never indicated rolls on fermati or in the prolongation of the final note, as these were commonly understood embellishments of the Baroque Period and were left to performer's initiative. According to Peters, these roll indications were the first that appear in the history of musical notation. (Peters, 70-71).

The kettledrums that Bach was accustomed to writing for were poor quality instruments for the time, and this probably had an influence on their somewhat limited use in his compositions. They had small bowls which were not as spherical in shape as modern day timpani, and the diameter of the largest drum probably did not exceed twenty inches. The head was made of a thick parchment and was much less resonant than today's timpani. The resulting tone was probably a dull or harsh sound.

The type of stick which was used by Bach's kettledrummers probably had hardwood or ivory ends. Most eighteenth-century illustrations of kettledrummers show a consistent use of this type of stick. There are occasional illustrations, however, which show a cartwheel-type stick covered with cloth or leather. Bach's kettledrummers, however, were military drummers, and they probably used the sticks they were most familiar with, that being the hardwood or ivory.

Bach's use of percussion was almost entirely confined to kettledrums. He did score for two *campanella* (bells) in his cantata *Schlage doch, gewunschte Stunde*. He uses only two notes, B natural and E natural. However, they are notated in the bass clef on the G and D lines  , so he must have considered the *campanella* a transposing instrument, or the bass clef is a mistake for what should have been the treble clef. This part was probably meant to be played on the organ, as Bach often referred to bells and chimes in connection with the organ, and many of his organ registrations are suggestive of the bells.

Handel's treatment of the timpani was much the same as Bach's. His usage of the timpani was almost entirely confined to his choral works and more particularly to his oratorios. His employment of the two drums was still rhythmical, with generally no pitch changes throughout an entire composition, and they were most often associated with trumpets.

In some respects Handel did differ from Bach. Whereas Bach confined his scoring for the timpani to the tonic and dominant, Handel often used the third. But when Handel did use the tonic and dominant, it was always at the interval of a fourth. Handel confined the use of the timpani to only two keys, C and D. He wrote the actual pitches for the timpani, with the exception of a few of his earlier works, where he treated them as transposing instruments.

Handel introduced a dissonant use of the timpani by anticipating a harmony. This dissonance was mostly encountered with the trumpets and was very short in duration. Handel probably used this dissonant anticipation because he felt the need for the rhythmic and dynamic properties of the timpani in a particular passage. Another device appearing frequently in Handel's kettledrum parts is an increased rhythmic activity in the approach to the final cadence. This filling-out of what are otherwise rhythmic anemic measures by the kettledrum had its orchestral origin with Handel.

Handel was probably the first composer to indicate a change of pitch for the kettledrum within a composition. This occurs in only two of his works. Peters claims that these changes may not have been intended, as Handel was under pressure of time when composing them. (Peters, 74) The two works are: *Serenade Il Parnasso in Festa* and the *Occasional Oratorio*.

Handel was careful to mark all of his kettledrum parts very clearly. He frequently used the sign "tr" to indicate a roll, but like Bach, Handel seldom marked a roll on the final note, even when it was sustained.

The kettledrums that Handel had in mind when scoring for them, particularly in his oratorios, were quite different from modern day timpani. He repeatedly requested the use of the *Artillery Kettledrums*, which were used in many of his oratorios. These drums, known as the *Tower Drums*, were quite large, measuring approximately thirty-six and thirty-eight inches in diameter, respectively. This is ten inches larger than present day timpani. The more common kettledrums of the Baroque Period, like those used by Bach, were much smaller and had a diameter of nineteen and twenty-one inches. (Farmer, 94-95).

These *Tower Drums* were struck with a hardwood or ivory stick, similar to those used by Bach's kettledrummers, but the resultant sound was a brilliant, resonant sound, far superior to the sound of the common kettledrums. Quite often more than one person was employed to play the kettledrum parts of Handel. In the *Fireworks Music* the score calls for three players on a part, three players on the "D" kettledrum and three players on the "A" kettledrum.

Handel also had occasion to use kettledrums in octaves. The *Tower Drums* sounded an octave below the common kettledrums, and Handel would use them together giving him an octave bass. This *octavo basso* could be considered an orchestral innovation as Handel was the first to use such a compositional device.

Handel's use of the kettledrums was very dramatic, almost in the style of Beethoven. He uses the kettledrums as solo instruments occasionally, but most often they are used to create an effect or an atmosphere, such as in *Solomon* where there is a kettledrum outburst to suggest the 'shaking of the dome', or in their first entry in the "Hallelujah Chorus" of the *Messiah*. (Blades, 252) White says:

> Few composers who have followed this great master have written more effectively for the kettledrums than did Handel. The "Hallelujah Chorus" from his *Messiah* remains one of the most thrilling and effective parts ever written for the kettledrums, and it is one of the best examples of writing for the character of these instruments. (White, 147).

Handel also drew on the technique of the kettledrum player. He incorporated what was called double tonguing, a term borrowed from the trumpet. This technique was the playing of two notes with one stick generally in a rapid tempo. He also incorporated lengthy periods of fast notes in succession, and as previously stated, he used the roll quite effectively.

Handel could also be credited with other percussion innovations in his scoring. He originated the use of the carillon, or what would be the present day glockenspiel, in the orchestra. There has been considerable debate as to the construction and sound of this instrument. It

was comprised of either plates or bells and had a chromatic range of more than two octaves. The instrument was struck with some type of hammer, probably metal. The resultant sound was very metallic. Handel first wrote for the carillon in his oratorio *Saul* and then continued to use it in succeeding oratorios.

Handel is also credited with the first use of gunfire in a composition. In the first performance of *Judas Maccabaeus,* the audience was startled that Handel had actually used guns, but they had a good effect. Probably, however, the guns were drums which were struck with a hard stick. (Blades, 253-254).

In conclusion, Bach's and Handel's conceptions of percussion were similar in most aspects. They both confined their use of percussion almost entirely to the timpani, and they used the timpani for rhythmic stability and variety. Both composers consistently associated the timpani with the trumpets, and neither composer used the timpani as a solo instrument to any extent.

Bach and Handel were innovators with their use of percussion. Bach broke tradition with his use of the interval of a fifth between the two timpani, and he introduced the notation for the roll on timpani. Handel was the first to use the interval of a third between the two timpani, and he also created the dissonant use of timpani in his scoring. Both composers introduced new sounds to the orchestra. Handel's use of the carillon and "gunshot" were innovations which probably influenced later composers to experiment with these as well as other percussion instruments.

Bach does, however, seem more creative in his approach to the timpani. He made important use of the timpani in a variety of his works, including his two major orchestral suites. He was more experimental in his development of the timpani part, in spite of the poor quality of instruments he had to use. Handel, on the other hand, limited his works almost entirely to his oratorios, with only a few exceptions. His scoring for the timpani was effective, but many of his innovations on the instrument were probably caused by accident, such as his dissonant use of the timpani, which most likely was a result of need for rhythmic stability at a particular point rather than intended harmonic dissonance. It seems that with the fine quality of instruments which Handel had at his disposal, he would have experimented and used them more in a solo capacity. Handel was probably less adventurous than Bach because he was concerned with pleasing his listeners; Bach appeared to be less concerned with worldly success and thus was perhaps more creative in his approach to the timpani.

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"THAT" SMALL ENSEMBLE CONDUCTING CONTROVERSY

By

Ronald W. Holdman

About the Author:

Ron Holdman, currently timpanist of the Phoenix Symphony Orchestra. He is a graduate of Boston University where he was a student of Tom Gauger of the Boston Symphony Orchestra.

During the past twelve years as a student, teacher, and professional performer, I feel there has always been an enigma regarding an aspect of the percussion ensemble.

Assuming that the percussion ensemble is indeed a chamber ensemble, it is my feeling that a work requiring six players or less should be rehearsed and performed without a conductor. Consequently, the enigma merely presents itself in the form of a question. Why should such an ensemble require the services of a conductor?

Several arguments and theories come to mind in relation to this subject and some which are purely speculative, Also, may I state that I am open to response and verification from readers regarding the following theories and historical documentation.

At the outset I speak of the "post-Ionization" percussion ensemble, or the ensemble as we think of it today, as a regularly assembling ag-

gregation of musicians engaged in the common purpose of playing the wealth of percussion literature that exists. I've decided upon the year 1945 as an approximate point of departure.

I've been impressed with the fact that the early percussion ensembles were comprised of a compendium of musicians whose backgrounds were varied and essentially "conductor" oriented and not oriented toward the common performance of chamber music. I am inclined to think that perhaps many of the players were either young studio players, percussionists in the infancy of the college "percussion major" programs, fine marching band drummers or even competent non-percussion players. In any case, all were anxious to experiment with the idea and to eventually create what was to be a new form of musical performance media.

As a result of the varied backgrounds of all involved, it was probably inadvertently felt that for the group to experience any form of success, a conductor was absolutely necessary. It seems apparent that due to its genesis, the tradition was maintained.

The idea of a conductor reaches very far back in time, undoubtedly deep into the musicological woodlands including the hammer pounder who would beat the rhythm to which the oarsmen would row in battle frigates on the Mediterranean. In modern Western musical history, with the advent of polyphony, new instrumental groups (not conditioned to performing together) and with logistic factors (antiphonal arrangements), a conductor found his place more regularly in music circles, such as the church and in performances of secular music. Rapid cell-like growth of larger secular ensembles and new literature to be performed, plus the discovered interest in the Manheim school of orchestra playing, the conductor was to become an integral part of the operation.

The Renaissance was slowly transforming shaums into oboes, sacbuts into trombones, and deGambas into lesser stringed instruments, therefore the need for smaller informal musical congregation was more prevalent. For some reason, the small string, woodwind, and brass ensembles no longer felt the need to employ the conductor's services. Although it was a much different musical era, the question of a conductor remains. The premise may very well have been similar to ours today as percussionists within *our* growing pains. It is likely that since most historical events that involve non-political change occur somewhat automatically, and without our having much knowledge of their forethought, the conductor was phased into oblivion and the birth of what we today consider "chamber music" took place.

For us to imagine their feelings is very speculative but what resulted remains fact; these small ensembles that performed in the chambers of the aristocracy or in the sitting rooms of the middle class were most likely performed without a conductor. And so it remains

with string, woodwind, and brass quartets and quintets on the Carnegie Hall stage today.

In reference to personal feelings, during the period prior to my playing percussion ensemble literature without a conductor, I had always envied groups such as a string quartet who performed unconducted. I was aware of being deprived of a musical sensibility which I know could certainly have existed for myself. I was cognizant even as an observer that there dwelled within each performance a sort of spontaneous electricity and a more acute listening mechanism at work among the players; perhaps not dissimilar to the atmosphere which pervades a fine jazz or rock ensemble while performing.

Some fine examples of the success of an unconducted assemblage of musicians are the several professional percussion ensembles existing in the world today. A few are in this country and I know of two in Europe. There are several factors to which their success can be attributed:

1. Most likely they are sensitive, mature musicians who possess a sophisticated conceptual basis.
2. One group, the Black Earth, has an obligation as an "in residence" performing group which entails daily rehearsals when not on tour. This experience provides them the opportunity of learning a great deal about each other and to be able to respond to and sense musical emotions and gestures, almost the way a fine athletic team "clicks."

I must admit however, there have been occasions within the groups when baton type hand movement is required. It is seldom needed and is always done from behind the player's instrument; during a very polyrhythmic complex portion in a usually very pointillistic-type piece of music. In a sense, it is similar to a series of head gestures that the first violinist of a string quartet might perform throughout even the most classical of pieces. (The somewhat transient memberships of these percussion groups is immaterial to the effectiveness of their ability to respond to each other. The Juilliard, Marlboro, Budapest, or Amadeus string quartets have some twelve to fifteen membership changes over the years if one tends to examine album jackets.)

I have performed the *Toccata* by Carlos Chavez four or five times within the span of my career, but for the first time three summers ago, I played it without a conductor with my fellow colleagues of the Chicago Civic Symphony Orchestra. They were all fine musicians and I was glad to know that the idea or question of a conductor did not arise once, although we had been coached by Gordon Peters. The composition suddenly offered a new excitement and displayed within it nuances of which I had never been aware. It seemed to sharpen our nerve endings

in terms of listening and simply sensing what was going on around us. It was undoubtedly the most conscise musical reading I had ever experienced with this familiar work.

While interviewing in respect to the "conductor or no conductor question", I have received some interesting feedback.

A friend and percussion colleague Alan Kennedy exposed me to the following concept:

A major hindrance confronting ensemble performers without a conductor is due to the compositional techniques employed in percussion literature. In a chamber group of instruments which are inherently sustained and "melodic", as oppsed to percussion instruments which often deal in notes of short duration (with the exceptions of some percussion instruments which are at home with sustained sounds such as vibraphone, marimba, and cymbal), it is generally much easier for the violinist or clarinetist to insert his notes more readily into the phrase or into the motion of the music. It comes more naturally for him to accompany a line or properly place his counterpoint, rhythm, etc., because he can simply hear where he belongs within the total structure. This natural phenomenon is the result of these musicians having been able to play "regular" melodic music which was composed over generations: Baroque, Classical, Romantic, etc. It is not always that easy for the percussion player since chamber music for percussion is quite young, and percussionists are constantly subject to dealing with changing modern compositional techniques. Most percussion music, as we all know, is more "modern" or alien sounding than a Haydn string quartet or a Brahms piano trio. Many of the pieces are quasi-impressionistic and even have unusual titles that are often symbolic, futuristic, sarcastic, or humorous. Rarely do we find a work entitled Percussion Quartet No. 5 Op. 21 by Johaness Doe or Romanze for Snare Drum Septet by Wolfgang Amadeus Smith. This may also be an implication of how few, if any, composers are very prolific in their percussion writing. We discover in the percussion literature many bizarre or weird musical circumstances. Many composers find havens in the assumed intense profundity of prolonged silences or sporadic single notes which occur once every ten minutes with only a woodblock and triangle being played every fifth minute. We are drenched with random disconnected, unrelated running sixteenth notes, and a fortississimo tam-tam tremolo written simultaneously with a pianississimo antique cymbal note and strangely enough, this does not shock the percussionist.

Perhaps such exaggeration on my part will make my point more lucid. Where *do* we fit those notes and how *can* we respond to such erratic incoherent lines and phrase fragments?

Another valid and logical conclusion was drawn by friend and colleague Mr. Mervin Britton, Professor of Percussion at Arizona State

University. Mr. Britton feels that, especially at the college level, the percussion ensemble does not meet in a chamber music program per se. They do meet on a regular basis but more as a "class" type gathering once or twice a week for credit hours. Therefore, it is difficult for the musicians to "get to know" each other as do some of the professional percussion ensembles and so must tolerate this circumstance. He further stated that since we are constantly moving around there is an excessive liability of losing one's place in the music or perhaps not seeing or hearing a cue due to the preoccupation of making that move from one instrument to another.

Do not misinterpret the above arguments which in fact may imply that a conductor is needed. I'm stating an open minded case by illustrating that the above situations are merely problems that exist and must be overcome.

I'm not certain as to the solutions. The musicians who play the abundance of classical string, woodwind or brass literature do indeed have a similar, if not the same issue to contend with when playing contemporary music but due to the fact they were trained with a more acute response mechanism through constant performing without a conductor, their adjustment is more painless. Perhaps the answer to the question, regarding percussion performance, is training at an early age. This conditioning should certainly begin at the college level, where many musicians are being taught to be teachers as well as performers. Although the enigma remains unresolved, I have confidence that in time the approach to small ensembles of six or seven percussion players will be adhering more to non-conducted experiences than to conducted ones. I think it whould be this way.

For two years prior to his death, Gustav Mahler came to New York City from Vienna to become the music director of the Metropolitan Opera and occasionally conducted the New York Philharmonic. After a highly acclaimed performance of his own fifth Symphony with the Philharmonic, a bassoonist recalls overhearing Mahler to have said to the press, "a great orchestra regardless of its personal differences should be able to play beautifully together without a conductor at all."

And Mahler was referring to an entire symphony orchestra!

I tend to agree.

—————————O—————————

BASS DRUM
By Robert Matson

(Robert Matson is assistant timpanist and percussionist with the Cleveland Orchestra, and also a member of the Board of PAS.)

The following thoughts on bass drum seem to follow naturally the article in the Summer 1975 issue about cymbals, written by Warren Johnson. With the triangle, these two instruments were the only accep-

table percussion instruments in the early days of the symphony orchestra, but often are the most misused in modern playing, especially in school situations. Therefore I aim my remarks at the high school and college band director, although I hope others may find a useful thought or two.

In recent years more and more drummers have moved to plastic heads. Nowadays the plastic head has reached a point where it is better by far than an inferior calf head. I find the only exception to this is the concert bass drum. I have not heard a really good-sounding plastic headed bass drum. What's more, really first rate calf bass drum heads have become almost impossible to get. So - what do you do when you get a hole in your bass drum? In the Cleveland Orchestra we followed the advice of Danny Hinger of the Metropolitan Opera Orchestra, and used a fiberglass boat patch, following the printed directions exactly. This was several years ago, and the drum sounds fine and the patch has held up very well. It looks a bit strange, rather like Hoffnung's drawings, but it works.

Any bass drum can improve its sound by being suspended from its stand, rather than sitting on the stand. You can prove this by making the following experiment. Put one person on each side of the drum, as in figure 1 below. Let them both lift the drum off the stand, and then play the drum. As the drum is being played, slowly lower the drum until it rests completely on the stand, as in figure 2. Note the difference in tone and resonance. I believe most of the major orchestras in this country now use a suspended arrangement. One of these stands is made by Alan Abel of the Philadelphia Orchestra, there may be others. The main point is that the drum is suspended from a ring by rubber bands, as in figure 3.

Speaking of stands, several stands now in use allow the drum to be turned horizontally so the drum may be played like a timpani. This can be a useful device if not overdone. Some experiments we made in the Cleveland Orchestra showed that there is slightly less tone and resonance when the drum is horizontal. It may be that the sound of what becomes the "bottom head" bounces from the floor back into the drum. However, there are some places in the repertoire, such as the last movement of the "Fantastic Symphony" of Berlioz, where the horizontal position facilitates playing the part.

Almost all school bass drums are tuned too tightly. Some method books mention tuning the drum to a pitch such as low G or C. The bass drum is *not* a pitched percussion instrument. For concert use, it should be tuned almost as low as it can be, without the head actually flopping back and forth, or without the tension rods coming out of the lugs. For marching band, a short, dry sound from a tight head may be desirable. Incidentally, to prevent your marching band bass drummer from dropping his stick on the march, he should wear something like a thin cot-

ton glove, form a fist around the stick, and then tape the fist into position.

How many school band directors have a bass drummer who has for his use more than one stick? The absolute bare minimum is two matched sticks, so that a roll can be played. Composers and arrangers have an unfortunate habit of indicating that the bass drum and often the suspended cymbal should be played with timpani sticks. This is wrong, and is a waste of timpani sticks. Use a matched pair of bass drum beaters for a roll, which, incidentally is a single stroke roll. Also, this roll does not have to be fast. On a loose drum, a roll of approximate 16th notes and a tempo of quarter equalling 100 may be quite adequate. Of course, in top line professional playing the bass drummer may have as many as six pairs of sticks of varying hardnesses and weights. Generally, the softer the stick, the heavier it should be, but many of the commercially made beaters are too soft and mushy and too light for any use.

The bass drummer should be familiar with the sound of every spot on the playing head, as played with every stick he has. Various spots will have different sounds, such as the exact center for very loud staccato, about halfway between the center and the edge for long notes where tone is important, and just off center with the left hand muffling the opposite head somewhat for rhythmic passages, such as playing "time" on a march. If the bass drummer is a real musician, every spot will be useful to him at some time.

The up and down or glancing blow on the bass drum has fortunately almost disappeared. There is no other percussion instrument which is played this way with this stroke, therefore why the bass drum? One possible exception might be for marching band where show sometimes takes priority over musicianship.

I have one last suggestion. It's amazing how stupid experienced players can sometimes be. I only realized a few years ago that if the cymbal is to the right of the bass drummer when they must both read the same music, the problems will be slight. When the reverse is true, one man, probably the bass drummer, will have to wear distance glasses and probably aim his vision elsewhere than at the conductor. This will inevitably result in problems.

Fig. 1

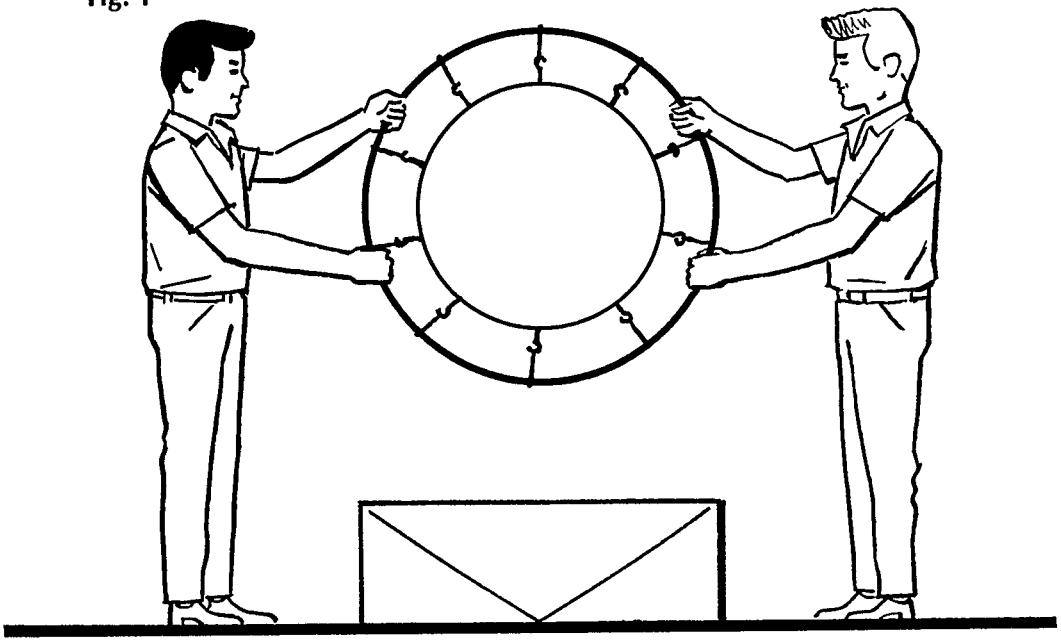


Fig. 2

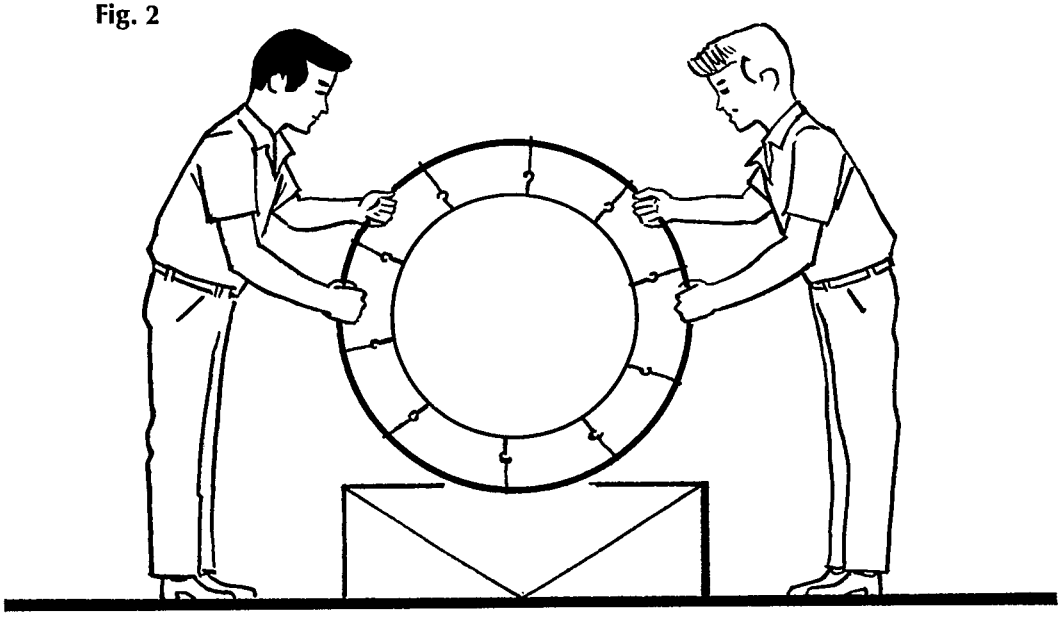
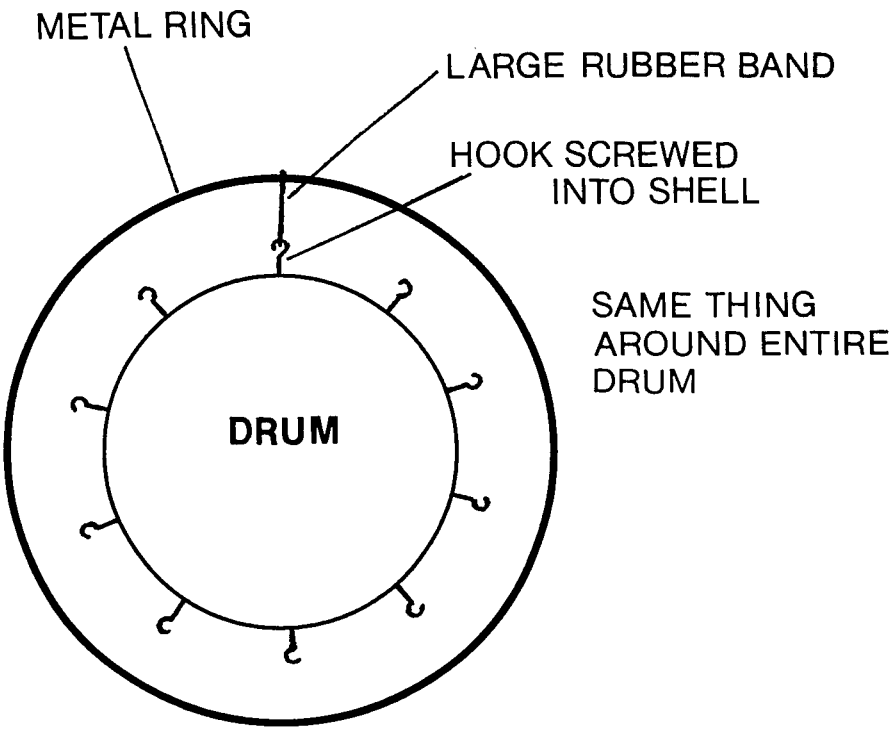


Fig. 3


METAL RING
LARGE RUBBER BAND
HOOK SCREWED INTO SHELL
SAME THING AROUND ENTIRE DRUM
DRUM

ACOUSTICS OF TIMPANI: Preliminary Studies

Thomas D. Rossing and Garry Kvistad
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About the Authors:

Thomas Rossing is a professor of physics at Northern Illinois University, where he formerly served as Chairman of the Physics Department. He has taught courses in musical acoustics for 15 years, and recently prepared a Resource Letter and Reprint Booklet on Musical Acoustics for the American Association of Physics Teachers.

Prof. Rossing has published research papers in a number of scientific fields, including solid state physics, surface science and acoustics. He has established an Acoustics Laboratory at Northern Illinois University to study environmental noise control as well as studies on the acoustics of musical instruments. He also participates in research at the Argonne National Laboratories, which is related to Thermonuclear Fusion as a source of energy. He holds a number of patents on magnetic storage devices for computers.

Garry Kvistad is a faculty artist-in-residence at Northern Illinois University, and co-founder of the Blackearth Percussion Group. He was a timpanist with the Grant Park Symphony of Chicago, and he has also been a percussionist with the Buffalo Philharmonic and Creative Associates of Buffalo.

He graduated from the Oberlin Conservatory, and was a founder of the Oberlin Contemporary Chamber Ensemble. He has recorded on AR records and film score for Claes Oldenberg, and also served as instructor at the Saskatchewan Summer School of the Arts.

Editors Note:

The authors transported three timpani from the Music Building to the Physics Laboratory at NIU to make some measurements on acoustical properties. They answered a number of questions, while raising several others. This is an informal report on their findings.

The timpani were Ludwig Professional Symphonic suspended-bowl models, 32", 26", and 20" in diameter, equipped with plastic Weathermaster db-750 heads. The timpani sticks were of two types: hard (wood wrapped with felt) and soft (felt wrapped with felt). In the laboratory we had available a Honeywell 51B Real-time Spectrum Analyzer, as well as a mechanical driver consisting of a loudspeaker coil, a soda straw, and a wad of gum. The real-time analyzer was used to record transient spectra, and the driver to study steady-state vibrations; together they represent the extremes of sophistication in measurement apparatus, but they complement each other rather nicely. We also employed a General Radio 1/70-octave analyzer and graphic level recorder to measure the decay times of individual modes of vibration.

Before we describe the results of our measurements, let us briefly review the physics of vibrations of round membranes. The logical place to begin is with the "ideal" membrane, which has uniform thickness, is

under a constant outward tension, is completely flexible, and vibrates in a vacuum. Under these conditions, many different modes of vibration can be excited, as described in a number of books, including Lord Rayleigh's classic[1] of more than 80 years ago.

It is customary to label these modes by two numbers, the first representing the number of radial nodes and the second the number of circular nodes (including the node at the rim). Thus the mode of lowest frequency (the fundamental mode) is designated as mode 01, since there are no radial nodes and only one circular node. In the fundamental mode, all segments of the membrane move in phase. The principal mode of timpani, however, is the 11 mode, which has one nodal diameter, so that the two halves of the membrane move in opposite phase. The natural frequency of this mode is about 20% greater than that of the fundamental. The first 14 modes of a free membrane are shown in Figure 1, along with their frequencies compared to the fundamental frequency f01. It is clear that these modes are not harmonics of the fundamental. In fact, a free stretched membrane would not have a very definite pitch at all.

Well-tuned timpani, however, when struck in the proper spot, are known to sound a strong principal pitch plus several harmonic overtones. Rayleigh[1] recognized the principal note as the 11 mode and recognized overtones about a fifth, a major seventh, and a near-octave above the principal tone. Taylor[2] identified a tenth (octave plus a third) by a "humming" test.

How are the inharmonic modes of the ideal membrane coaxed into a harmonic relationship? To our knowledge, no one has worked out a detailed theory, but a qualitative explanation is not too difficult to construct. A real timpani drumhead has some stiffness of its own, and it is strongly coupled to the air enclosed by the bowl or kettle on one side and the free air on the other side. The stiffness of the membrane, like the stiffness of piano strings, raises the frequencies of the higher overtones, while the motion of the air lowers the frequency of certain modes (such as 11 and 21) in a rather complicated way. The net result of these two effects acting together is to separate the frequencies of the lower modes, and move them into a nearly harmonic relationship. We suspect the air-loading is the more important effect, but as yet we do not have sufficient data to prove that assumption.

We should point out that the frequencies of the fundamental (01) and other symmetrical modes (02, 03, etc.) will be raised by the "stiffness" of the enclosed air in the kettle. Morse[3] has calculated this frequency rise to be approximately 5-6% for the 01 mode, 0.2% for the 02 mode, etc. (This is not unlike the increase in the resonance frequency of a loud-speaker when it is placed in an air-tight speaker enclosure). However, he incorrectly states that the frequencies of the musically-important unsymmetric modes will be unaffected by the enclosed air in the kettle. Benade[4] first called our attention to the fact that the air

which "sloshes" back and forth as the drumhead vibrates (although the average air pressure in the kettle does not change), can substantially lower the frequencies of the principal unsymmetric modes such as 11 and 21. We believe that this is the most important consideration in designing the shape of the kettle.

Partials of a timpani

With this introduction, we proceed to present the results we obtained with the Ludwig timpani. The sound spectra obtained by striking the 26" timpani (tuned to E3, f = 165 Hz) in its "normal" place (about 1/4 of the way from edge to center) and at the center are shown in Figure 2. Note that the fundamental mode (01) appears much stronger when the drum is struck at the center, as do the other symmetrical modes (02, 03). They damp out rather quickly (ca. 0.6 sec), however, so they do not produce much of a drum sound. In fact, striking the drum at the center produces quite a dull, unmusical sound.

Striking the drum in the normal place produces prominent partials which have frequencies in the ratios 0.82 : 1.00 : 1.51 : 1.97 : 2.44 : 2.87. If we ignore the first, which is the heavily-damped fundamental, the others are nearly in the ratio 1 : 1.5 : 2 : 2.5, a harmonic series built on a non-existent fundamental an octave below the principal tone.

The next step in our experiments was to drive the drumhead in steady state with our loudspeaker-soda straw-chewing gum driver in order to identify the modes of vibration and try to associate them with the partials in the sound spectra. To do this, we proceeded in two ways. We sprinkled cork dust on the drumheads to observe Chladni patterns,[5] and we moved a small probe microphone around near the surface of the vibrating drumhead.

It is not difficult to identify the first 4 or 5 modes, but beyond that, the identification becomes less certain. Furthermore, as we go to the higher modes, the frequencies become closer and closer, and "mode mixing" tends to occur. (Fletcher and Bassett[6] have detected over 100 partials in the sound from a bass drum.) Nevertheless, we believe the mode identities in Figure 2 are reasonably reliable. Table I indicates the measured frequencies (compared to the principal mode) as well as the corresponding ratios for the ideal free membrane. In order to estimate the amount by which the frequencies are lowered by air loading, we have "normalized" the frequencies to the 41 mode, where the shift due to air loading should be fairly small. This tells us that the principal mode, for example, has been lowered in frequency by about 20% , the 21 mode by 8% , and the symmetrical 02 mode by 7% . The fundamental mode, on the other hand, has been raised about 5% , which is in agreement with 5-6% predicted by Morse.[3] These are crude estimates, but they serve as a starting point for more careful studies.

Measurements on the 32" and the 20" timpani (tuned to G2 and A3), shown in Figure 4, yield similar results, but with one notable difference: the fundamental tone is more prominent in the case of the

20" drum and much less prominent (almost totally missing) in the case of the 32" drum.

Besides its major function in tuning the principal modes, the kettle improves the efficiency of sound radiation by providing a baffle to separate the two surfaces of the drum. This is similar to the behavior of a loudspeaker; without a baffle or enclosure, radiation of low-frequency sound is weak, because radiations from the front and back sides of the speaker cone tend to cancel each other.

In this connection, it is interesting to note that Adolphe Sax, inventor of the saxophone, was of the opinion that the bowl had a harmful effect on tone, and he constructed and patented shell-less kettledrums.[7] Kirby[8] says that a shallow bowl tends to clarify the principal note, a deep shell to increase its resonance. Taylor[2] considers the ideal drum to be one where the depth of the shell is equal to the distance from the playing spot to the furthermost edge. Many drum makers make the kettle hemispherical or nearly so.

Nearly all timpani have a vent hole at the bottom to equalize the air pressure inside and outside. Whether the vent hole has an appreciable effect on the acoustics of the timpani is a question on which there is disagreement. Benade[4] feels that the vent hole provides considerable damping of the fundamental mode, and that its size is therefore critical. Blades,[7] on the other hand, hears no appreciable difference in tone whether the hole is open or closed. Our experiments support Blades, since we find no appreciable change in either the sound spectrum or the rate of decay of the fundamental mode when the vent hole is open or plugged. We estimate that the damping of the fundamental due to radiation of sound by the drumhead is substantially greater than that due to viscous friction in the vent hole. Nevertheless, there is considerable flow of air through the vent hole when the drum is struck at the center, as can be observed easily by placing one's hand just below the hole.

One interesting subject for further study is the directionality of the sound radiation by different modes of different drums. Sound spectra taken along the center axis at different distances from the drum and at various locations off axis show substantial differences. There is some radiation from the bowl, but this appears to be insignificant compared to that radiated from the drumhead itself.

We were a little surprised to learn that the pitch of a drum corresponds to the pitch of the principal tone rather than that of the non-existent fundamental of the harmonic series which would be an octave lower. The latter behavior might be expected on the basis of our experience with chimes and bells.[9] Apparently, the strengths of the overtones (the fifth and the octave) or their durations are insufficient, compared to the principal tone, to establish the harmonic series of the missing fundamental in the lower octave. Brindle observes that a gentle stroke at the proper spot with a soft beater may produce a rather indis-

tinct sound an octave lower.[10]

Further experiments and detailed calculations are clearly needed in order to fully understand the acoustics of timpani. In preparing a resource letter on musical acoustics,[11] it became apparent that little research has been done on the acoustics of percussion instruments. We plan to continue our experiments, and we would like to hear from others who are doing research on percussion instruments.

TABLE I. Vibration frequencies of various modes of a free membrane compared to a timpani drumhead.

Mode number	Free membrane	Timpani	Multipled by 1.98/ 2.44
01	0.63	0.82	0.66
11	1	1	0.81
21	1.34	1.51	1.23
02	1.44	1.66	1.34
31	1.66	2.03	1.64
12	1.83	(2.35)*	(1.90)
41	1.98	2.44	1.98
22	2.20	2.69	2.18
03	2.26	(2.46)*	(1.96)
51	2.29	(2.87)*	(2.33)
32	2.56		
		(3.22)*	(2.61)
61	2.60		
42	2.89	(3.33)*	(2.70)

*identification of these modes is uncertain.

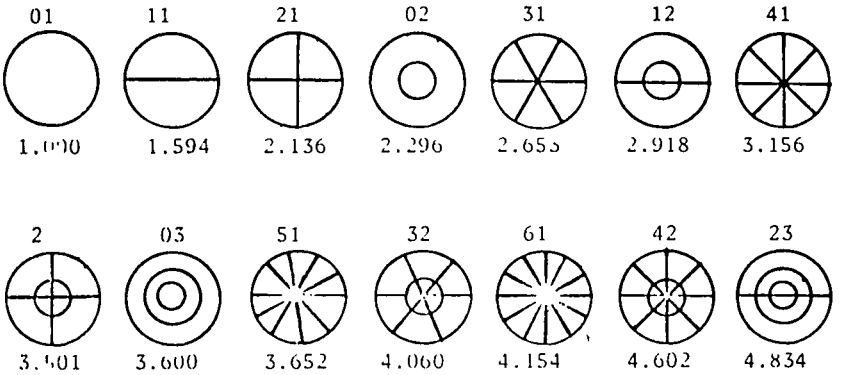

Figure 1. Modes of an ideal membrane, showing radial and circular nodes, and the customary mode designation (the first number is the number of radial nodes and the second is the number of circular nodes, including the one at the edge). The number below each mode diagram gives the frequency of that mode compared to the fundamental (01) mode.

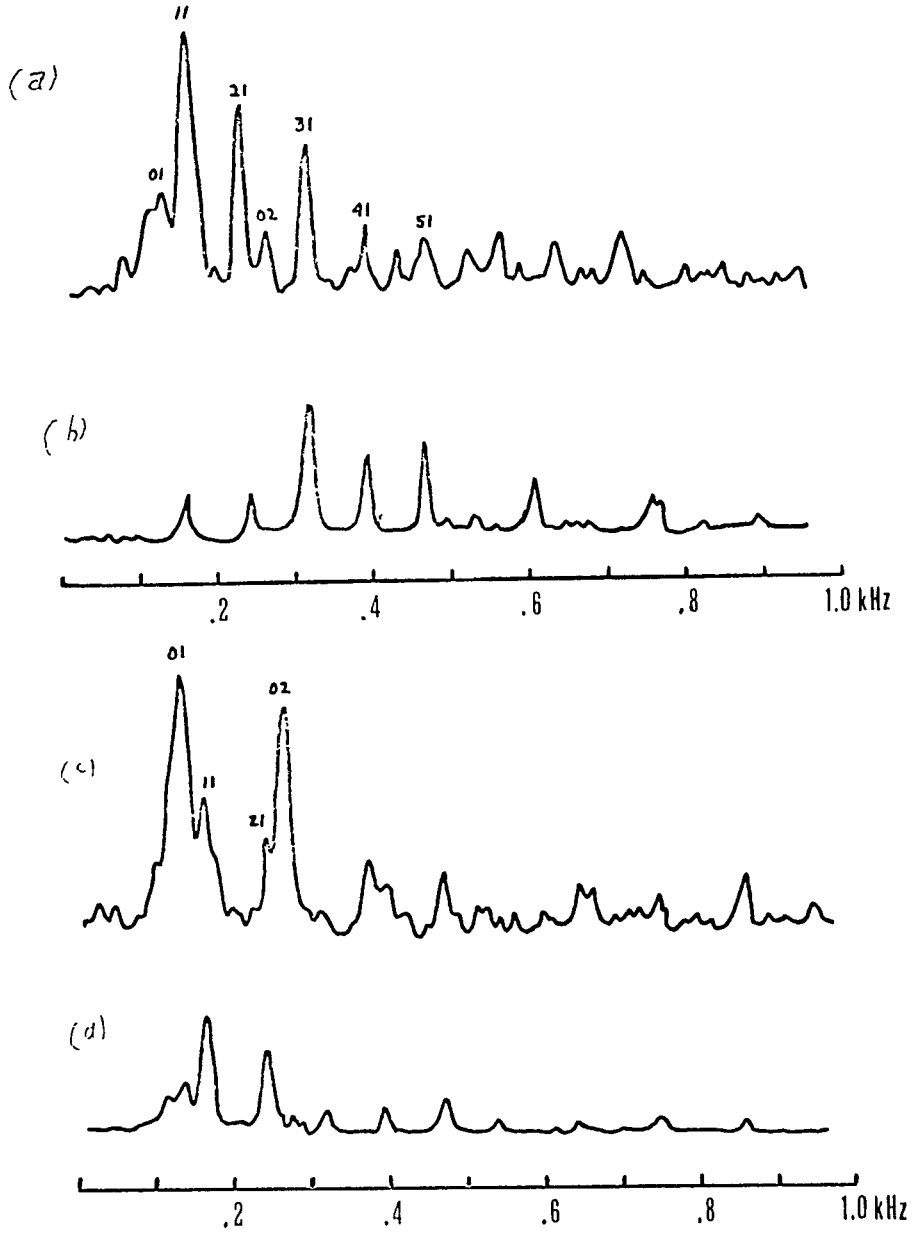

Figure 2. Sound spectra from a 26" timpani tuned to E3.
a) Approx. 0.03 sec. after striking at the normal strike point;
b) Approx. 1 sec. later;
c) Approx. 0.03 sec. after striking at the center;
d) Approx. 1 sec. later.
Mode numbers of some peaks are identified. Note that the symmetrical modes (01, 02, 03) appear prominently in (c), but quickly die out (d).

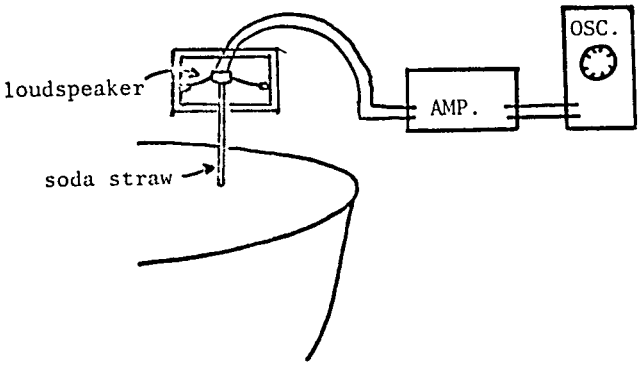

Figure 3. Arrangement used to excite steady state vibrations in the drumhead and obtain Chladni patterns.

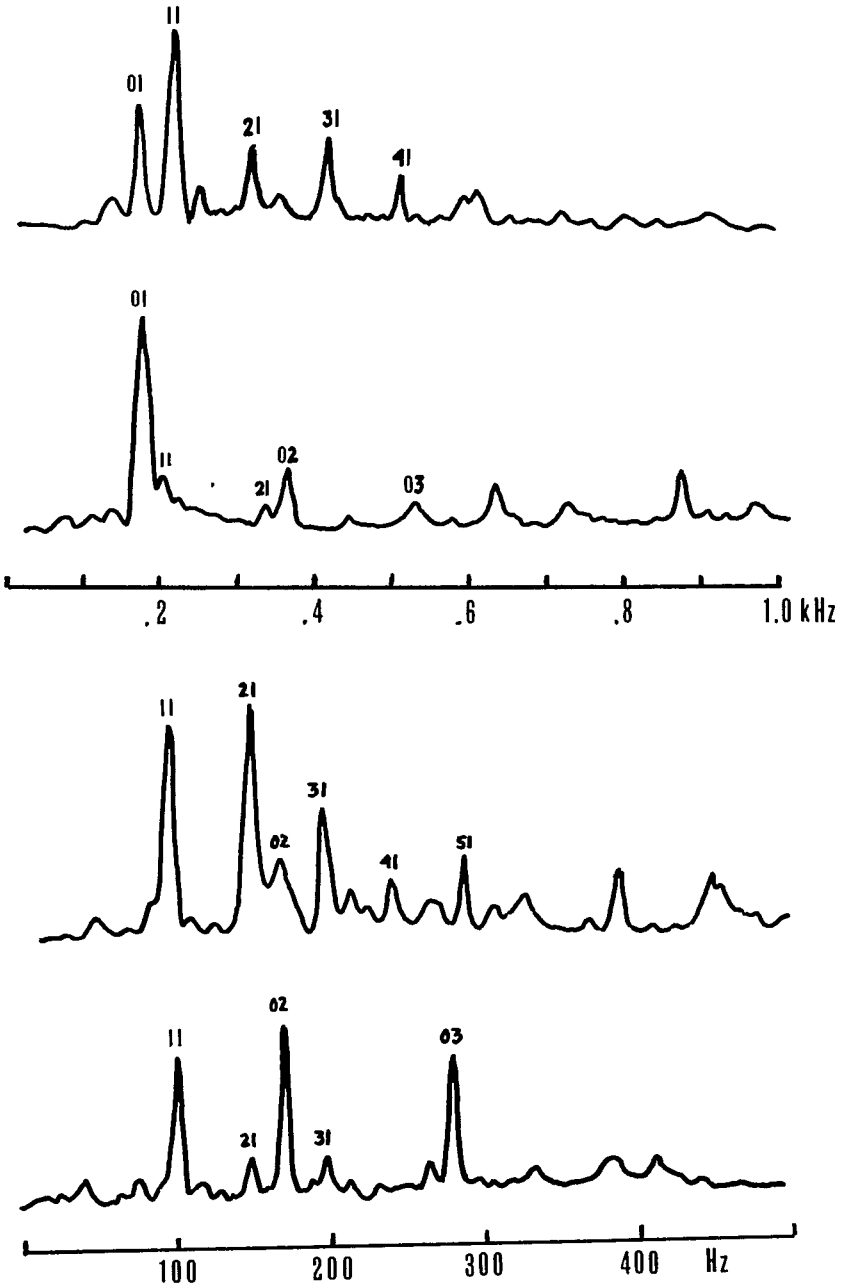

Figure 4. Sound spectra from 32″ and 20″ timpani tuned to G2 and A3.
a) 20″ timpani, normal strike point;
b) 20″ timpani, struck at the center;
c) 32″ timpani, normal strike point;
d) 32″ timpani, struck at the center.

[1]J.W.S. Rayleigh, *The Theory of Sound,* Vol. I, Macmillan, 1894 (reprinted by Dover, 1945).

[2]H.W. Taylor, *The Art and Science of the Timpani,* Baker (London) 1964.

[3]P.W. Morse, *Vibration and Sound,* McGraw-Hill, 1936.

[4]A.H. Benade, private communication. This is also discussed in his recent book, *Fundamentls of Musical Acoustics,* Oxford, 1976.

[5]Chladni patterns, first described by E.F.F. Chladni in 1787, are a standard method for observing the vibrational patterns of plates and membranes. Coarse particles, such as salt or sand sprinkled on a vibrating membrane, collect along nodal lines, whereas fine particles, such as cork dust or lycopodium powder, behave oppositely, tending to migrate to areas of maximum vibration. Chladni patterns are described in the following articles: Proc. Roy. Soc. A211, 265 (1952); Am. J. Phys. *23,* 503 (1955); Acustica *29* 14 (1973); also in M.D. Waller, *Chladni Figures, A Study in Symmetry,* Bell and Sons (London), 1961 and in T.B. Lindsay, *Acoustics, Historical and Philosophical Development,* Dowden, Hutchinson and Ross, 1973, p. 155.

[6]H. Fletcher and I.G. Bassett "Analysis and Synthesis of Bass Drum Tones," 90th Meeting of Acoust. Soc. Am., San Francisco, Nov. 7, 1975.

[7]James Blades, *Percussion Instruments and Their History,* Praeger, 1970.

[8]P.R. Kirby, *The Kettledrums,* Oxford, 1930.

[9]R. Culver, and T.D. Rossing,"The Acoustics of Chimes," 90th meeting of the Acoust. Soc. of America, San Francisco, Nov. 7, 1975; also T.D. Rossing, "The Acoustics of Percussion Instruments: *The Instrumentalist* 30, No. 10, SS (May, 1976).

[10]R.S. Brindle, *Contemporary Percussion,* Oxford Univ. Press, 1970, p. 142.

[11]T.D. Rossing, "Resource Letter MA-1: Musical Acoustics," Am. J. Phys. *43,* 944 (1975).

AN ORFF APPROACH TO TEACHING INDONESIAN GAMELAN MUSIC

By William A. Anderson
Professor of Music Education, Kent State University

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Indonesians have cultivated a rich tradition of vocal and instrumental music, including solo, chamber, and orchestral styles. One of the most sophisticated types of music is that played by ensembles of instruments known as gamelan. Gamelan are composed primarily of metallophones and knobbed gongs positioned either horizontally or vertically. In addition, most ensembles possess a flute, several stringed instruments, and drums. Solo voices and a unison chorus are also integral members of the ensemble.

For many centuries performances by gamelan have been an important part of Indonesian life. Gamelan accompany puppet plays, dance dramas, weddings, birthdays, festivals, visits of guests and heads of states, and numerous other occasions. Gamelan are found not only in the more wealthy urban areas but also in every small village. Attesting to the overwhelming popularity of the ensemble, in the 1930's Jaap Kunst, a Dutch ethnomusicologist, found over 17,000 gamelan on just the islands of Java and Madura (small island off the coast of Java).

Some of the gamelan found in urban areas contain very high quality bronze instruments, which are positioned in embroidered inlaid gold teakwood frame supports. Performances by these ensembles are often heard on radio throughout the islands. Village gamelan generally have fewer instruments than ensembles found in urban areas. The instruments in rural ensembles also are somewhat less refined, sometimes being made of iron or bamboo. Although more sophisticated concerts generally are heard in urban areas, village performers often seem to overcome lesser ability with greater enthusiasm. Gamelan is an important communal activity with clubs rehearsing regularly to prepare for yearly competitions held among various groups.

Teaching Gamelan Music

Gamelan are found in a number of areas in the United States: University of California, Los Angeles, University of Michigan, Wesleyan University, University of Washington, Oberlin College, and the Indonesian Embassy in Washington, D.C. For teachers living near these areas, arrangements can often be made for having students see and play real instruments. However, since gamelan instruments are hand-crafted and expensive, instruments can be used which are already available in schools and which are nearly similar in sight and sound to those of real Indonesian orchestras. For example, a makeshift gamelan can be organized with Orff glockenspiels, metallophones, and xylophones, along with resonator bells, and several gongs (see Figure 1).

Figure 1 — Javanese Gamelan

Javanese Instruments	Classroom Instruments
Saron Barung	Alto Glockenspiel
Saron Demung	Alto Glockenspiel
Slentum	Alto or Bass Metallophone
Gong Ageng	Large Vertically Suspended Gong
Kenong	Three Gongs Suspended Horizontally On Pasteboard-Box Frames
Kempul	Three Vertically Suspended Gongs
Ketuk	One Gong Suspended Horizontally On a Pasteboard-Box Frame
Peking	Soprano Glockenspiel
Gender	Alto or Soprano Glockenspiel
Bonang	Resonator Bells with Construction-Paper Discs
Gambang Kayu	Xylophone
Kendang	Barrel-Shaped Conga Drum

Several Styles of gamelan playing are found in Indonesia and the one described here is the Javanese tradition. Javanese gamelan music is constructed in the following manner: First, there is a principal melody which is repeated over and over in equal time values throughout a composition. The principal melody for a composition called **Ritjik-Ritjik** ("Flowing Water") appears below (Figure 2) in Western notation along with a cipher notation used by the Javanese.

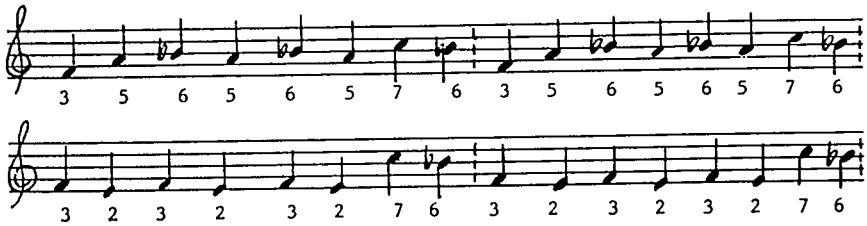

Figure 2.—Principal Melody for Ritjik-Ritjik

The principal melody is a fundamental element of gamelan music, acting a foundation for the development of other melodic and rhythmic parts. The melody is generally played by three instruments, the saron barung, the saron demung, and the slentum (see Figure 1). The saron barung and saron demung are barred instruments with thick rectangular-shaped bronze keys. The instruments are built in octaves so that the pitches of the saron demung are one octave lower than those of the saron barung. In addition to the saron barung and saron demung, another instrument, known as the slentum, often reinforces the principal melody at an octave below the saron demung. Although somewhat similar to the saron, the slentum has thin bronze plates carefully supported by cords over resonating tubes.

All three instruments are played with rounded wooden mallets. However, the mallet for the slentum is covered with a cloth cushion.

In fashioning a makeshift ensemble, the saron barung, saron demung, and slentum can be represented in the classroom by two single-row Orff alto glockenspiels and an alto or bass metallophone.

The single-row keyboards are similar to the real gamelan instruments and also have the advantage of permitting the player to execute a key damping technique employed by Indonesian musicians (See below).

The second element in gamelan music is the rhythmic framework created by a series of gongs (see Figure 1) which are sounded at various points of the principal melody. The longest phrase units of an orchestral composition are marked by the sounding of the gong ageng, the largest gong in the gamelan. The gong ageng is approximately a yard in diameter and when its protruding boss is struck with a cloth-covered mallet, the instrument elicits a very low voluminous "boom." A large orchestral gong may serve as the gong ageng in a school ensemble. In the composition **Ritjik-Ritjik,** the gong ageng is played on each eighth beat (see Figure 3).

Figure 3.—Principal Melody and Interpunctory Gongs

Beats	1	&	2	&	3	&	4	&	5	&	6	&	7	&	8	&
Principal Melody	3		5		6		5		6		5		7		6	
			3		5		6		5		6		5		7	6
			3		2		3		2		3		2		7	6
			3		2		3		2		3		2		7	6
Interpunctory Gongs	T	N	T	P	T	N	T	P	T	N	T	P	T		N G	

G = Gong Ageng (beat 8)
N = Kenong (beats 2, 4, 6, 8)
P = Kempul (beats 3, 5, 7)
T = Ketuk (off-beats)

Each phrase unit delineated by the sound of the gong ageng is subdivided into four sections by sounds of the kenong, a set of gong kettles positioned horizontally on cords stretched across wooden frames. In **Ritjik-Ritjik,** for example, the kenong are played on beats 2, 4, 6, and 8.

Kenong may be constructed for the classroom by placing several small gongs of different size on cords stretched between the sides of pasteboard-box frames. In **Ritjik-Ritjik,** the kenong sound on pitches 5, 6, and 2 of the principal melody. The pitches of the kenong should match as closely as possible those of the principal melody on which they are played.

The phrase divisions marked off by the gong ageng and the kenong are further subdivided by the kempul, vertically suspended gongs, and by the ketuk, an instrument consisting of two horizontal gongs placed on a frame with cross cords. The kempul may be fashioned from ver-

tically suspended gongs available from several music dealers in the United States. As with the kenong, the pitches of the kempul match the pitches of the melody on which they are played. In the composition **Ritjik-Ritjik,** the kempul sound on beats 3, 5, and 7 while the ketuk is played between beats.

So far it has been shown how instruments function to produce two fundamental elements in gamelan music, namely the principal melody and the interpunctory gong parts. Attention is now directed to the third and final group of instruments in the gamelan—the embellishing instruments. The embellishing instruments elaborate on the principal melody in a variety of ways. Stated generally, there are several types of elaboration, some of which are relatively simple and others which are highly complex. The intricate techniques performed on some instruments may require many years to develop.

Some simple embellishing techniques may be played on a number of different instruments. These techniques will be described below along with a few of the elaborating instruments of the gamelan which can be substituted by instruments already in the classroom.

One of the most common simple embellishing techniques is that of reiterating each tone of the principal melody (Figure 4).

Figure 4.—Embellishment Through Reiteration of Each Pitch in the Principal Melody.

Beats	1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 &
Principal Melody	3 5 6 5 6 5 7 6
Embellishing Instrument	3 3 5 5 6 6 5 5 6 6 5 5 7 7 6 6

A more advanced version of the above technique is often performed. This techniques consists of not only doubling but also anticipating each of the notes of the fundamental melody (Figure 5).

Figure 5.—Embellishment Through Doubling and Anticipating the Principal Melody.

Beats	& 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8
Principal Melody	3 5 6 5 6 5 7 6
Embellishing Instrument	3 3 5 5 6 6 5 5 6 6 5 5 7 7 6 6

In a makeshift gamelan for schools, the simple embellishing techniques explained in Figures 4 and 5 may be executed by the following instruments: peking, gender, bonang, and gambang kayu (see Figure 1).

The peking is a small xylophone-like instrument with thick bronze keys. It may be substituted by a small soprano glockenspiel. The gender are metallophones which have thin bronze plates suspended by cords over resonating tubes. The voluminous quality of the gender may be duplicated in the classroom by an alto or soprano Orff metallophone. The bonang consist of a number of small gong kettles which are placed on cords stretched between sections of a horizontal frame. Bonang may be fashioned for schools by covering resonator bells with yellow construction-paper discs. The gambang kayu, which is a wooden xylophone in the gamelan, can be easily substituted in the classroom by an Orff xylophone. While the gambang often doubles or doubles and anticipates the melody, it may also use an embellishing technique known as quadrupling (see Figure 6).

Figure 6.—Embellishing Technique of Quadrupling.

Principal Melody	3	5	6	5	6	5	7	6 etc.
Gambang Kauy	333355556666555566665555777766666							

It must be remembered that the embellishing techniques shown above represent only a few of a great number of elaborating procedures, many of which are highly complex. Further it should be noted that in the gamelan there are five other members of the embellishing family which are not discussed above. These include the suling (flute), the rebab (bowed lute), the tjelempung and siter (plucked string instruments), and vocalists. These instruments and voices provide some of the most highly independent melodies in the gamelan.

Added to the foregoing instruments is a set of drums which help coordinate all parts of the gamelan. The drummer is the functional leader of the ensemble and has the responsibility for maintaining tempo, indicating changes in speed and dynamics, directing transitions from one section to another, and for successfully ending compositions.

Performing Gamelan Music

In learning to perform the gamelan composition **Ritjik-Ritjik,** the principal melody (performed on the saron barung, saron demung, and slentum) should be placed on the blackboard in the Javanese number notation (see Figure 2). The melody is to be repeated over and over in a steady rhythm of equal time values (♩ -88). Since all elements of gamelan music are related to the principal melody, students should be encouraged to sing along (with numbers) and to memorize the tune. Those students who are playing the instruments should attempt a damping technique employed by the Javanese. (In moving from one

pitch to the next on Javanese instruments, it is necessary to dampen each pitch with the left-hand thumb and index finger as each succeeding key is struck. This technique is essential in preventing the blurring quality created by overlapping pitches).

In order to assist in playing the principal melody on the saron barung, saron demung, and slentum, numbers corresponding to the cipher notation of the gamelan composition should be affixed to keys of the makeshift instruments with small plastic gummed labels. The labels should be placed on the lower part of the keys where they can easily be seen and yet far enough from the end of each key so as not to interfere with the key-damping technique.

While learning the principal melody, the interpunctory gongs can be added to the ensemble. As shown in Figure 3, in **Ritjik-Ritjik,** the gong ageng is sounded on beat 8, the kenong on beats 2, 4, 6, & 8, the kempul on beats 3, 5, and 7, and the ketuk on the off-beat.

Once the students are able to play the melody and interpunctory gongs together in a steady tempo, another gamelan technique may be added—that of loud and soft sections. In gamelan compositions, there are two styles of playing: a loud style in moderately fast tempo and a soft style executed at a somewhat slower pace. In the soft/slow sections, the tempo is approximately half that of the loud/fast sections. Further, in the slow sections, all instruments in the gamelan play softer except those which are embellishing the melody. The embellishing instruments should predominate in the soft sections.

The composition **Ritjik-Ritjik** should be rehearsed by playing the principal melody through six times, two times in loud/fast style, two times in soft/slow style, and finally two times in loud/fast style (see Figure 7). The teacher or a student should help the group make changes in tempo by using the conga drum.

Figure 7.—Rehearse Ritjik-Ritjik with Loud and Soft Playing Styles

Loud/Fast	Soft/Slow	Loud/Fast
3 5 6 5 6 5 7 6	3 5 6 5 6 5 7 6	3 5 6 5 6 5 7 6
3 5 6 5 6 5 7 6	3 5 6 5 6 5 7 6	3 5 6 5 6 5 7 6
3 2 3 2 3 2 7 6	3 2 3 2 3 2 7 6	3 2 3 2 3 2 7 6
3 2 3 2 3 2 7 6:II	3 2 3 2 3 2 7 6:II	3 2 3 2 3 2 7 6:II

Once the students are able to execute the principal melody and the interpunctory parts in loud- and soft-playing styles, the embellishing

parts may be added. As mentioned earlier, these parts are to be played on four types of instruments: the peking, the gender, the bonang, and the gambang. Students may begin the embellishing parts by doubling each note of the principal melody (see Figure 4). After they are able to perform this technique with ease, the somewhat more advanced manner of anticipating while doubling may be employed (see Figure 5). When playing in soft/slow sections, the gambang player may employ a further technique—that of quadrupling the melody (Figure 6).

In order to assimilate the embellishing procedures, it is suggested that the techniques be employed gradually, making sure the students are secure with each one before adding the next. The complete composition should be rehearsed a number of times with the form given in Figure 7: twice through the principal melody in loud/fast style, twice in soft/slow style, and then twice again in loud/fast style. Considerable attention will be necessary in making a smooth change from one section to another.

As soon as the students are playing the composition with some degree of ease, a short introduction may be added. The introduction is to be played by one instrument, often a bonang. The introduction to **Ritjik-Ritjik** is given below (Figure 8) and is to be played in a tempo which is twice as fast as that of the principal melody in the composition.

Figure 8.—Introduction to Ritjik-Ritjik.

6 . 3 5 6 . 5 3 2 . 3 5 6* *gong ageng sounds

As will be observed, the gong ageng signals the end of the introduction. The composition proper follows the introduction without a break. However, as mentioned, the composition is at a tempo approximately half as fast as the introduction.

In summary, I have attempted to show how the gamelan music of Indonesia can be presented in schools with instruments now available in the United States. Performance with Orff instruments provides a means of having students actively involved in learning how a music outside their own Western system is structured.

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