

Creative Orchestration

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To my colleagues and to the many students who have shared with me the adventure of experience and discussion from which this theory of orchestration gradually emerged.



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Preface

THE ORCHESTRAL SOUNDS SUMMONED UP BY THE GENIUSES of music sometimes seem like sheer magic, but the imagination and flair of the master composer must inevitably be based upon certain principles of tonal relationship and procedure which are the same for both the student beginner and the developed artist. Clear and effective sound and structure stem from applications of unity, contrast and variety. These applications can be formulated into fundamental types of technique which can be understood and utilized by every student of music. The main purpose of this book is to formulate a general theory based on such techniques.

There have been too few theoretical speculations on orchestration by the composers of the past. Much has been written by theorists about the technicalities of instrumentation, but far too little has been said by the creative artists themselves about "how" to write for the orchestra. The pioneering effort by Berlioz, *Treatise on Instrumentation*, is lively and evocative and, in spite of a certain obsolescence, still has much to offer from an artist's creative insight. The modern revision by Richard Strauss has further values derived from Strauss's own experienced craftsmanship.

Rimsky-Korsakov, in his *Principles of Orchestration*, offered many creative suggestions, but fell short of a complete general theory. Richard Wagner began his book *On Conducting* with the sentence, "The secret of good orchestral sound is sustained tone." With this fragmentary statement we are left groping at unfulfilled total analysis because there are so many other sources of "good orchestral sound."

Sibelius has been quoted as saying, "The orchestra has no pedal." He meant that while improvising on the piano, use of the pedal produces a continuous resonance that can be had in

the orchestra only by adding actual supplementary sustaining material. This is also strikingly true, but again, we are left groping toward a complete system which will surround all mastery of craftsmanship with a basic explanation. It is toward such a complete, inclusive and far-reaching analysis of "how" to write "good" orchestration that this treatise is directed.

The methods of orchestration discussed in these pages, with their emphases upon central principles of effective sound and performance by small ensembles, were developed through many years of experience in orchestration.

At first, standard books were used for reference and in teaching, but these were found to have an overemphasis on factual material and a lack of workable general theory.

Later, a method was adopted which emphasized the imitation of styles used by various master composers. To learn orchestration the student was asked to analyze the scores of Bach, Mozart, Tchaikovsky, Debussy, etc., and to imitate these principal styles by writing full-score examples. This was a better method and led to much effective technic and the gradual formulation of a general theory. Eventually this method was also abandoned because, in writing for full orchestra, actual performance was too difficult to obtain; as a result, knowledge had to remain too theoretical. Furthermore, the student was usually impelled too strongly toward imitation; and his own individuality was left dormant.

Finally, through further experiments in teaching, it became clear that the best results came from a freely creative use of general theory. The most creative orchestration occurred when the student was unburdened from imitating masterworks and was allowed to develop personal expression restricted only by the most fundamental guiding principles and by the sincere artistic criticism of an interested teacher.

Of all the musical studies, orchestration can be the most adventurous. But its ultimate sense of creativity can be had only if that which is written can be tried out in actual performance.

All the formulations contained in this book can be tried out successfully on a small ensemble of the type usually available among members of an orchestration class. (See page 212 for an example of a laboratory-type ensemble used at the University of Washington.) It is not necessary to write only for the large orchestra. The basic principles of clear organization and tonal interest are essentially the same for ten instruments as for one hundred.

In forming an orchestra for which to write, it is best to have some representation of each family of sound (e.g., two woodwinds, one brass instrument, a few strings, a piano or other percussion) or some combination that will make available two or more choirs of sound (three woodwinds, four strings and piano, for instance). Any available small combination of mixed instruments will provide, for the student, much basic experience in the application of general principles. By writing for small groups, much time will be saved and the experience gained can later be applied to writing for the large orchestra.

Complete knowledge is a combination of theory with practical and artistic experience. Live performance of students' compositions is urgently necessary. In a day-by-day adventure in joint discovery the teacher can play a decisively creative role as analyst, critic and enthusiast. Now and then genius will appear in a few measures, and with it will come an exhilarating group feeling of identification with musical creativity.

This treatise, then, offers: (1) compact presentation of basic information; (2) a comprehensive general theory; (3) a teaching method strongly motivated by emphasis upon creativity; (4) a practical means for testing results by actual performance; (5) an orderly and progressive study plan; (6) analytical discussion which stresses contemporaneity and musical frontiers; (7) principles of value to listener and conductor; (8) examples transposed to actual sound for the convenience of the reader, and (9) charts citing specific pages in standard scores where further illustrations may be found (see pages 218-220).

PREFACE

I wish to express my appreciation to the Boston Symphony Orchestra, Inc., for permitting the use of photographs in this book. Pictures of the orchestra, under the direction of Charles Munch, appear as a frontispiece and on pages opposite each of the chapter openings.

George Frederick McKay

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I

The Instruments of the Orchestra

BEFORE YOU CAN WRITE CORRECTLY AND EFFECTIVELY for the instruments of the orchestra you will need to know: (1) the ranges of the instruments, (2) how to write for the instrumental parts which must be transposed (higher or lower than actual sound), (3) something about the special qualities of different pitch locales or registers of each instrument, (4) how to mark *staccato* and *legato* indications for wind instruments, and bowings for strings, (5) how to set the instruments into effective motion and (6) how to avoid writing musical parts which would be physically awkward or impossible for a player to perform on his instrument.

The charts, examples and discussions which follow will furnish this information in concentrated form.

As a preparatory exercise, those unfamiliar with the various instruments should write one example, correctly transposed, for each of the instruments included below. Whenever possible, performers should be invited to visit the orchestration class to demonstrate the ranges, tonal characteristics and physical limitations of their instruments.

RANGES AND REGISTERS (Actual Sound)

Since authorities differ as to the actual physical possibilities of playing in the upper registers, the following chart makes no attempt to be definitive. The upper ranges and registers included are considered *practical* or *safe* for use in the following exercises in orchestration.

Piccolo
weak, soft, clear, shrill

Flute
deep, sweet, bright, clear

Alto Flute
deep, full, ordinary

Oboe
deep, warm, shrill

English Horn (Cor Anglais)
dark, mournful, intense

E^b Clarinet
bland, normal, bright, shrill

B^b Clarinet
dark, weak, bright, shrill

A Clarinet
dark, weak, bright, shrill

E^b Alto Clarinet
dark, bland, mellow, intense

B^b Bass Clarinet
very deep, dark, heavy

B^b Soprano Saxophone
ordinary, plaintive, shrill

E^b Alto Saxophone
heavy, natural, stringent

B^b Tenor Saxophone
heavy, natural, intense

E^b Baritone Sax.
heavy, usable

THE INSTRUMENTS OF THE ORCHESTRA

Bassoon
rough clear piercing

Contra Bassoon
ponderous heavy grotesque

B^b Trumpet
dull clear strident

Horn
dark deep natural stringent

B^b Trombone
dull strong intense

Bass Trombone
heavy deep powerful

Tuba
deep natural usable

Violin
deep warm bright

THE INSTRUMENTS OF THE ORCHESTRA

Viola
dark warm intense

Cello
dark warm intense

Bass
heavy natural

Harp
bright

deep natural

Timpani

Vibraphone

Xylophone
(sounds octave higher)

Chimes

Glockenspiel
(sounds two octaves higher)

Celesta

TRANSPOSITION RATIOS

In order to produce the correct pitch to correspond with the rest of the orchestra, certain instrumental parts must be written higher or lower than the pitch or key in which the rest of the orchestra is playing.

In the chart below, the natural pitch of each of these transposing instruments is compared to middle C. To determine how much higher or lower to write the part for a specified instrument, find the interval listed for it on the transposition chart below.

TRANSPOSITION CHART

If middle C is *lower* than the pitch tone (the tone in parentheses), the part for that instrument must be written *lower* than actual sound by the distance shown.

If middle C is *higher* than the pitch tone of the instrument, the part must be written *higher* than actual sound by the distance shown.

For instance, the chart shows that for the C piccolo, middle C is an octave *lower* than the pitch tone. The part must therefore be written an octave *lower* than actual sound. For the horn in F the chart shows that middle C is a fifth *higher* than the pitch tone. The part must therefore be written a fifth *higher* than actual sound.

RULES FOR BOWING AND PHRASING

Down-bow is marked with this sign:



Up-bow is marked with this sign:



In general, there will be two bows to a measure, with down-bow and up-bow alternating.



If down-bow and up-bow alternate continuously this is the most natural pattern and does not need to be marked.

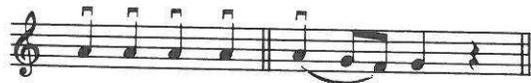
All notes included under a single slur will be played by one bow.

If a phrase begins with an up-beat or *anacrusis* it is understood without marking that it will be played up-bow. If down-bow is preferred it must be indicated.

Any desired deviation from the regular alternation of down-bow and up-bow must be marked accordingly.



Successive down-bows give a powerful hammered effect.



Successive up-bows are more light and graceful.



Separated notes with dots indicate varied types of *staccato* which must be defined for the player by further description in Italian: *spiccato*, *saltato*, *martele*; or by the English meaning: "rapidly and lightly," "jumping bow," "hammered," etc.

Separate notes with dots may be included in a slur, with the type of dot indicating intensity of articulation.



Whenever dots are used under a slur to indicate successive down-bows or successive up-bows, or whenever any deviation

from the normal alternation is brought into the phrasing, mark indications for the bowing which will return it as soon as possible to the normal alternation (down-bow, up-bow).



It is sometimes effective to have accented points in a phrase at the end of a bow, but this is a special effect and an exception.



PHRASING FOR WIND INSTRUMENTS

In writing for the wind instruments, indicate the *staccato* and *legato* character by dots and slurs. Because winds are more sluggish in articulation than strings, any *staccato* effects in winds will have to be vividly indicated and you may have to add additional instructions to the *staccato* markings. Use descriptive terms such as "crisp," "emphatic," "delicate," "vigorous," etc.

Wind instruments can play quite long and continuous *legato* passages without too much trouble. *Legato* passages can be made most effective by shaping them in accordance with those points where the player would naturally pause for breath.



String Effects

Legato (two bows to a measure) Détaché (vigorous separate bows)

Slow spiccato (slow bouncing bow) Fast spiccato (rapid bouncing bow)

Measured tremolo Tremolo

Fingered tremolo Trill

Connected staccato (easy) Connected staccato (difficult)

Broad staccato Martelé (hammered)

Down bow emphasis Up bow emphasis

Ricochet (bouncing effect) Glissando

Alternating strings Sul G. (high on the string)

Natural harmonics on the D string (each open string has harmonics in the same ratio)

(actual sound)

(as written)

Artificial harmonics

(actual sound)

(as written)

Col legno (drum with the back of the bow) Pizzicato (plucked)

Ponticello (bow very near the bridge and slanted toward player) Sul tasto' or flautando (soft bowing away from bridge - forward on the fingerboard)

Non-vibrato (non-vibrato) Divisi

Woodwind Effects

Double-tonguing

Triple-tonguing

Flutter-tongue (flutter)

Glissando

Arpeggiation

Legato (one breath)

Staccato design

Trills

Runs

Leaps

Legato design

Pedal tone

Brass Effects

Fanfare

Double-tonguing

Triple-tonguing

Flutter-tongue (flutter)

Glissando

- Mutes
- Straight mute (standard)
 - Cardboard mute
 - Cup mute
 - Harmon mute
 - Metal mute
 - "Jazz" mute
 - Robinson mute etc.

Maestoso

- Off-stage (muted effect)

Extended Legato (with breath mark)

Trills

Staccato design

Pedal tone

Percussion Effects

The roll or trill

Grace note pattern

Rhythmic pattern

(flam) (ruff) (ratamacue)

Intervallic pattern (on timpani or bell instruments)

Cymbal crash (crash)

Cymbal struck (struck)

Cymbal trill (with hard sticks or with soft sticks)

f *p*

Harp Effects

Glissando (tones to be included indicated at beginning)

or

Harmonics

Trill

Enharmonics

Chordal pattern (arpeggiated)

Chordal pattern (non-arpeggiated)

Near the sounding board (intensified)

POTENTIALITIES AND LIMITATIONS

The Piccolo

The piccolo is interestingly shrill in its high register, shockingly so in its very highest notes. When used too frequently or when used at great length, this instrument can wear out its welcome; but when it enters suddenly as a surprise, as punctuation, or as humorous characterization, it adds a striking newness and brightness. In its extreme low range it possesses a sweet, but wan, quality. The piccolo is quite agile but, because of its minia-

ture construction, is not quite as fluent in *legato* playing as the flute.

There are numerous opportunities to hear the piccolo used in its high brilliant range, as in the storm scene from Beethoven's *Symphony No. 6* ("Pastoral") or in the third movement of Tchaikovsky's *Symphony No. 4*. Examples of the use of low range are more rare; there is one very clear and expressive example at the end of the second movement of *La Mer* by Debussy.

The Flute

The flute tone contains the very essence of lyric and pastoral feeling. It has great *legato* fluency and is able to skip about from register to register more easily than any other instrument. Its lowest register has a rich and appealing depth of tone. In its higher registers it gives the illusion of sounding lower than it actually is. These higher registers are normal and can be used freely. The flute can disappoint if expected to be powerful in its medium and lower registers, and it cannot cut through the orchestral ensemble very easily except when played in high register. Its *staccato* articulation is not very incisive or pointed, and requires special marking. The flute is particularly effective in melodic and decorative passages.

For concentrated listening experience related to the characteristics of flute tone and motion, hear the *Poem* for flute and orchestra by Griffes and *Night Soliloquy* by Kennan.

The Alto Flute

The alto flute, or flute in G, is a rare instrument mainly used for a certain low register quality. The heavy lower tones have unique substantiality and depth. The upper tones are hardly distinguishable from those of the flute in C (the ordinary flute).

The alto flute may be heard in Holst's *The Planets* — as third flute in the movement "Saturn."

The Oboe

When well played the oboe is unsurpassed for poignancy. Its intense and impassioned tone is ideal for use in simple melody and for the enrichment of other timbres by doubling. The oboist, more than any other player, needs time to breathe and prepare for entrances. *Staccato* articulation is more definite and interesting than on the flute, but must not be too rapid or lengthy. All simple *legato* passages sound well but should usually be kept within middle register, since the higher and lower registers are extremely intense and difficult to play. Rapidly moving accompaniment patterns do not seem suited to the character of the oboe, and skips from register to register should be limited to a few well prepared leaps. Use the oboe mostly for melodic line.

For illustration of typical oboe writing hear the slow movement of *Symphony in C* by Bizet or *The Winter's Past* by Barlow. A rarity is the use of bass oboe in *Brigg Fair* by Delius.

The English Horn

The English horn, or *Cor Anglais*, is an alto oboe. Its limited range and its articulation difficulties are similar to those of the oboe. The English horn sounds best in its middle register, where its deeply brooding and pungently dark timbre can be most easily produced. The higher and lower registers are stringent and cannot be played softly. The tone is phenomenally expressive and attractive but must be used sparingly. In its essentially melodic role, the English horn is most valuable for the expression of the more tragic and meditative moods. It also adds a choice richness when used as an alto voice in woodwind harmony.

Good examples of the use of English horn may be heard in the slow movement of *Symphony No. 5* by Dvorák ("From the New World") and in *Concerto da Camera* for flute, English horn and strings by Honegger.

The Clarinet

There are several sizes of clarinets, each of which is identified by a basic pitch. There are clarinets in E-flat, B-flat, and A; there is also an alto clarinet in E-flat, and a bass clarinet in B-flat. The B-flat clarinet is the one most commonly used, and its liquid tone has a sweet, warm, expressiveness. The A clarinet has the same flexibility as the B-flat but its tonal character is darker and more tragic.

The shrill, gay and prankish E-flat clarinet is garishly high in pitch and is rarely used except for special dramatic effect and tonal grotesquerie. The B-flat bass clarinet has a particularly dark and deep tone. It can be used for tonal surprise in its low register, and it adds vital reinforcing power when doubled with low strings, bassoon, or tuba. The bass clarinet should carry melody only briefly, because of its intensely vivid roundness and substantial tone. Like all low instruments, it must articulate and move more slowly. The bass clarinet has the most authentic depth of all instrumental timbres, and its use could well be restricted to its deep low and middle registers. The upper tones are more difficult to play and are somewhat dry and grotesque in effect. The E-flat alto clarinet is known mainly as a moderately deep timbre which adds mellowness and depth to woodwind harmony.

Music written for the clarinet can be very agile. Clarinetists are able to skip about easily from high to low register and, like flutists, can easily execute runs and rapidly moving *legato* designs. They can also maintain a sustained tone or a slow *legato*. As on the flute, *staccato* articulation will be played with sufficient definiteness only when specially marked with dots and interpretative indications: e.g., "incisive," "delicate," *marcato*, etc.

In its middle register the B-flat clarinet is disappointingly weak and relatively characterless. In its upper tones it becomes strikingly bright and powerful, while in the *chalumeau* or low register it has an unequalled rich, mellow, deep quality much

treasured for its poetic power. The extreme high notes should be used with caution because of a disagreeable shrillness that increases markedly as the player approaches the top of the range.

Outstanding illustration of clarinet use can be heard in the *Première rhapsody* for clarinet and piano by Debussy and the *Quintet* for clarinet and strings by Brahms. The prankish E-flat clarinet can be heard in *Concertino* for piano and orchestra by Janáček, in *Till Eulenspiegels lustige Streiche* by Strauss, and in *El Salón México* by Copland. Bass clarinet can be heard in "Dance of the Sugar Plum Fairy" from the Tchaikovsky *Nutcracker Suite*.

The Bassoon

The bassoon has a timbre of great individuality. It has a certain ungainly charm that lends itself to comic effects, but it can also be plaintively expressive, especially in the upper part of its range.

Normally the bassoon supplies a thickening ingredient for the bass in passages where fullness and power are needed. When used as foreground or melody its value is mainly in the addition of dramatic characterization. Because of the grotesque character of its sound the listener's interest is soon lost when the bassoon timbre is overused.

The bassoonist can make skips with relative ease, and *legato* playing is possible but does not sound quite as comfortably fluent as on the flute or the clarinet. As with the oboe, florid design goes somewhat "against the grain," but *staccato* effects are very natural and are easily produced.

The bassoon may disappoint if expected to sound softly in low register. As the player progresses down into this register there is an increasingly sharp edge to the articulation that works against the possibility of playing softly.

For typical examples of bassoon use hear the very opening measures of *Le Sacre du Printemps* by Stravinsky, the opening

statement of *L'Apprenti Sorcier* by Dukas, and the beginning of the movement "Uranus" from *The Planets* by Holst.

The Contrabassoon

The contrabassoon is pitched an octave below the bassoon. Because its tone is somewhat dull and harsh, and its action necessarily sluggish, it is mainly useful for octave doubling to create the deepest possible bass effects, but it is occasionally used for special dramatic characterization: e.g., to represent the beast in "Beauty and the Beast" from the *Mother Goose Suite* by Ravel.

The Saxophone

Like the clarinet, the saxophone is available in several sizes, each with its own characteristic pitch and timbre. The differences of tone quality within the saxophone family are less marked than those within the clarinet family.

The E-flat alto is the standard saxophone. It is relaxed and normal in its sound, whereas the B-flat soprano instrument is rather nasal and grotesquely high in sound. The B-flat tenor saxophone has a nobler depth and a certain heaviness, while the E-flat baritone has an especially deep resonance which can add an illusion of substance and rich depth to woodwind harmony. A feature of the saxophone is a certain uniformity of quality throughout its range.

The saxophone is somewhat handicapped by a relatively sluggish articulation and a certain regularity of tone quality that works against variety of dynamics and register. In small groups it tends to be garishly prominent, but in the large orchestra it tends to disappear into the generality of the full sound without adding to its character. It does have certain unique soloistic expressive potentialities and has been used for a certain soft richness of tone—as in Bizet's *L'Arlésienne* suite; for a high festive brilliance—as in Ravel's *Bolero*; and to characterize a certain mawkish wistfulness—as in Prokofiev's *Lieutenant Kijé*.

A more complete acquaintance with saxophone tone potentialities can be had by listening analytically to the many uses made of it in jazz and popular recordings.

The Horn

The horn is the most difficult instrument to articulate and, in writing for it, care must be taken to allow the player to "recuperate" and to prepare for his next entrance. The horn player cannot skip from one register to another very easily. The part should be written to move smoothly and consistently within a practicable pitch locale.

Originally the horn had no valves and was capable of only a limited use. The modern horn has a much wider capability and need no longer be thought of as a subordinate or background instrument. If given sufficient time between each entrance, the modern horn player is capable of playing almost any reasonably written part. *Legato* demands must allow for sufficient breathing. *Staccato* design must not be too rapid or too long.

As the top of its range is approached, the tone of the horn becomes extremely difficult to produce, and therefore can get too tense and vivid. Because of the extra long tubing of the horn it is possible for the player to produce certain unique and wonderfully deep low tones.

These bass clef tones are rather uncommon but possible for most players, but they cannot be produced in rapid succession or with a pointed *staccato*. When writing for this unusual register, give the player time to find, produce and terminate each tone.

When the horn is muted the tone is surprisingly insubstantial but, because of the mysterious, distant effect, very attractive. By inserting the hand in the bell the horn may be partially muted or "stopped"; this causes a sound which is mellower and less distant. To indicate this effect, write "stopped horn" at the point where it is desired.

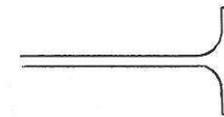
The ordinary horn tone may be made bland or raucous, depending upon the amount of "rattle" or "buzz" that the player

imparts to the tone, and the composer can ask for varying degrees of gentleness or vigor by indicating the character of sound desired: e.g., *sotto voce*, "rough," "flexible," etc.

Hear the famous and challenging horn solo at the beginning of *Till Eulenspiegel* by Strauss. Also listen for the vigorous use of horn in the "Millers Dance" from *The Three Cornered Hat* by de Falla, the long solo line at the beginning of *Pastorale d'été* by Honegger and the opening horn call in the *Oberon* overture by von Weber.

The Trumpet

In his *Symphony in D minor*, Franck has written for the two types of trumpet: the standard orchestral trumpet, which has the more vigorously strident and martial tone that results from the shape of the bell;



and the cornet, with its mellower tone which results from a more graduated bell.



Although the timbres are different the playing techniques and resulting problems are much the same.

The few lowest tones are rather inferior in quality and should not be used too often. As the top of the range is approached the tones become excitingly stringent and furnish an

intensity well known to composers of dramatic music. Good players like to produce these tones, but because of the effort required they should be used sparingly.

The trumpets are the loudest of the instruments and this must be taken into consideration when marking the dynamics. When muted they are surprisingly weak.

Traditionally, trumpets have been thought of as instruments of fanfare, and composers of the past too often limited use of the trumpet to a detached articulation. Modern players, however, can do surprisingly well with *legato* effects and should be challenged more often by *legato* melodies and designs. When playing *legato* the player will need to pause for breath, and this should be considered when marking the *legato* phrasing.

Rapid *staccato* is possible but not easy, and should be limited to brief patterns which allow the player time to prepare for each active segment of the pattern.



Twentieth-Century developments in the use of mutes have added greatly to the variety of trumpet timbre. For instance, the straight mute creates a silvery, miniaturish sound; the Harmon mute adds a mellower lyricism to the tone; the cup mute produces a genial, slightly mocking distortion. When it had only its natural strident tone the trumpet was doomed to either foreground or silence. With the invention of the mutes it became possible for the trumpets to play a more subtle role and to contribute a new, more fluid and *legato* action to rhythmic and harmonic background.

For the most striking and modern use of mutes and other trumpet effects, listen with analytical curiosity to all kinds of dance band and jazz recordings. It will also be profitable to ob-

serve the remarkable use made by Stravinsky of both open and muted trumpets in *Petrouchka*. In this score there are many instances of trumpet effect which are given the foreground for dramatic purposes. In the Franck *Symphony in D minor* there is unique use of both trumpets and cornets to create a richness of harmonic effect.

The Trombone

The tone of the trombone is rich, lyric and ponderous. It can be nobly melodic but, due to problems connected with the shifting of the slide, the player can never be completely at ease in *legato* playing. The trombone *staccato* cannot be very biting, rapid or pointed. Music written for trombone should, therefore, have a certain epic breadth and dignified moderate pace. When played softly the trombone can produce a mellow lyric quality; when played loudly it has a full-fledged power that is very stirring. It adds nobility and depth to the brass choir.

For illustrations of their general use, listen to the trombones in Tchaikovsky's *Symphony No. 6*, and in the opening of *The Russian Easter Overture* by Rimsky-Korsakov.

The Tuba

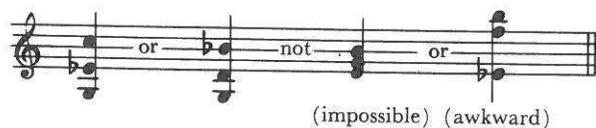
The tone of the tuba is only moderately interesting as melody. Its real contribution is the intensity and depth which it can give to the bass line when needed. Its shortcomings are its lack of mobility and its difficulty with *staccato* articulation. It is very effective when needed for unusually deep power, but otherwise should be used with caution. Unless it is given a part which it can articulate with enough ease it will slow up the pace for the other instruments.

Tubby the Tuba by Kleinsinger, a children's piece, illustrates tuba potentialities.

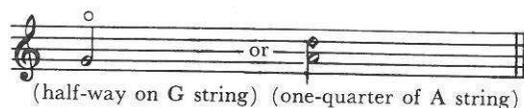
The Violin

Of all the instruments the violin is the most flexible in articulation, the most passionate in utterance, the most versatile in motion potentialities. It can be used either for melody or accompaniment. The player can shift easily from register to register and can execute the most subtle musical designs, either in *staccato* or *legato*. The violin responds readily to demands for dynamic change.

Special effects possible on the violin are: (a) the *pizzicato* (the most delicate and pointed staccato sound) which is made by plucking the string — the *pizzicato* can be delicate or rough, depending upon the way it is produced; (b) the trill; (c) the *tremolo* (for illustrations see pp. 10-11; (d) chords, which can be played by either strumming the strings or bowing — chords are not possible unless each tone of the chord is produced by a different string and unless the finger positions are practicable;

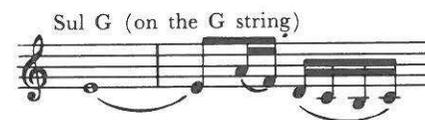


(e) harmonics, which are produced by stopping the string at a point one-half or one-quarter of its length and then drawing the bow,



which produces a flute-like tone — harmonics cannot be played in rapid succession and, because of extreme delicacy, must be

more sustained than *staccato*; (f) the special sound of each individual string, which can be exploited by indicating that the player is to execute a passage entirely on one given string.



FROM BACH: *Suite No. 3 in D Major for Orchestra*

The string tone has a special pliability and a potentiality for softness and gentleness that makes it particularly suited for use as general background. The woodwinds, brass and percussion have a more insistent vividness and force of impact. Because of this difference in tonal character, the ear can tolerate the string tone for longer periods of continuous use.

When writing for the violin, give the player time to make the change from *pizzicato* to bowed sound, or vice versa. In *legato* passages two bows per measure are generally required to ensure that the player will have enough bow for a full, free tone. Be reasonable in asking for rapid and continuous leaps from high to low register (across the strings). Be inventive enough with the bowing (mixing *staccato* and *legato*) to avoid a monotony of articulation.

To hear the essence of violinistic effectiveness, listen to recordings of the principal violin concertos played by famous artists and also to the string quartets of the classic masters (such as Beethoven, Haydn and Mozart), as well as those of Bartók.

The Viola

This mellow alto instrument has all the versatility of the violin, but it responds a little less quickly to demands for motion and is more subdued in tone. You cannot expect power from the

violas, but you can expect a highly attractive melodic character and much usefulness in accompanimental design. The lower and higher registers are most unusual because of the gruff, slightly hoarse, charm of the C-string, and the poignant and nasal, but poetically expressive, timbre of the high A-string.

The *Suite* for viola and piano by Bloch reaches deeply and originally into viola effect — be sure to hear it.

The Cello

There are certain natural limitations to the possibilities of the cello. It can play rapidly, but not as easily as the violin and viola. It can play chords, but in the orchestra they tend to blur. The cello has an especially good melodic register on the A-string. The first octave of this A-string register is easy to play and is expressively eloquent. Higher up, extreme intonation difficulties begin.

It is possible for the cellist to do all types of bowing and produce all the trills, *tremolos* and harmonics that the violinist and violist are able to, but he needs just a little more time to prepare for the problems peculiar to cello playing. The composer must take into consideration the need for heavier finger pressure on the thicker cello strings, the slower action of the shorter, heavier bow, and the larger distances required of the hand in shifting position.

The middle register of the cello is neither vivid for melodic use nor effective as bass line. A bass line will usually employ the lower tones, while typical cello melody will tend to exploit the upper register.

For listening experiences in effective cello writing, hear the concertos by Saint-Saëns and Schumann and *Schelomo* by Bloch.

The String Bass

When the bass is played without support from other instruments it sounds somewhat incomplete, struggling and gro-

tesque. Its time-honored role is that of doubling the bass line. This reinforcement is usually an exact doubling, one octave below the cello. The ponderous articulation of the bass requires that it be not too elaborately active. Since the bow is relatively short, detached bowing will be more natural for most passages, and the amount of *legato* indicated should be moderate.

To illustrate the orchestral use of basses without doubling, hear the opening measures of the slow movement of the *Symphony No. 3* by Beethoven.

The Harp

The harp furnishes excitement and motion principally by means of the *glissando*. To create this effect the hands sweep freely over the strings. Before this is done the strings must be set into the desired tonal pattern by shifting the pedals.

Once the strings are set the harpist is free to create any rapid or unusual *glissando* pattern. It is necessary to indicate the tones desired for each of the letter names of the scale. C can be pitched at C-natural, C-sharp or C-flat; D can be pitched at D-natural, D-sharp or D-flat, etc. These must be indicated at the beginning of the *glissando*. Any up or down motion should be indicated by a line (see page 14).

Before any new tones can be introduced, the foot pedals must be shifted and the player must be given sufficient time to make this adjustment.

A variety of delicate patterns are possible through the use of the *staccato* or plectrum sound made by plucking the strings. Harmonics are effected by stopping the string lightly at a point one-half or one-quarter of the distance up its length. When harmonics are to be played, the player must be given time to prepare for each tone.

For orchestral purposes the harp is essentially an instrument of motion. Too much harmonic emphasis in the part can slow up action. The most imaginative writing should almost always

feature either relatively elaborate *glissando* motion or rather simple, pointed and direct *staccato* motion.

The harp tone is weak and easily obliterated except when set in motion by vigorous *glissando* playing.

To hear the harp in action as an orchestral ingredient, such scores by Debussy as *La Mer*, *Ibéria* and *Danses sacrée et profane* are outstanding. The *Harp Concerto* by Glière, available as a recording (as are most of the works mentioned in this book), will illustrate effective and typical writing for the harp as used in solo work with orchestra.

An interesting recording which shows the possibilities of the guitar (another member of the plectrum family) is *Concierto de Aranjuez* by Rodrigo.

The Piano

In the high register of the piano there are marvelous potentialities for bell-like chordal complexities that no other instrument can equal. In the middle register there are resources for a fluency of motion that can add subtle elaboration to accompanimental background (Manuel de Falla has made much of this possibility in *El Amor Brujo*). In the low register there are extraordinary *marcato* percussive intensities useful for punctuating and thickening the bass sounds. When the piano is used routinely or for ordinary doubling, the result is dull. If used in the orchestra it should have its own independent and imaginative part.

Works which show a particularly inventive and effective use of the piano as an orchestral instrument are *El Amor brujo* by de Falla and *Petrouchka* by Stravinsky.

The Harpsichord

The delicious "jangle" of the harpsichord is very valuable as an orchestral ingredient. Its unique plectrum articulation is more vivid than that of the harp, and it furnishes a *staccato* intensity that is strikingly resonant and continuous.

Hear the *Harpsichord Concerto* by de Falla and *Petite Symphonie Concertante* by Martin.

Percussion Instruments

Although they are immediately exciting when they first enter, the idiophonic (percussive) instruments become somewhat wearing if overused. Like seasoning, they must be used sparingly and in just the right amount. When they enter briefly for sudden emphasis or punctuation, there is a keenness of impact and a sense of happy surprise. The rhythmic excitement of percussion adds a mysterious substance and glamor to orchestration, but only when the percussive timbres chosen have a fitness for the music being played. Avoid routine use of the noisy military instruments and experiment with the more subtle and delicate percussive sounds.

Some percussion instruments, like the snare drum, bass drum, and cymbals, are naturally loud, and must be given dynamic markings that will moderate their intensity.

The timpani can be played in various pitches (see the example on page 5), but these pitches must be set in advance on two or three drums; if new pitches are needed the player must be given enough time to effect mechanical changes. This is particularly true if timpani are adjusted by hand. The pedal timpani can be adjusted more quickly by improved mechanical means but the player must still be given enough time to adjust the pedal. Timpani can effect dynamics ranging from an utter *pp* to a thunderous *ff*.

Drums and cymbals can be struck with "hard sticks" or "soft sticks," depending upon the degree of harshness or gentleness of effect needed.

Two works which may be studied for illustration of imaginative use of ordinary percussion instruments are *Music for Strings, Percussion and Celesta* by Bartók and *Toccata for Percussion* by Chávez.

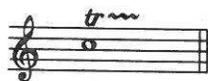
There are certain orchestral works which intentionally illustrate the individual characteristics of the various instruments of the orchestra; these can be valuable for further experience in analyzing the characteristics of timbre and motion. Scores especially recommended for further listening are *The Young Person's Guide to the Orchestra* by Britten, *Concerto for Orchestra* by Bartók, and *Peter and the Wolf* by Prokofiev.

INSTRUMENTAL MOTION

Do not take the supposed incapacities of players and instruments *too* seriously. Challenge players with stimulating musical designs. Not all the instruments can play melody or long sustained tones, but *all* of them can be set into subtle or dramatic motion, and most players will respond with enthusiasm when given something to play which is alive and original in its motor action. Such "liveliness" is more a matter of imaginative pattern than of mere elaboration and complexity. Effective design should be the aim. Although vigor of motion and adroit rapidity will always stir a response, do not depend too much upon them. Simplicity and repose are also tonal virtues.

Basic types of instrumental motion are illustrated in the following examples. The expansion, development and combination of these elements will furnish an inexhaustible resource for the creation of orchestral patterns.

(a) the trill:



(b) the tremolo:



(c) reiterated *staccato*:



(d) *staccato* arpeggiation:



(e) *legato* arpeggiation:



(f) the run:



(g) wave pattern:



(h) reiterated rhythmic pattern:



(i) leaps:



(j) alternation of entrance:

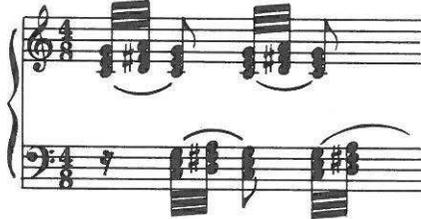


(k) alternation of *staccato* and *legato*:



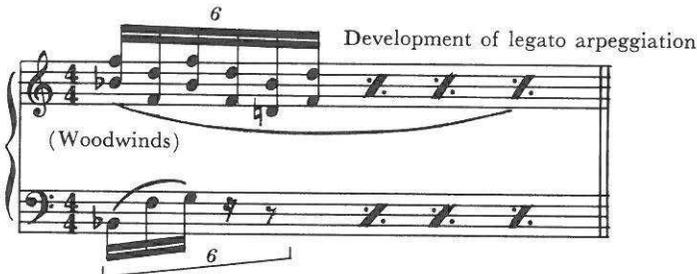
(l) expansion:

(Strings)



A trill harmonically expanded

(m) development:



Development of legato arpeggiation

(n) combination:



Combination of the run, repeated rhythmic pattern, and alternation of entrance

Much of the glamor and individuality of the music of outstanding orchestrators comes from invention of patterns which seem fresh and attractive but which are derived from types of motion that are natural and typical. Fully developed knowledge in orchestral techniques requires much experience. Study various orchestral scores to see how the elements of design have been transformed into new and original patterns. Take advantage of every possible opportunity to hear orchestral music in rehearsal. Analyze the relation of instrumental motion to listening experience, and whenever possible discuss, with players, orchestral parts you have written for them. To know, experience; to learn, do.



II

Principles of Clarity

ORCHESTRATION IS EFFECTIVE ONLY WHEN IT IS CLEAR or definite. Conversely, it is not effective when the result is confused or vague. Clarity in orchestration results from positive (definite) organization of sounds and structures by means of certain types of control. Each of these types of control will be explained and illustrated. Following each explanation a study project will be outlined, to be used as a guide to experimentation.

The exercises written for completion of these projects need not be long. A few measures will suffice to try out each principle. The object is to do many exercises in order to achieve experimentation over the total range of basic technique.

Write the exercises in actual sound, in reduced score — with the woodwinds at the top, brass next to the top and percussion and strings placed at the bottom (woodwinds, brass, percussion, strings).

After you have written and heard your own example, search through the works of some of the master composers — particularly such recent composers as Bartók, Stravinsky, Hindemith

and Prokofiev — to see how they have applied the same technique.

Those with less experience in music writing may prefer to search out piano music to arrange as exercises. This is quite acceptable, but it should be kept in mind that it may take more time to search out a suitable example to arrange than to write a few measures directly adapted to the project. Also, it is more of an adventure to write your own original example. The simplest of diatonic harmony will suffice for testing out the various techniques.

CONSISTENCY OF UNIT ORGANIZATION

The ear naturally tends to separate the different families of sound into units of tonal action and to focus similar timbres into unified meaning.

Because of this tendency, achievement of clarity demands that instruments of similar timbre (woodwinds, brass, strings, and percussion) be grouped into units that are rhythmically and harmonically consistent.

There are no immutable laws governing this grouping, since matters of preference will always enter into the writing of any music. However, certain general suggestions can be offered.

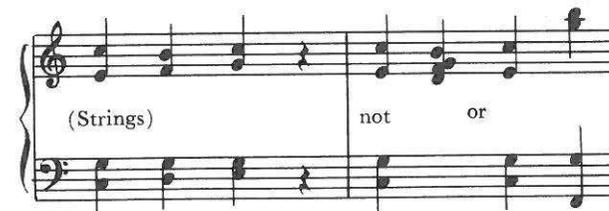
(1) Groups usually consist of instruments of related or similar timbre: e.g., four horns, four strings, three woodwinds, etc.

(2) Each group should be rhythmically consistent and harmonically complete, and should make musical sense when played separately.

(3) Groups may be made up of any number of voices, but two-, three-, and four-voice units are the most common. A single line may be used as a representative grouping, since it is obviously consistent in design.

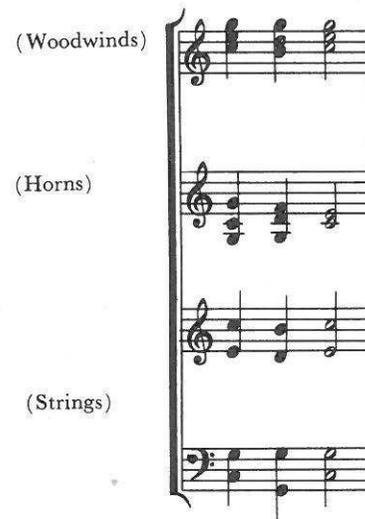
(4) Harmonically full groupings of more than four voices are quite often used, but it should be remembered that rich sounding chords tend to obliterate clarity of design. If one group has many harmonic voices, other groups sounding at the same time should ordinarily counter this by using few voices.

(5) The harmonic spacing of a group can be open or close, depending upon preference, but once a spacing has been established it should, as a rule, continue.



(too sudden except for grotesque effect)

(6) All groups should ordinarily use the same general harmonic progression, but each can have its own independent disposition of parts. If each group is harmonically complete in its own right there is no further harmonic organization needed.



(each group is rhythmically and harmonically consistent)

(7) Different groups sounding simultaneously may have different rhythms or similar rhythms, but the rhythmic relationship of two or more groups should be inclined toward either contrast or similarity.

Project 1

Organization of the families of sound into structurally consistent groups is the most fundamental of all orchestration techniques and deserves much practice. Use only two groups at a time. The possibilities are manifold: e.g., two flutes and three violins; or three woodwinds and four brass, etc.

Dissonant or clashing melodic and decorative tones are softened and absorbed when groups of contrasting timbre are sounded simultaneously (see the example on page 150).

Analyze the unit organization in the foregoing example, and invent similar simultaneously sounding multiple groups of your own. Analyze the group organization in some of the classic and modern scores.

In writing out the separate parts for performance it will be necessary to transpose certain parts. For instance, horn in F must be written a fifth higher, and B-flat clarinet must be written a whole step higher. For explanation, consult the transposition chart in Chapter 1 (page 6).

DEFINITENESS OF TEXTURE

There are certain elementary types of unity which are necessary for clarity of musical meaning. These will be referred to as *textures*. They are types of "togetherness" in musical action, and are particularly necessary to orchestral writing because of the many diverse sounds and motor potentialities which, if left unorganized, would incline toward confusion. The orchestra, more than any other medium, profits most from clear and definite design (positive texture).

There are eight fundamental texture types:

(a) *monophonic* texture:



(concentration of action into a single reinforced line)

(b) *chordal* texture:



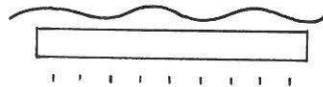
(concentration into vertical blocks of sound)

(c) *polyphonic* texture:



(unity through line similarity)

(d) *homophonic* texture:



(unity through contrast of role)

(e) *polythematic* texture:



(unity through contrast of motive)

(f) *polyrhythmic* texture:



(unity through blended rhythmic action)

(g) *heterophonic* texture:



(unity of theme and variation played simultaneously)

(h) *onomatopoeic* texture:



(thunder)

(lightning)

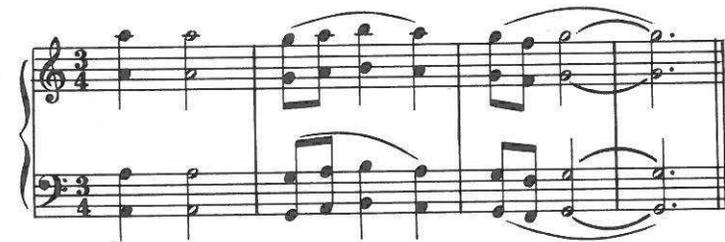
(unity through nature imitation)

The application of the word "texture" to music may need to be defended. The main definition as given in the dictionary is: "texture — the peculiar disposition of the constituent parts of any body; the manner in which they are disposed, arranged or united; structure in general." Surely this definition includes music (a body of sound).

Each of these textural types will be fully explained and illustrated and study projects suggested. After the several textural projects have been completed it should become clear that every score must necessarily utilize one or another of the textures at some point in its progress, since they are indispensable sources of unity.

MONOPHONIC TEXTURE

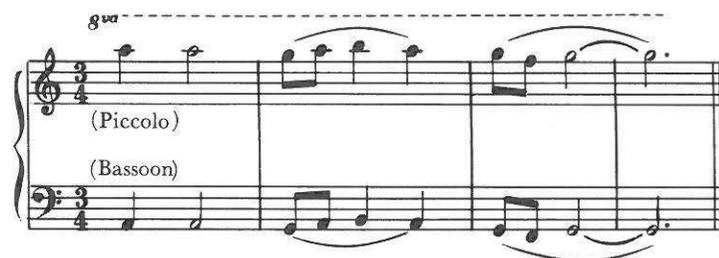
Of the eight types of texture, the simplest is the *monophonic*. Monophonic means "single-voiced" or "unisonal," but in the orchestra such unison can be composed of either a single line or any amount of octave doubling.



One use of monophonic texture is in the so-called "grand unison," with all instruments doubling in their natural registers (bottom of preceding page); or the instruments may be used to produce an intense and concentrated single line in middle register (such as viola, cello, horn, high bassoon, or low clarinet).



The instruments may be widely spaced for unusual effect.



The doubling may include register and timbre variegation.



There may be differentiated articulation.



Variation of pitch locale and articulation, and a certain effect of light and shade achieved by alternating octave doubling with single line, all contribute to a needed variety. If the experimental procedure also includes variegation of timbre, it can be seen that the possibilities for monophonic interest are far-reaching indeed.

The creative and historical importance of the monophonic texture is evidenced by the emphasis that it received in early European and Oriental music. A study of the music of India and China gives a vision of the possibilities to be explored. The student is referred to the Louisville Symphony recording *And The Fallen Petals* by Chou Wen-Chung. This is an outstanding example of essentially monophonic procedure, intensely variegated, especially by variety of timbre, with much use of percussion.

Project 2

Write a short monophonic example. The unison line will furnish such a tight and intense unity that the music will be monotonous unless enough variety is brought in as a counteracting force. Make full use of variety of register and timbre. Use some percussion to intensify the effect, and alternate between octave doubling and unison line.

from RIMSKY-KORSAKOV: *Scheherazade* (Eulenberg)

Allegro molto ♩: 152 P.G. P.G.

Flauto piccolo

2 Flauti

2 Oboi

2 Clarinetti in A

2 Fagotti

I. II.

4 Corni in F

III. IV.

2 Trombe in A

3 Tromboni e Tuba

Timpani in E H

Triangolo

Tamburino

Tamburo piccolo

Piatti

Cassa (poi tam-tam)

Arpa

Violini I

Violini II

Viole

Violoncelli

Contrabassi

Allegro molto ♩: 152 sf P.G. mf P.G.

PLATE I. MONOPHONIC TEXTURE

CHORDAL TEXTURE

Chordal texture is the opposite of monophonic texture. Monophonic texture results from a concentrated horizontal emphasis. Chordal texture results from a concentrated vertical emphasis. The unity of the monophonic texture is a focus of musical action into line. The unity of the chordal texture is a focus of musical action into blocks of sound. These blocks of sound have two continuing characteristics: (1) harmonic impact, and (2) similar rhythm in the several voices. Note these characteristics in the example below:

Allegretto

This miraculously simple theme, from Beethoven's *Symphony No. 7*, has a certain restricted and hymn-like motion that is natural to the chordal texture. However, chordal texture has other more active possibilities and most of these will come into action because of the need of the extremely compact unity of the chordal texture to be balanced by variety. This variety can be supplied by the rhythmic content. Observe the four examples below, which illustrate types of rhythm: (a) active rhythm; (b) varied phrase pattern; (c) groups with similar rhythm; and (d) groups with dissimilar rhythm.

(Trpts.)

(Woodwinds)

(Trpts.)

(Trom.)

Musical notation for Trpts. and Trom. parts. The Trpts. part is in the upper staff, and the Trom. part is in the lower staff. Both are in 4/4 time and feature a series of chords and single notes.

Allegro

(Woodwinds) *f*

(Strings) *mf*

Musical notation for Woodwinds and Strings parts. The Woodwinds part is in the upper staff, and the Strings part is in the lower staff. Both are in 4/4 time and feature a series of chords and single notes.

Any number of groups may be added together if each has its own harmonic completeness and if together they have an effective rhythmic co-ordination. Because of their somewhat limited ranges, trumpets and horns will often be in close harmony, depending upon the expressive intensity needed.

As long as the very strongly unifying force of the chordal texture is in action almost any spacing or pitch emphasis will have some special flavor or interest. Spacing, choice of register, and the amount of doubling of the third are almost entirely matters of personal preference, although a certain consistency in part writing will be desirable as in previous harmony exercises. In this next example the third has been included in each choir. Since each choir is harmonically consistent and complete, the sound is effective.

Allegro molto vivace

Woodwinds

Brasses

Strings

Fl. Ob. Cl.

Bassoons

Trpts.

Horn

Trom.

Violins

Violas

Cellos

Basses

Musical notation for Woodwinds, Brasses, and Strings parts. The Woodwinds part is in the upper staff, the Brasses part is in the middle staff, and the Strings part is in the lower staff. All are in 4/4 time and feature a series of chords and single notes.

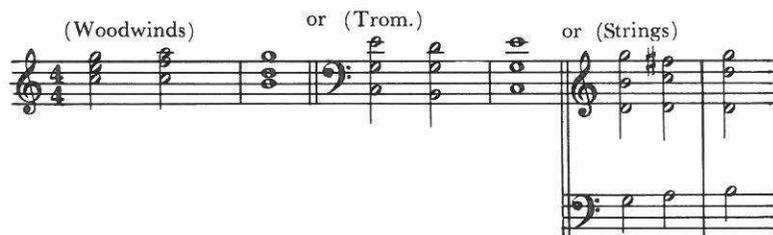
from SCHUMANN: *Symphony No. 1 in B-flat Major, "Spring"*

Sibelius features low string harmony in order to let the woodwinds through. Brahms often seems to prefer a certain close harmonic concentration in the mellow middle register (bassoons, clarinets, violas), with the upper and lower parts of the texture open. Berlioz seems fond of a concentrated high-sounding harmony, with the middle of the range open. Beethoven

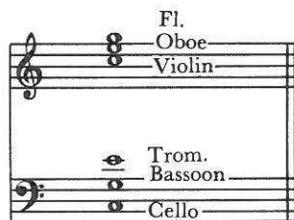
likes his woodwinds harmonically rich, but keeps the strings and brass consistently open in sound. What type of spacing do *you* prefer?

Project 3

Write a number of brief examples illustrating chordal texture. Begin with the natural spacing of any trio or quartet combination and continue the spacing consistently through a short chorale-like phrase: e.g.,



Following this, experiment with the combination of two groups at once or write a short freely experimental composition in chordal texture for any available performing group. Whenever possible divide the instruments into choirs of similar timbre, but if only a few mixed instruments are available, divide them into any groupings for which one of the commonly used spacings is practicable.



Beginners in composition should keep the rhythms hymn-like and uniform in the two groups. Those with more experience in composition technique may attempt some of the rhythmic variety and motor interest suggested in the general discussion on chordal texture.

Almost any standard masterwork will have some manifestation of chordal texture. Find several instances of chordal texture and analyze the harmonic spacings used.

POLYPHONIC TEXTURE

To aid theoretical understanding it is important to point out, again, that the organizing power of the several textures comes from their ability to create types of unity. The primitively simple line unity of the monophonic texture and the concentrated vertical simultaneity of the chordal texture are easy to observe and acknowledge as sources of unity. The source of unity of the polyphonic texture is perhaps less immediately apparent.

Polyphonic means "many-voiced" when it is literally translated, but in musical terminology it has come to imply a similarity of pace and motion in the "many voices." The unity of the polyphonic texture could be compared to that of dramatic action upon a stage onto which twins, brothers, or other recognizably similar characters enter at different times and by different doors.

In polyphonic texture the unity results from the several lines which are nearly similar but which enter and leave the musical fabric constantly, to create an overlapping action of several simultaneously continuing voices. The clarity results from the fusion of the several voices into a single impression. There is a dominating similarity of design presented by the overlapping action, which draws attention to motivial or linear characteristics shared by all voices as they enter anew.

from BRAHMS: *Piano Concerto No. 2 in B-flat Major* (Baron)

450

Fl.
Ob.
Cl.
Bn.
Hn.
Tr.
Timp.
Piano
Vln I
Vln II
Vla.
Vc.
Cb.

PLATE II. CHORDAL TEXTURE

Nothing sounds more warmly sonorous and firmly clear than good polyphony. However, before examples are written for performance, the essential values of polyphonic texture must be clearly understood. Three or four strongly melodic lines sounding simultaneously are not necessarily polyphonic. Unless there is enough open space (sculptured silence) in each of the parts, unless the voices enter and leave the musical fabric by turn, and unless beats other than the first beat of the measure are highlighted as points of entry, the effect will be only partially successful as polyphony.

Every outstanding composer, from Bach to Webern, has used the polyphonic texture in orchestration. It is timeless and absolutely basic. It can contain any reasonable number of authentic voices, but the composer will learn early that a structure made up of only two or three strong lines can have amazing interest and clarity when projected by orchestral sound.

Polyphonic lines may be in unison or octaves, and choice will be determined by the amount of power desired. For variety, some lines may be in unison while others are doubled in octaves. Choice of timbre is an entirely personal matter, but variety is of great importance. Too continuous use of timbre of any one kind may result in monotony. On the other hand, a too frequent change of timbre may result in a rather "scrappy" sound.

Sometimes a too prolonged use of pure polyphony can become tiring because of lack of harmonic effect. To counter this, composers sometimes supplement the sound with a small amount of supporting harmony, motivally insignificant and usually limited to two or three voices.

Study the three examples on the next pages.

The amount of harmonic support given will depend upon personal taste and the dramatic or climactic need of the music. Although harmonic support adds warmth and substance, it also endangers the effectiveness of the polyphonic texture, the main glory of which is clean, clear linear design.

(a) unison lines:

Musical score for unison lines. The score is in 4/4 time and consists of four staves. The top staff is labeled '(Fl., Ob.)' and contains a melodic line. The second staff is labeled '(Clar.)' and contains a similar melodic line. The third staff is labeled '(Horn)' and contains a similar melodic line. The bottom staff is labeled 'Cello, Bass' and contains a similar melodic line. All four staves play the same melody in unison.

(b) lines in octaves:

Musical score for lines in octaves. The score is in 4/4 time and consists of three staves. The top staff is labeled '(Violin, Viola)' and contains a melodic line. The middle staff is labeled '(Cl., Horn)' and contains a similar melodic line. The bottom staff is labeled 'Cello, Bassoon' and contains a similar melodic line. The lines are in octaves.

(c) mixed octave and unison lines with thin supporting harmony:

Musical score for mixed octave and unison lines with thin supporting harmony. The score is in 3/4 time and consists of three staves. The top staff is labeled '(Oboe)' and contains a melodic line. The middle staff is labeled '(Viola)' and contains a similar melodic line. The bottom staff is labeled '(Cello, Bass)' and contains a similar melodic line. The lines are in octaves. The bottom staff has a 'pizz.' marking.

Project 4

Orchestrate any short phrase which employs the polyphonic texture. Use reduced scoring as in the three examples above, and try to achieve variety, melodic interest and growth. Apply varied timbre and sufficient octave doubling to contrast with unison line. Use sufficient register variegation. Study polyphonic sections in the works of various masters of orchestration (see the charts on pages 219-220). Examine the scoring methods used by Stokowski, Schönberg, Respighi, Webern and others in transcribing the music of Bach for orchestra.

HOMOPHONIC TEXTURE

In each of the textures previously explained (monophonic, chordal and polyphonic), the unity of action resulted from *similarities* of line, rhythm and motion.

from KODÁLY: *Concerto for Orchestra* (Copyright 1942, Revised Edition 1958 — reprinted by permission of Boosey & Hawkes, Inc.)

PLATE III. POLYPHONIC TEXTURE

The clarity of the homophonic texture results from *differentiation* of the instrumental action into three functional elements: (a) melody, (b) accompanimental rhythmic design, and (c) sustaining chord. The more positively these elements are differentiated, the clearer the resulting orchestration will be.

It is this combination of differing action in the homophonic texture that dominates page after page of the orchestration of Rimsky-Korsakov and also the many illustrative examples in his treatise on orchestration. Observe the contrast of roles in this example, from his *Scheherazade*:

Although this balance of roles has been associated with much commonplace Romantic Period music, it is misleading to suppose that all homophonic music is necessarily dull. The homophonic texture represents, in fact, the most complete and subtle of all orchestral balances, and it has been constantly used with marvelous elaboration and ramification in the orchestration of imaginative composers such as Debussy, Ravel, Prokofiev and others.

It has been a fundamental resource through all style periods and, in various manifestations, has been used more than any other orchestral texture.

If balanced by significant melody and adequate harmony, the rhythmic accompanimental material is free to expand into expression and design of great interest. This potentiality for freshness and inventiveness in the accompanimental material is a constant challenge to ingenuity and motor sensibility.

The homophonic texture is not really as old-fashioned as is sometimes implied by those who reject it in favor of more "contemporary" types. Since the homophonic clarity results from a more developed and subtle perception (an understanding of the value of contrast), it represents a mental advance toward structural awareness. Homophonic texture will therefore remain as a major factor in all future music.

To maintain a balance of textures, a composer might well alternate homophonic texture with the other more primitively simple (monophonic, chordal and polyphonic) types.

In writing for performance, a few variants in the application of the homophonic texture should be kept in mind.

For example, an accompanimental pattern sometimes combines both the motion and sustaining factors into one compound design.

Oboe

mf

Andantino

Strings

p

Sometimes the melody may be expanded into a harmonized line. Such reinforced melody is still a sufficient line in terms of the definition of homophonic texture (contrast of line, sustaining material, and accompanimental pattern). Study the three versions of a line given in this example:

or

or

The more harmonic the line becomes, the less harmonic the accompanimental pattern will need to be.

Sometimes a homophonic texture will include what is commonly called a *counter-melody*. As it relates to the main melody, it is roughly contrapuntal and by itself is melodically incomplete. It must merge into the melodic action without drawing too much attention to itself — as shown on page 58.

Project 5

Write examples to illustrate homophonic texture. Take special care to assure that your design plan positively differentiates the three "roles" (melodic line, rhythmic accompanimental design, and chordal sustaining material). In the sustaining choir, chords do not always need to be full; sometimes a single sustained tone will suffice. Use percussion freely, as it is very

Moderato

Melody *mf* 3

Counter-melody *mp* 3

Sustaining choir *p*

Accompanimental design *p*

from SCHUBERT: *Serenade* (arranged)

effective as part of the accompanimental pattern and can even simulate sustaining effect by continuing the sounds of timpani and certain gongs and cymbals with a "roll" (by using soft sticks).

For concentrated practice use four staves, as in the above example. This will keep the contrasted action of the basic elements clearly before you as scoring proceeds.

POLYTHEMATIC TEXTURE

The unity of the polythematic texture also results from *differentiation*, but this differentiation is derived from a contrast of motival opposites, simultaneously interacting. This requires a positive contrast of architectural characteristics in two or more lines of motival action which will pit curve against angle, leap-

from BARTÓK: *Piano Concerto No. 3* (Copyright 1947 by Boosey & Hawkes Ltd.—reprinted by permission of Boosey & Hawkes, Inc.)

Clar. I, II in A

Pf.

Viol. II

Viola

Vc. *pizz.* *p*

Cb. *pizz.* *p*

Fl. I

Clar. I, II in A

Pf.

Viol. II

Viola

Vc.

Cb.

PLATE IV. HOMOPHONIC TEXTURE

ing energy against steadiness, agitation and rapidity against calm, *staccato* against *legato*, or fullness against thinness.

Since it offers such an opportunity for live and interesting use of the various motor characteristics of the instruments, the polythematic texture is being used more and more in modern orchestration.

In the Nineteenth and Twentieth centuries the mechanisms of the brasses, woodwinds and percussion were greatly improved, and the playing ability of the average orchestra player increased markedly. It is natural, therefore, that modern composers should be keenly interested in new potentialities for technical manipulation. This interest in instrumental motion for its own sake has led to an emphasis on polythematic texture.

There should be no "dead" parts in polythematism, for to be successfully characteristic this texture requires strong and vivid motival design at all times. For this reason it can be especially meaningful to the players.

Observe this moment of polythematic texture (motival contrast) from the *Symphony No. 6* by Beethoven:

In this example both motives are written for sections of string tone. It is more usual, however, for the polythematic contrast to occur between contrasting timbres — as in this quote from the *Concerto for Violin and Orchestra* by Tchaikovsky:

This example also illustrates contrasts of pace. The solo violin is active and fast moving, the horn is more moderate in its tempo, *tutti* violins are more leisurely and *legato*, and the *pizzicato* accompaniment is neutral.

Usually two such live motives on a given page are quite enough for the average listener. If a third motive is brought into the texture, it must necessarily be rather inconspicuous and be inclined toward the non-motival character of accompanimental material. In the example on p. 62, which of the three motives is the most definite? Which is the least definite or most likely as accompanimental material?

Project 6

In preparing for experimentation with polythematic texture it is helpful to practice invention of motival ideas for each of the

Moderato marcato

Woodwinds

Horns

Strings
pizz.

separate instruments of the orchestra. Each instrument has potentialities for characteristic motion that are individual to it alone, and which can be produced only by its particular playing techniques. The scores of Stravinsky, Debussy, Rimsky-Korsakov and Berlioz are outstanding for their exemplification of the musical interest that can naturally result when the instruments are set into motion by designs that make the most of idiomatic potentialities. The scores of Stravinsky are particularly inventive in this direction and should be studied for the stimulating examples they afford.

After preliminary exercise in the invention of idiomatic motives and designs for each instrument, try combining some of them into polythematic textures. Or, after you have become interested in some particular motival effect, search mentally for another that will add contrast and supplementary strength to it.

Keep in mind that both motival tangibility and motival contrast are essential to the polythematic textural values. Paradoxically, successful unity and variety both result from such definiteness within contrast. For architectural contrast, pit *stac-*

from RUBBRA: *Symphony No. 5* (Lengnick)

2 FLUTES

2 OBOES

COR ANGLAIS

2 CLARINETS IN A

2 BASSOONS

HORNS 1 2 3 4

TROMPETS 1 2

2 TENOR TROMBONES

BASS TROMBONE

BASS TUBA

TRUMPET

BASS DRUM

HARP

1ST VIOLINS

2ND VIOLINS

VIOLA

CELLO

BASS

SENZA SORD.

- A POCO.

- A POCO.

PLATE V. POLYTHEMATIC TEXTURE

cato against *legato*, angle against curve, smooth motion against angular or disjointed motion, etc. Usually a contrast of basic pace between the opposing motives is desirable. A rapid and agitated motion should ordinarily be contrasted by one that is more moderate and slow.

In the Tchaikovsky example on page 61, a slight amount of accompanimental material was also added. If such accompanimental or sustaining material is included it must be kept particularly slight in motival content, lest it spoil the impact of the polythematism, which ordinarily has the most strength and clarity when limited to two strong motival elements.

POLYRHYTHMIC TEXTURE

The characteristic unity of the polyrhythmic texture results from a dominating rhythmic "drive" or unified kinaesthetic impact which enables the listener to merge differing threads of instrumental motion into a single impression.

There can be quite a number of simultaneous but differentiated threads in this composite, but the action of each of these threads of motion must be non-motival, so that no one motion factor will predominate. Within an excitingly primitive rhythmic emphasis, an overriding similarity of "beat" will absorb and unify an idiomatic and rhythmic diversity.

The polyrhythmic texture, with its interplay of variety and unity and its almost hypnotic rhythmic excitement, originates from a time as far back as it is possible to trace African drums and other orgiastic percussions.

Although common to ancient and primitive music, polyrhythm became almost extinct in the music of the Classic and Romantic Periods. It has had a revival in the music of Twentieth-Century composers such as Stravinsky and Debussy. It also has had an influence on "jazz" music. The modern use of poly-

rhythmic texture grew partially from a widening of musical expression to include a certain primitive energy drawn from attractively naïve folk cultures.

Analyze the opening pages of Stravinsky's *Petrouchka*—with its exciting "hurly-burly" of instrumental action. Also study the opening pages of *Ibéria* by Debussy and certain passages in his *La Mer* that tend toward the polyrhythmic. The example below exemplifies the characteristics of the polyrhythmic texture.

Allegro vivo

The musical score consists of five staves, each representing a different instrument: Flutes, Oboes, Harp, Horn, and Cellos. The music is in 3/4 time and marked 'Allegro vivo' and 'mf'. The Flute part begins with a melodic line that has a fermata over the first measure. The Oboe part has a rhythmic pattern of eighth notes. The Harp part has a complex rhythmic pattern with many sixteenth notes. The Horn part has a rhythmic pattern of eighth notes. The Cello part has a rhythmic pattern of eighth notes.

Project 7

Write a page of polyrhythmic score. Start by inventing a particularly active rhythmic pattern, for any instrument, or any thinly harmonized unit of similar timbre. Combine this with

other thinly harmonized or single-line rhythmic patterns which will contribute variety and interest but which will merge naturally into the rhythmic unity of the basic "beat."

The concentrated rhythmic focus of the polyrhythmic texture can cause it to become monotonous after a short time, unless there is some element of variety. There may have to be some vestige of melody, thematic interest or phrase continuity, but these should be kept at a minimum, so that the over-all impression of exciting motor action will dominate the musical effect.

HETEROPHONIC TEXTURE

The word "heterophonic" when literally translated means "with differentiated voices." When applied to orchestration, it implies a principal melodic line sounding with other concurrent lines which are recognizably similar yet different enough to create internal surprise and variety. The heterophonic texture could be said to be "a melody with simultaneous variations."

One or more such simultaneous variations may be added, depending upon the degree of complexity desired. In the following two examples, the variations are more complex than the melody to which they are added.

This and the next example from BEETHOVEN: *Violin Concerto in D Major*

Allegro ma non troppo

Oboes *p*

Solo Violin *p* 3

Woodwinds *sf sf sf*

Strings *sf sf sf*

The variation added is often more simple than the melody, rather than more complex. If more than one variation is added, a certain balance between simplicity and complexity is desirable. If it has sufficient unity and enough surprise and variety of motion, the resulting heterophonic effect will be both clear and interesting.

Primitive peoples made much use of heterophonic techniques. These techniques are naturally effective in any essentially monodic music, and still furnish great vitality and excitement when applied to the modern orchestra.

Moderato capriccioso

Flute *mf*

Violins *mf*

Violas and Cellos (divisi) *mf pizz.*

Bass *mf pizz.*

from MALIPIERO: *Impressioni dal Vero* (By permission of the copyright owners, J. & W. Chester, Ltd., London)

A detailed musical score for Plate VI, titled 'POLYRHYTHMIC TEXTURE'. The score is for a full orchestra and includes parts for Flute (Fl.), Oboe (Ott.), Clarinet in B-flat (Cl. (Sib)), Bassoon (Fg.), Contrabassoon (Cf.), Horn in F (Cor. (Fa)), Trumpet in B-flat (Tr. (Sib)), Trombone (Tbn.), Timpani (Timp.), Cymbals (Car.), Snare Drum (Cel.), Arpeggiator (Arp.), Violin I (VI. I), Violin II (VI. II), Viola (Vie.), Violoncello (Vic.), and Double Bass (Cb.). The score is marked with a tempo of 'Moderato parlando' and a dynamic of 'mf'. The music features complex polyrhythmic patterns across the instruments, with some parts having multiple rests and others playing continuous rhythmic figures. The score is numbered 30 at the top and bottom.

PLATE VI. POLYRHYTHMIC TEXTURE

The heterophonic texture is mainly a melodic phenomenon. Therefore, if harmony is added it should be kept quite thin. Accompanimental material will ordinarily not be needed, since the varied action of the other voices supplies enough complexity of motion.

However, when elaborating the accompaniment in homophonic design there is a special heterophonic technique which can be applied. The example on page 67 shows an accompanimental unit which has been heterophonically enriched by differing versions of an essentially arpeggiated motion.

Analyze the relationship of the voices in the next example. Which variant of the melody is more complex? Which is more simple? Would you add harmony or further accompanimental design?

A musical score for 'Moderato parlando' featuring three instruments: Flute, Oboe, and Violin. The score is in 4/4 time and marked with a dynamic of 'mf'. The Flute part has a melodic line with some grace notes and a 'pizz.' (pizzicato) marking. The Oboe part has a similar melodic line. The Violin part has a simple, rhythmic accompaniment. The score is numbered 30 at the bottom.

The type of heterophonic texture thus far explained can be designated as *horizontal*, since its unity results from a main, on-going, line. There is another manifestation of essentially heterophonic unity which can, for analytical purposes, be thought of as *vertical*. In this type, two or more familiar and self-sufficient tunes are played at the same time (vertically juxtaposed): e.g.,

Swanee River by Foster and *Humoresque* by Dvořák. The impression of unity results from the natural clarity of meaning of the readily recognized tunes. The polyphony will be rough, harsh, and perhaps incorrect, but the resulting variety will have an attractively vigorous and rough-hewn quality of unique interest.

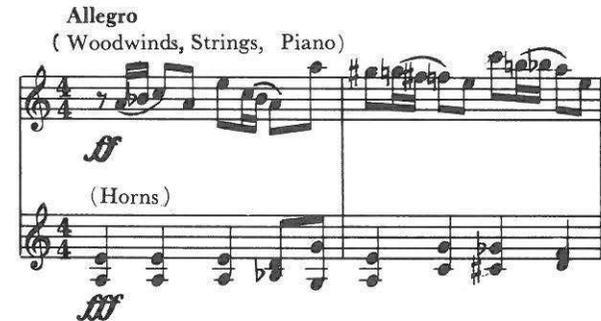
A well-known example of this *vertical* application of heterophony occurs in Wagner's *Die Meistersinger Overture*, at the point where the composer finally brings together three main motives which have previously been heard separately — shown in the reproduction below. Each of these is memorably tuneful. They are rather similar in motion, but different enough to make sufficient variety in combination.



Still another illustration is this moment in the Shostakovich *Symphony No. 1*. Here the first and second themes have been brought together. Each is authentically tuneful in its own right. Note the rough-hewn vigor of the design and the independence of the harmony (see example on page 71).

Project 8

Write some pages of reduced scoring to illustrate the two types of heterophonic texture (horizontal and vertical). In the



horizontal type, try for intensity of motor interest. In the vertical type, the page will probably be limited to the lines of the independent tunes. Because the differing lines will have already put such a strain on the attention, other demands can hardly be added without endangering clarity. Study scores and search out as many examples as you can of heterophonic texture types. Observe the necessarily stark and linear character of the design, also the relative sparseness of sustaining and accompanimental material.

Good heterophonic examples may be found in the *Lieutenant Kijé Suite* by Prokofiev and in "Farandole" from the *L'Arlésienne Suite* by Bizet.

ONOMATOPOEIC TEXTURE

The word *onomatopoeic* implies "imitation of natural sounds." If the composer brings in an actual cuckoo call, as Beethoven did in the "Pastoral" Symphony, or as Delius did in *On Hearing the First Cuckoo in Spring*, the effect may be said to be "onomatopoeic."

When orchestration employs such literal portrayal or is strongly programmatic, the resulting unity creates an "onomatopoeic" texture.

When Respighi causes a "fountain of sound" to rise and fall in the score of *The Fountains of Rome*, or when, by use of a phonograph, he brings the actual song of the nightingale into the score of *The Pines of Rome*, or when he has the trombones imitating the roar of the lions in *Roman Festivals*, the music has a texture that may be said to be "onomatopoeic."

Such a texture is not easily definable in terms of architecture, except to say that the resulting shapes and patterns reflect the contours and motions of nature.

It is the dramatic verity of these contours and motions that convinces the listener and gives meaning to what might otherwise be a chaotic, monotonous or random musical experience.

A composer might write a piece called "Chaos No. 1," or "Turbulence No. 2," or a single smashing sound to be entitled "A Punch in the Nose"; if the audience were dramatically convinced, mere chaotic motion, random turbulent action, or sudden savage impact would be seemingly clear and meaningful.

Sometimes a score will combine onomatopoeic patterns with more structurally clear textural prototype, as in *The Ride of the Valkyries* by Wagner (essentially homophonic).

Project 9

Attempt a page of story-telling orchestration. In addition to the Respighi scores already mentioned, analyze others such as *Impressioni dal Vero* by Malipiero (the owl, the woodpecker, cypresses, etc.), *Peter and the Wolf* by Prokofiev, certain sections of *Pictures at an Exhibition* by Moussorgsky (orchestrated by Ravel), and *Pacific 231* by Honegger. Attempt to imitate sounds and actions from everyday life: such as children at play, machines at work, church bells ringing, waterfront sounds, and so on. It is said that Leoš Janáček frequented the market place to write down actual speech sounds to be used in his music. The relation of Sibelius' *Tapiola* to the arctic winds and forests is movingly clear.

from RESPIGHI: *The Fountains of Rome* (By permission of G. Ricordi & Co., copyright owner)

The image displays a page of a musical score for Respighi's *The Fountains of Rome*. The score is arranged in two systems of staves. The first system includes staves for Oboe (Ob.), Flute (Fl.), Oboe (Ob.), Clarinet in G (Cl. in G), Clarinet in Bb (Cl. in Bb), Cornet (Corno), Trumpet (Tr.), Trombone (Tr.), Triangle (Triang.), Percussion (Pied.), Clarinet in Bb (Cl. in Bb), and Percussion I & II (Perc. I & II). The second system includes staves for Percussion (Perc.), Violin I (Vn. I), Violin II (Vn. II), Viola (Vcllo), Violoncello (Vcllo), and Contrabass (C.B.). The music is written in a complex, rhythmic style with many notes and rests, characteristic of the 'onomatopoeic texture' mentioned in the text. There are some markings like 'con Bordone' and 'DOLZ. RIT. UN POU' SOUS LE H.' in the score.

PLATE IX. ONOMATOPOEIC TEXTURE

TEXTURAL COMBINATION

Control over group organization and the ability to invent clear and positive texture types are basic to any soundly developed orchestration technique. Other principles of clarity organization will be studied subsequently, but the techniques of unit consistency and texture formation should be thoroughly understood and practiced before going on.

Throughout all future stages of orchestration study, it will be important to analyze scores constantly to observe the formative power of the textural prototypes. Such analysis will keep alive an understanding of the creative force and organizing power of these elemental unities. They must be understood as protean sources, structurally necessary to any textural manifestation.

All discussions thus far have presented textures in their most elemental forms, but as scores are analyzed it will be discovered that there are many variants of these fundamental types. Through compounding and hybridization many transformations of the basic unities are possible.

Musical score for Horns, Trpts., and Trom. and Tuba, marked *Lento*. The score is in 4/4 time and consists of three measures. The Horns part (bass clef) plays a series of chords, starting with a *ff* dynamic. The Trpts. part (treble clef) plays a melodic line. The Trom. and Tuba part (bass clef) plays a rhythmic accompaniment. The key signature has one sharp (F#).

A *compound* texture is a texture with two or more choirs, each of which is organized by a different unity principle. In the example opposite (from Franck's *Symphony in D Minor*), the composer has organized the horns as a chordal texture. At the same time the trumpets and trombones together make a polyphonic texture.

A *hybrid* texture is a texture that blends the characteristics of two different unities. For instance, there might be two essentially chordal textures, one in woodwind and one in brass, overlapping in a polyphonic way: e.g.,

Musical score for Woodwinds and Horns, marked *Moderato*. The score is in 4/4 time and consists of two measures. The Woodwinds part (treble clef) plays a series of chords, starting with a *mf* dynamic. The Horns part (treble clef) plays a polyphonic texture. The key signature has one flat (Bb).

Why is this chordal? Why is it polyphonic? Why is it not a compound texture?

These possibilities of compounding and hybridization are endless, and further study in orchestration could well include experiments with these complex types. Keep in mind, however, that the closer texture comes to the pure prototype, the stronger its impact will be and the more immediately intelligible it will be to the audience. Before attempting complex textures, succeed first with the simple ones.

At this point in the development of technical understanding it is pertinent to re-emphasize that the choice of timbre or "tone color" is very much a matter of personal preference. There is no need to be overly concerned yet about choice of timbre;

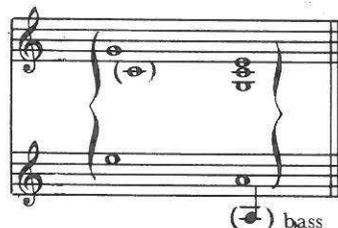
clarity of structure comes first. If the groups are consistent and the textures positive, almost any timbre takes on a fascinatingly mysterious quality.

Certainly, choice of tone color makes a real difference and is, in a way, the very heart of orchestration; but achievement of clarity should come first in the earlier stages of study.

PITCH DISTRIBUTION

The placement of tones into effective pitch locales has much to do with clarity. Melodies, accompaniments and harmonies must be placed in the registers in which they can be most clearly heard in relation to one another. Extremely high pitches tend to obscure lower tones. Extremely low tones are difficult to hear clearly and produce a blurred effect when used harmonically. Middle register tones are weak and easily obscured.

On the staff there is a central area located among the tones closest to middle C—see the example below. This is the tonal area that is most inconspicuous and the most naturally suited to accompanimental design and harmonic background. It is in this register that the horns, violas, clarinets and second violins seem to be comfortably non-stringent, normally relaxed and fluent. When written higher, accompanimental material takes on brightness and shrillness; and when written lower, harmonies become progressively blurred and vague as the lowest tones are approached.



Normal accompanimental distribution

Competing factors in similar pitch locale have a tendency to neutralize one another and to obliterate design. When melody, accompaniment and harmony, or competing motives and lines are located in different non-competing pitch locales, the result is crystal-clear and vivid.

To illustrate the negative action of two motives competing in the same register, let us suppose that there are two motivial designs in two different tone colors sounding together as follows:

Because they are in the same register, neither motive can be heard clearly, since the two tend to “eat each other up.” At one time or another, every novice composer will have suffered from this ineffective sort of distribution of registers. One way to improve the result would be to move the violins up an octave, so that the trumpets can have the middle register to themselves. Or, if the trumpet design were played by flutes, an octave higher, the violins could continue in middle register with typical D-string vigor. In either case, the design could come forth clearly. Because of this attention to the pitch locale, the two opposing designs would no longer interfere with one another.

The shrill intensity of extreme high pitch or the gruff “fog-giness” of extreme low pitch becomes tiring if allowed to continue for too long. If both high and low pitches sound together for any length of time, the danger to clarity is further increased.

The foregoing analyses lead to the following general recommendations for the restriction and control of pitch distribution:

(a) Use the natural and moderate middle register much of the time, alone or in combination with either high or low pitch.

(b) Use high and low pitch together (without middle register) only for special effect.

(c) Use the high, middle and low pitches, sounding together, only for maximum intensity and only for brief periods of time.

(d) High pitch alone or low pitch alone are very expressive but incomplete and tiring.

(e) Competing motival ideas should be in different registers.

(f) There should be sufficient variegation of pitch locale to ensure growth, variety and interest.

When a certain composer said "All symphony orchestras scream," he was, no doubt, thinking of the tendency of composers of the Romantic Period to overuse the high brilliant sounds for dramatic excitement.

There is an acoustical fact back of this observation. High frequencies tend to absorb and obscure low frequencies when they are sounded together. This means that the addition of low sounds to high will enrich the high sounds, but the addition of too many high sounds to low will tend to block out the low sounds. If low sounds are to be featured they should be heard in a rather isolated structure. What registers would you choose for the accompaniment in a concerto for double bass?

Project 10

Write a page of score which will demonstrate effective use of pitch distribution. Illustrate: (a) sufficient use of middle register; (b) clarity of motival content through pitch differentiation of competing motives; (c) surprise, change and climax through alternation of high, low and middle register; and (d) limited use of extremes of high and low pitch.

from DEBUSSY: *Ibéria* (Permission for reprint granted by Durand et Cie, Paris, France, copyright owners; Elkan-Vogel Co., Inc., Philadelphia, Pa., agents)

The image shows a page of a musical score for Debussy's *Ibéria*, specifically Plate X. The score is arranged in a standard orchestral format with multiple staves. The instruments listed on the left are: (obsc.), strings (pizz.), H. b., Cl., Cora, Tromp., Tromb., Timb., T. de B., Cass., Harpes, 1^{re} vcl., Div., and 2^{de} vcl. The score includes various musical notations such as notes, rests, and dynamic markings like *pp* and *ppia*. There are also some performance instructions like "Sourdines aux 8 Tromb." and "1. 2.". The page is numbered 35 and 36 at the top and bottom of the score sections.

PLATE X. PITCH DISTRIBUTION

The music of Debussy, Mozart, Mendelssohn and Tchaikovsky shows evidence of conscious control of pitch distribution for clarity. Study the works of these masters for analysis of the relation of pitch locale to clarity (see the charts on pp. 219-220).

LIMITATION OF HARMONY

Orchestral instruments are so naturally rich in overtones that when they are sounded together harmonic effects are intensified. Even when played in unison there is an illusion of harmony. The harmonies in the score will seem magnified in performance, so that harmonization which is too full will endanger structural clarity.

Study of scores will lead to the conclusion that master composers often restrict the harmony in order to allow essential design to come through clearly.

The music of Beethoven is typical of this kind of restriction. It serves especially well as a general illustration of the effective limitation of harmony, and it shows the importance of such limitation to the achievement of the clearest possible result.

The outstanding clarity of the music of Beethoven seems to imply a formula for harmonic limitation which may be stated as follows: (a) in the string section use strong, clear, linear design with a very small amount of harmony in the middle register; (b) restrict the brass to strong, open, foundational intervals; (c) concentrate the harmonic emphasis in the woodwinds, where it will be most softened and inconspicuous.

Observe the application of this formula in this excerpt from the *Symphony No. 6* of Beethoven (opposite page).

It is when played by the brass choir that harmony has the most naturally intense harmonic impact. If the harmonization is located there, hardly more will be needed, especially since additional harmony in the woodwinds and strings can be heard

In tempo d'Allegro

Woodwinds
 (Ob.)
 (Cl.) *sf*
 (Bn.)

Brasses
 (Horns) *sf*

Strings *ff*
sf

only with difficulty. If all three choirs are harmonic at the same time the effect will be too full, too cloying and too undifferentiated.

Even when the harmony is limited to the brass, care must be taken not to fill up too wide a total range with brass timbre, as this will tend to obstruct the possibility for other timbres to be clearly heard.

not

Most other composers do not concentrate the harmony in the woodwind section as Beethoven did. More often, they alternate the harmonic role among the several choirs (even percussion can simulate harmony with bell sounds). Beethoven's treatment of harmony was an outcome of his personal predilection, and it should not be imitated too exactly; but it does prove, through the outstanding clarity of his music, the general value of limitation of harmony.

If three degrees of harmonic intensity are categorized into: (1) close harmony (strongly harmonic), (2) foundational open harmony (moderately harmonic), and (3) linear design (non-harmonic), a general law may be stated as follows:

The most normal balance in the use of harmony will result from a combination of three different degrees of harmonic intensity.

The three different degrees (strong, moderate and non-harmonic) should be distributed among differing families of sound.

Six optional distributions are possible, since these three degrees of intensity can be combined in six different ways.

TABLE I

1. Woodwind (close)	Brass (open)	Strings (linear)
2. Woodwind (close)	Brass (linear)	Strings (open)
3. Woodwind (open)	Brass (linear)	Strings (close)
4. Woodwind (open)	Brass (close)	Strings (linear)
5. Woodwind (linear)	Brass (close)	Strings (open)
6. Woodwind (linear)	Brass (open)	Strings (close)

Any one of these distributions of the harmonic emphasis would produce an effective balance of harmonic intensity or, in other words, a *normal harmonic limitation*.

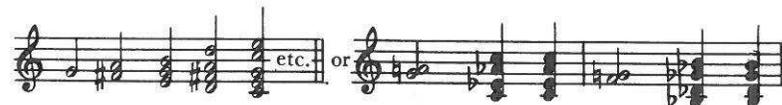
Project 11

Write some pages of reduced scoring in which experiments are directed toward trying out various dispositions of the harmonic factor. Balance the differing degrees of intensity as suggested by the previous discussion and table of balances.

For the best harmonic result certain other points about harmony should be kept in mind:

(a) When played on a piano, quick changes of complex harmony are easily and clearly heard, but if harmonies change rapidly in orchestral music they are more difficult to follow. Orchestral harmony, therefore, needs to be based upon a slower harmonic rhythm than does harmony for other media.

(b) Orchestral harmony normally maintains a consistency of choir action (number of voices and type of spacing), but the number of voices and type of spacing may be varied if varied within a design which is sufficiently clear and purposeful.



(c) The relation of parallel, oblique and contrary motion should be balanced. At any point in harmonic progression where there are two or more choirs there will be a need for supplementary difference. If all choirs move upward or downward at the same time there will be an imbalance which, if continued over a long period, could make both players and audience "seasick" with parallel motion.

Since the orchestra is such a massive entity, orchestral music needs some kind of "keel" action at the center of things, so that parallel and contrary motion in other groups can be steadied or stabilized by their relation to it.

Play the following parallel structure:



Play it again, this time with a stabilizing or "keel" action added by the horns. Note the increased strength and interest in the effect.



In further scoring, a unit of contrary motion might be added. This would give still more stability and balance.

Since the very essence of value in orchestration is design and movement, harmony is perhaps only a lesser or minor element, which often becomes stronger in effect than was intended. Young composers sometimes dote upon the harmony which they conjure up from the piano and use improvisation as a resource from which to evoke intensity of feeling. In writing for orchestra this tendency must be somewhat guarded against for the sake of strong design. Harmony can be magnificently poignant and expressive, as Delius, Wagner and Franck prove by their music. Nevertheless, it is suggested that for healthy growth in the study of orchestration the highest aim should be flourishing design in combination with somewhat meager harmony — not the opposite (flourishing harmony with meager design) which is often the "easiest way."

from COPLAND: *Appalachian Spring* (Copyright 1945 by Hawkes & Son [London] Ltd. — reprinted by permission)

12

Fl. I, II non legato

Fl. II non legato

Ob. I, II *f* non legato *mf*

(In Bb) Clar. I, II *mf*

Cor. (F) I, II *f marc.*

Tr. (Bb) I, II *f* *mf*

Arpa *pp*

13

Vi. I *f marc.*

Vi. II *f marc.*

Vla. *f marc.*

Vc. *f marc.*

Cb. *f marc.*

PLATE XI. LIMITATION OF HARMONY

Play the following parallel structure:



Play it again, this time with a stabilizing or “keel” action added by the horns. Note the increased strength and interest in the effect.



In further scoring, a unit of contrary motion might be added. This would give still more stability and balance.

Since the very essence of value in orchestration is design and movement, harmony is perhaps only a lesser or minor element, which often becomes stronger in effect than was intended. Young composers sometimes dote upon the harmony which they conjure up from the piano and use improvisation as a resource from which to evoke intensity of feeling. In writing for orchestra this tendency must be somewhat guarded against for the sake of strong design. Harmony can be magnificently poignant and expressive, as Delius, Wagner and Franck prove by their music. Nevertheless, it is suggested that for healthy growth in the study of orchestration the highest aim should be flourishing design in combination with somewhat meager harmony — not the opposite (flourishing harmony with meager design) which is often the “easiest way.”

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PLATE XI. LIMITATION OF HARMONY

VIVIDNESS OF TIMBRE

A melody or pattern is strengthened and made clearer when it is presented to the ear by means of a vivid timbre. When timbre is non-vivid, structural elements have a tendency to be absorbed into the general background.

Vividness can be partially achieved by loudness or softness, but the most intense vividness results only from distinctive tonal character. Unusual timbre is sometimes inherent, as in the case of the English horn, which always makes a striking effect with its dark, brooding tone. However, unusual timbre is most often obtained by the use of extreme registers (high or low).

Nearly every instrument is rather mild and neutral in its middle register. The clarinet is a typical example of this. In its middle register it is easily obscured and relatively simple in sound, but in its upper register it takes on a brightness and positiveness of character which is shrilly and sweetly intense. The low or *chalumeau* register is rich, warm and dramatic, and it has a distinctive character that cannot be duplicated by any other instrument or register. The viola and cello also become characteristically vivid in high or low register, while becoming more neutral in the middle register.

Allegro leggiero
(Clar.)

High register
Middle register
Low register

mf
p
pizz. p

These differences naturally suggest the use of middle register for background material when the aim is to effect a sort of quiet obscurity. If the aim is to vivify soloistic or motival material, high or low registers should be used.

In performing groups in which all voices have relatively similar timbre (e.g., the male chorus and the string orchestra), it is difficult to clarify design by means of vividness of timbre. This means that in these media special attention should be given to structural methods of ensuring clarity. The symphonic band, the mixed-voice choral groups and the pipe organ have a less oppressive similarity of timbre than the male chorus and string orchestra, but they, too, must depend principally upon structural means for clarity or upon conscious use of strikingly opposed registers. In the band, the sound is too often neutrally bland because of the constant sounding together of brass and woodwind. When the brass and woodwind are antiphonally separated, the sound immediately becomes more vivid and therefore clearer.

Opportunities for clarification through the use of vivid timbres are naturally offered by the orchestra because of its variety of tone color resources unequalled by any other medium. This vast palette of tone is a natural challenge to experimentation.

Timbre becomes more vivid when highlighted by essential contrast. In Table II a few types of tone quality are listed in contrasting pairs.

TABLE II

Dry	(snare drum, <i>pizzicato</i> strings)
Liquid	(glockenspiel, flute, clarinet)
Sibilant	(rattle, flute fluttertongue)
Solid	(wood-block, xylophone, trumpet)
Mellow	(viola, low clarinet)
Harsh	(trombone fluttertongue, cymbal crash)

Other contrasts which might be categorized for possible use are smooth-sharp, brittle-plastic, ethereal-vulgar, shrill-mellow, etc.

Categorization of tonal contrast is technically difficult and is a relatively unexplored psychological realm, as is evidenced by the groping terminology that must be used to describe tone qualities. Surprisingly little is said about timbre contrast in the literature of musical analysis. The unexplored world of percussion timbre has been especially neglected. There has not been a positive enough attempt to classify timbre according to the "attributes of tone" (the scientific term used by psychologists). Since timbre contrast is of such importance to the art of orchestration, perhaps the future will bring psychological clarification and a more positive terminology.

Although this categorization is a psychologist's scientific problem, it is nevertheless a musical artist's practical problem which must be met, in spite of the present lack of scientifically established terminology. Practical experiments with timbre contrast will lead to the following general principle:

Opposing timbres in differing design tend to become particularly clear.

For example, a trumpet or xylophone sounding against a background of middle-range strings would effect a contrast of strident against subdued tone. Or, a *pizzicato* line in the strings against a choir of flute sound would effect a contrast of dryness against liquidity.

Project 12

Write examples in reduced scoring which illustrate the clarifying effect of vividness of timbre. Speculate into the nature of the "attributes of tone" and try out some contrasts that come to mind. Contrast of any kind will be increasingly recognized as a central orchestral resource almost as fruitful as orderly design in ensuring clarity.

The world of percussion sound, in particular, has a wealth of fascinating timbres that invite exploration. After hearing some percussion works of composers such as Chávez and Varèse, make experiments of your own in use of percussion timbre. Increase your knowledge about the percussive "attributes of tone" by trying out various opposites. Use duo combinations of pure percussion, or duo combinations which combine percussive and sustained timbres.

LIMITATION OF MELODIC COMPONENTS

In music, some elements of design require very little attention for comprehension. Because they are simple in structure, briefly stated and repeated, they are intelligible almost immediately. Other elements of design are more lengthy and without repetition. They acquire their meanings from a set of consecutive relationships which may be compared to those of syntax in a sentence.

It is this relation of words or musical symbols that demands attention and mental effort. In language, this consecutive meaning results in the sentence. In music it becomes the melodic line, theme, motive or phrase.

If a succession of words without syntax is presented to the attention, as in the statement "rain, rain, rain," little effort is needed for comprehension and the mind can pass on to something else. However, if an elaborate syntax is presented, as in the statement "because of certain low pressure systems converging from the south, it will probably begin raining today at 2 P.M.; there will be some snow and hail, and you had better carry chains in the car," closer attention is required.

Music is similar to language since it demands varying degrees of concentration. Analyze the following rhythmic pattern. The musical meaning is easily comprehended because the state-

from TCHAIKOVSKY: *Nutcracker Suite* (Kalmus)

PLATE XII. VIVIDNESS OF TIMBRE

ment of the design is contained in a single measure and this measure is repeated. It is intentionally relaxed and non-consecutive in its meaning.

If this same material is developed so that it takes on a set of consecutive relationships, it must be heard throughout its length because of an organic totality which requires concentrated attention. If it is to be comprehended, more mental effort must be expended.

In orchestration, those elements which contain this more demanding consecutive meaning can be spoken of as *melodic components*. To achieve clarity in orchestration, there must be limitation in the number of melodic components sounding at any one time.

The memory and the attention power of the average listener are limited. It seems that the average mind can follow only one train of thought thoroughly at a time. To illustrate this, a comparison can be made to an attention-distracting situation from real life. If a person is asked to give attention to several things at once (a telephone conversation which is in progress, a political speech blaring over the radio, a scolding landlady, the town crier passing by), he will either grasp only fragments of each or will have to block out the others and give attention to the one that he really wants to comprehend.

In music, the psychological facts are comparable to those just described. The average listener can follow only one line of consecutive musical thought (one melodic component) at a time. Psychological experiment leads to this conclusion.* The ability to grasp two (rarely three) melodic components sounding simultaneously can be developed only by those with intense musical training. Given a specific degree of natural or developed attention power, the progressive addition of simultaneously sounding melodic components rapidly increases the difficulty of comprehension to the point of impossibility.

Beethoven, with his gift for clarity, seems to apply this knowledge about the listener's powers. His orchestration shows an almost instinctive limitation of melodic components, and it rarely demands attention to more than one melodic component at any one time.

Study the scores of Beethoven to analyze this limitation of melodic demand. Choose any one of the Beethoven symphonies and go through the score, underlining melodic components at different points. This will supply a vivid visual exemplification of the principle of limitation of melodic components.

For maximum clarity an orchestral texture should contain only one melodic component. There can sometimes be two components, but the second should be less demanding in its consecutive content than the principal melodic component. If a third melodic component is added, it will necessarily be even more restricted to a minimal consecutive content.

The excerpt on p. 95, from the *Piano Concerto No. 2* by Brahms, will illustrate three levels of melodic definiteness and is an example of Brahms' limitation of melodic components.

After stating the foregoing formulation, questions will immediately arise. Polyphonic texture has three, four, five or

*Harrison E. McKay, "Multiple Tone-Pattern Discrimination" (Master's Thesis, Purdue University, 1958).

Allegro non troppo
(non-motival)

Horns
Secondary melodic component
dim.

Piano
doubling of strings
f p

Strings
(principal melodic component)
f dim.

more equally important voices — are these not melodic components? Polyrhythmic texture often has four, five or six threads of differentiated rhythmic action — are these not melodic components?

Let us answer these questions. In the polyrhythmic texture the purpose is a kind of "oneness" of over-all motion. The repetitive threads of design which merge into this "oneness" are not melodic components because they are intentionally non-consecutive and have the basic simplicity of accompanimental material. It seems that if the ear is not expected to hear any of the separate threads of musical action as consecutive thought, the whole composite of motion comes to the mind as one compound meaning. The result is a single merged impression.

The polyphonic texture usually has such similarity of motion in the voices, that these also merge into a "oneness." A particularly characteristic quality of good polyphony is an "antiphonality" which permits the ear and attention to shift from one line to the other as principal motives come into the foreground, while lesser designs are comfortably absorbed into a generality of background motion. Any Bach fugue or invention will illustrate this alternating entrance of motive in polyphonic music, and will support the contention that a polyphonic texture is heard as one complex, developed, melodic component (a supreme example, of course, is his *Art of Fugue*).

The example on p. 97 is offered to illustrate the use of both polyphony and polyrhythm as components. The woodwinds are polyphonic (principal melodic component), the horns are polythematic (secondary melodic component), and the strings are polyrhythmic and non-melodic. There will still be an essential clarity when this compound texture is heard, because of the "oneness" of impression given by the unities of the polyphony and the polyrhythm.

As a final example, to illustrate the need for limitation of melodic components, the illustration on p. 98 is offered from my own experience. In my *Evocation Symphony* (1951), there is a passage in the finale which was difficult to clarify in rehearsal.

Examination of the score will show that the rehearsal difficulty was caused by insufficient limitation of melodic components (even the tuba part has some small bit of consecutive meaning). The strings and horns are too similarly definite in melodic content, and the extremely active brass design also demands melodic attention. Since only *two* such attention-demanding elements can be successfully heard at one time, one of the three competing components will have to be modified. Either the brass has to be softened to *pianissimo*, so that it will become mere background, or the horn part has to be made less melodically definite, so that the listener can hear the string line and trumpet-trombone unit in combination as foreground.

(Polyphonic unit) **Allegro**
(W.W.)

Principal melodic component

(Horn)

Secondary melodic component

(Strings)

Polyrhythmic

Non-motival background

pizz.

Project 13

With the previous analyses in mind, plan some balances of melodic components which will fulfill the conditions necessary for clarity. On a page of reduced scoring, write first a principal

Cantante appassionato

Woodwinds *f*

Horns *mf*

Trpts. *mf*

Trom. *mf*

Tuba *mf*

Strings *f*

Detailed description: This page contains a musical score for six instrument groups. The top staff is for Woodwinds, marked *f*, with two staves showing rhythmic patterns. The Horns staff is marked *mf* and features a long melodic line. The Trpts. and Trom. staves are both marked *mf* and play rhythmic accompaniment. The Tuba staff is marked *mf* and plays a simple rhythmic pattern. The Strings section, marked *f*, consists of two staves with melodic and harmonic lines.

Woodwinds

Horns

Trpts.

Trom.

Tuba

Strings

Detailed description: This page continues the musical score for the same six instrument groups. The Woodwinds staff has two staves with melodic lines. The Horns staff has a melodic line. The Trpts. and Trom. staves have rhythmic accompaniment. The Tuba staff has a simple rhythmic pattern. The Strings section has two staves with melodic and harmonic lines.

melodic component; then add a secondary component; finally, fill in a third musical element that makes only slight melodic demand (material that is sustaining or accompanimental in type).

This maintenance of balance of melodic components is a most important technique. If the study of orchestration had to be limited to only one guiding principle, limitation of melodic components might well be the best choice. Once the orchestrator has created the main melodic component and has added to it a secondary component, the essence of orchestration is in being. Further elaboration will usually be a mere filling in of decorative and supporting elements. Design of supporting elements and matters of pitch locale and tonal color are subject to freedom of choice and may be varied as personal preference indicates.

But the need to achieve clarity through limitation of melodic components is fundamental to all orchestration.

Just as in life one cannot flout the laws of nature and physical health, so no real clarity is possible in orchestration without the limitation of the number of melodic components.

Study the works of some of the master composers (the three excerpts which follow are fine examples) and observe that, however complex the orchestral page may become, there will seldom be more than *two* melodic components used at any given time.

CONTROL OF DYNAMICS

Another important factor in the achievement of clarity is the calculation of dynamic balance. Even the clearest design can be destroyed and made incomprehensible if some instruments are playing too loudly. In orchestral performance delicate sounds like the middle register of the clarinet, the muted trumpet or the sound of the harp, can be easily obliterated by other naturally

from BEETHOVEN: *Symphony No. 3 in E-flat Major, "Eroica"* (Kalmus)

The musical score shows measures 135 to 140. The instruments listed are Fl., Ob., Cl., Fg., Cor., Tr., Timp., Vl. I, Vl. II, Vla., and Vlc. e Cb. The score includes dynamic markings such as *ff* and *f*, and articulation like *a2*. The notation is in E-flat major and 3/4 time.

PLATE XIII. LIMITATION OF MELODIC COMPONENTS

from BEETHOVEN: *Symphony No. 4 in B-flat Major* (Kalmus)

Fl.
Ob.
Cl.
Fg.
Cor.
Tr.
Timp.
VI.I
VI.II
Vla.
Vlc.
Cb.

PLATE XIV. LIMITATION OF MELODIC COMPONENTS

from BEETHOVEN: *Symphony No. 5 in C minor* (Kalmus)

Fl.
Ob.
Cl.
Fg.
Cor.
Tr.
Timp.
VI.I
VI.II
Vla.
Vlc.
Cb.

PLATE XV. LIMITATION OF MELODIC COMPONENTS

powerful timbres. A thundering timpani or drum roll can smother almost any other sound, and the *fortissimo* of the trumpets can wipe out all else like the "Day of Judgment." The woodwind section of the orchestra is particularly delicate when compared to the brass section, or when competing with a string group.

Conductors are constantly confronted with the need to achieve dynamic balance. There is an old story attributed to a Toscanini rehearsal. In going over a passage the conductor asked the bassoon player to play "more softly" and later, "still more softly." The bassoonist strove mightily but could not satisfy the conductor. Finally the player did not play at all and the conductor said, "Ah, just right!"

Control of dynamic factors requires a knowledge of the relative strength of tone of the various instruments. When the dynamic markings are precise, the impact of any design will be clarified. In a carefully marked score, timbres and groups will often be marked differently. Woodwinds may have to be marked *f* to balance brasses marked *p*. Similarly, it might be necessary to mark a clarinet in middle register *ff* to enable it to sound through (even when brasses are marked *p*).

There are certain balances that can be approximately calculated, such as the need for two French horns to balance the power of one trumpet or one trombone, but orchestral music varies so much in context and in use of registers that any "scientifically approximate" calculation of dynamics is not too trustworthy.

Experience will be the best teacher. As you hear your music performed (by any small laboratory group) you will encounter both surprise and disappointment. This will be the most effective kind of learning. Such experience in dynamic balancing should lead to more ability in controlling the dynamic factors with such markings as *forte*, *piano*, *sforzando*, *crescendo*, *diminuendo* and *marcato*.

The following general statements outline some of the more evident facts about dynamics:

(a) Trumpets and trombones are naturally powerful when open; when muted they are surprisingly weak.

(b) Woodwinds are easily overpowered by either the brasses or the full string group.

(c) Timpani and the military instruments (snare drum, bass drum and cymbal) are vigorously powerful and must be held in check.

(d) Middle-range clarinet is especially weak and can easily become obliterated.

(e) Harp, harpsichord, and certain delicate percussions are weak and need to be brought forward.

(f) French horns are moderately strong and must sometimes be held in check.

(g) In full orchestra, strings playing *mf* may be considered the norm or standard degree of dynamic intensity against which the dynamics of other timbres must be balanced. Brasses and percussion are the strongest, while woodwinds are the weakest. In order to be heard in balance with strings marked *mf*, woodwinds should be marked *f*. In order to be heard in balance with the same strings, the brasses will ordinarily have to be marked *p*.

By the same token, if brasses are playing *mf*, strings will have to play *f* and woodwinds will have to play *ff*. Or, if woodwinds are playing *mf*, strings will have to play *p* to balance, while brasses must play *p* or *pp*.

Project 14

Experiment with control of dynamics by writing exercises especially planned to test the comparative power of the various instruments and the effect of dynamic marking on their balance. It is not necessary to write for the complete ensemble. A simple unison of two tones, an interval played by two instruments, or a chord played over and over with different indications, are perfectly suited to experiments in control of dynamics.

While attending orchestral concerts pay particular attention to the sound of the orchestra in relation to the dynamics. If the conductor has balanced the dynamics in rehearsal, the music will be clear (provided it has been well written) and no design elements will be obscured. If, on the other hand, the design seems obscure and blurred, there has been either insufficient balancing of dynamics in rehearsal, or lack of sufficient dynamic indications in the score.

Thus far in illustrating the principles of clarity, much potentially elaborate procedure has been expounded, but it must be emphasized that simplicity and directness are among the most desirable goals. It is particularly true of the large orchestra that a certain "epic" solidity and foundational resonance are necessary for good sound. This desirable strength and solidity can easily be lost when there is too much "fussiness" of design. In a long and elaborate composition the most wonderful moment may well be some particularly luminous sound or strong simple design. A page of score sounds twice as elaborate as it looks.

Experience will prove that there is a mysteriously creative effectiveness in inspired simple design — a kind of strength that no elaboration can equal. One of the surprises that should come early to the aspiring composer is the discovery that any characteristic instrumental timbre, if sounded in effective register and in clear design, will seem satisfying and mysteriously vital. There is a natural allurements conjured up by a skillfully produced tone. Nothing is more evocative, for example, than a simple oboe tone sustained in middle register. Add a touch of *pizzicato* and a natural attractiveness has been created!

Oboe

Cello

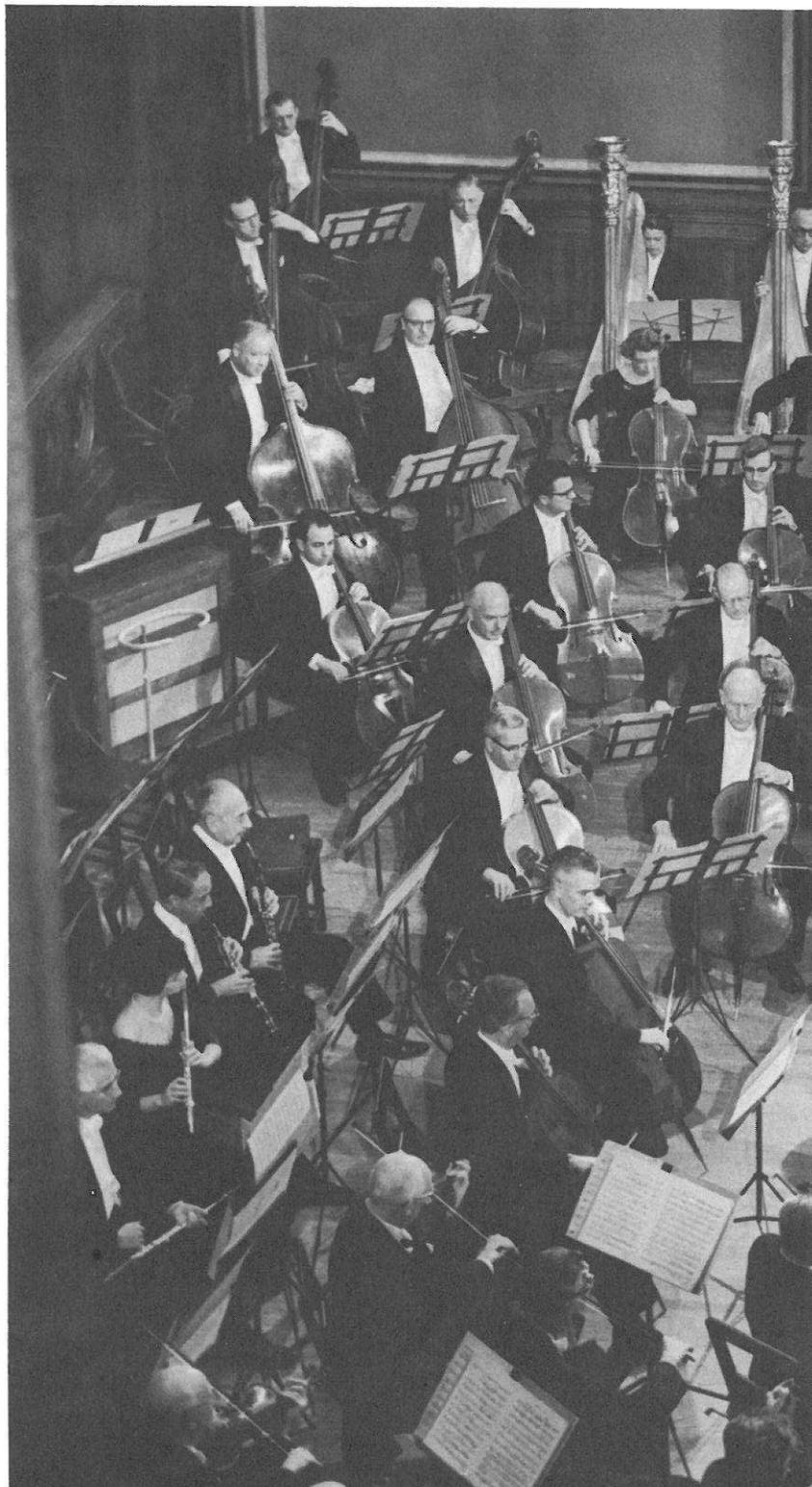
pizz.

from MAHLER: *Symphony No. 2 in C minor*, "Resurrection" (Kalmus)

PLATE XVI. CONTROL OF DYNAMICS

PRINCIPLES OF CLARITY

The survey of principles of clarity has now been completed. It is hoped that, as the result of exercises done thus far, clarity of design has become a natural and continuing outgrowth of musical thought.



III

Principles of Tonal Interest

WHAT MAKES FOR INTEREST OF TIMBRE HAS LONG BEEN somewhat of an unsolved mystery. Allurement and poetic poignance in sound have often been thought of as the inviolable province of the composer. In truth, the orchestration of a master such as Debussy does seem almost sublimely and frustratingly beyond the reach of rational explanation. Nevertheless, one of man's great achievements has been, and is, the gradual penetration into all mysteries by means of objective understanding; and the art of timbre, with its limitless iridescences, offers analytical challenges still to be met.

To explain completely the tonal poetry used by such geniuses of orchestration as Debussy or Stravinsky would be almost impossible, since it would require such a particularized and elaborate theory; but a beginning can be made by observing the action of certain fundamental processes and formulating them into practical principles.

Part of the "allure" of timbre comes from its association with types of motion and structure. Contrast also plays a very creative role in tone-mixing. Consciousness of register seems

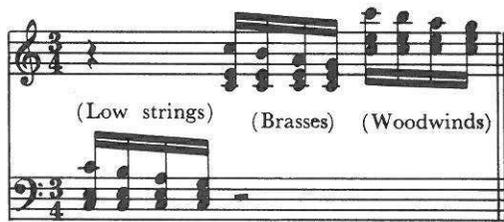
fundamental to choice of ingredients for tonal blend. When these three major sources (motion, contrast, and register) are studied as they combine into tonal phenomena, it will be noted that certain usages constantly recur. This frequent recurrence points to the existence of fundamental processes of creating timbre interest. These fundamental processes will now be explored and explained.

CONTRAST OF TIMBRE (Antiphonal)

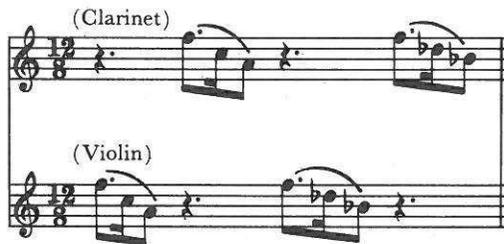
Antiphonal means "with contrasting voices" or "with contrast of timbre."

Contrast of timbre is keenest when presented with the surprises of sudden changes of tone color and register.

Antiphonal entrances can be made by a group of instruments, as in the first example, or in melodic form, as in the



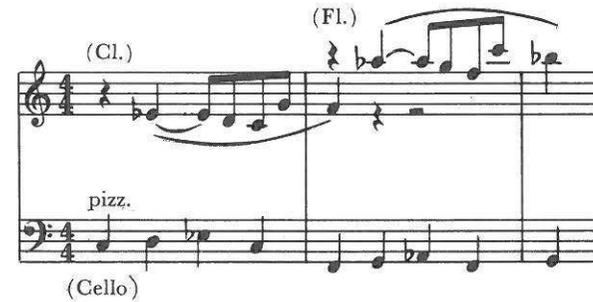
or



second one. It is not necessary to change register as in the first example, but this is usually done. Note that the changes come rather rapidly and that there is recourse to the natural contrast in timbres between the instrumental families.

Occasionally the contrast will be applied more mildly, as in the next example, which features change of register within a family of instruments.

The antiphonal effect is most desirably stark when each new timbre can be heard without interference from any other element. Nevertheless, antiphonal alternation is also striking when acting in conjunction with another design element, as shown here:



Still another type of antiphonal interest is that which results when groups are placed off-stage in different parts of the auditorium and then are heard alternately as they answer back and forth. Good examples of this "stereophonic" effect are to be found in the use of offstage trumpet in the Beethoven *Leonore Overture No. 3* and in the Berlioz *Requiem*; the latter specifies performance with different groups stationed in various parts of the auditorium. The full excitement of such antiphonal music can be experienced only in actual performance.

Project 15

Write some examples which apply antiphonal techniques. Include both harmonic and melodic entrances and apply changes of register whenever possible.

At first, illustrate antiphonal contrast in its purest form, with the entering groups of voices sounding without interference from supplementary design. Later, apply it in combination with some simple supporting background. For instance, there could be woodwind melodies alternating antiphonally against a background of string harmony or antiphonal music for strings only, with the soloistic registers of viola and cello alternating melodically against a *pizzicato* background.

INSTRUMENTAL MOTION

Music may be defined as "sound in motion, within a span of time." There is a whole realm of meaning and poetic feeling in musical motion which stimulates a kinaesthetic (motor) response. When an instrument is set into meaningful motion, an aura of attractiveness arises. A sudden flurry captures the attention, and any characterfully active design or live and continuous rhythmic pattern mysteriously magnifies the allure of a timbre.

The possibilities of instrumental motion are as rich and varied as are those of harmony or melody. These two facets have been carefully analyzed, but the processes and values of instrumental motion have remained largely untouched by practical analysis. Surely, here is an important theoretical frontier!

Although liveness of instrumental action was an important part of primitive music, its use diminished until Rimsky-Korsakov and others in the late Nineteenth and early Twentieth Centuries brought about a revival of interest in kinaesthetic values.

from BERLIOZ: *Symphonie fantastique* (Kalmus)

The musical score consists of approximately 15 staves. The top section includes woodwind parts (flutes, oboes, clarinets, bassoons) and string parts (violins, violas, cellos, double basses). Below these are two tuba parts labeled 'Tuba I.' and 'Tuba II.'. The score is marked with various dynamics: *f* (forte), *mf* (mezzo-forte), and *dim.* (diminuendo). A specific instruction 'muta B in H.' is present in the lower woodwind section. The notation includes complex rhythmic patterns and antiphonal entries between different instrumental groups.

PLATE XVII. ANTI-PHONAL CONTRAST

It is a special emphasis upon new frontiers in idiomatic invention that distinguishes modern from classic orchestration. Stravinsky is especially noteworthy for modern-day instrumental invention; Debussy and Rimsky-Korsakov were also very gifted in their motor sensibilities. Study some of the scores by these masters to analyze techniques of instrumental motion: such as *La Mer* and *Ibéria* by Debussy, *Scheherazade* by Rimsky-Korsakov and *Petrouchka*, *Le Sacre du printemps* and *L'Histoire du soldat* by Stravinsky.

Project 16

After preliminary experimentation in invention of attention-getting motor activity for each instrument, use the best of the resulting measures as a basis from which to develop a number of short duos. Employ instruments which afford contrasting motor potentialities: such as fluidity opposed to brittleness (flute and wood block), *legato* opposed to *staccato* (saxophone and snare drum), substantiality opposed to delicacy (trumpet and *pizzicato* viola). If possible, include the piano or the harpsichord in some of the duo combinations, since these are natural instruments of motion. When instrumental motion is featured, the

Allegro ritmico

Xylophone *mf* gliss.

Harpsichord *f*

from ROUSSEL: *The Spider's Feast* (Permission for reprint granted by Durand et Cie, Paris, France, copyright owners; Elkan-Vogel Co., Inc., Philadelphia, Pa., agents)

Animez très peu

Fl. 1. *cresc.*

Fl. 2. *cresc.*

Cl. *cresc.*

Bon. *cresc.*

Corn. *cresc.*

Trp. *cresc.*

Cymb. *cresc.*

Harpe

Viol. *cresc.*

Alt. *cresc.*

Viola *cresc.*

C. B. *cresc.*

PLATE XVIII. INSTRUMENTAL MOTION

texture often will tend to be polythematic or polyrhythmic. There is an illustration of this type of combination on page 116.

DOUBLING FOR POWER

When two instruments are played in unison this is known as *doubling*. Indiscriminate doubling results in rather poor and characterless sound. A cardinal rule should be this:

Unless the purpose of the doubling is theoretically clear to the composer, he should avoid it.

There are only two good reasons for doubling: (1) for tonal power, and (2) for tonal subtlety. Even when consciously chosen, a doubling which continues for too long will become tiring to the ear. Use no doubling or unison blending except for definite dramatic, structural or coloristic purposes. Before scoring any doubling, justify its use by explaining to yourself why it is needed. If you cannot justify the doubling, use only the clear, unmixed tone color.

Acquaintance with scores will lead to the conclusion that some composers, such as Tchaikovsky, Mozart, Mendelssohn and Debussy, prefer the pure, unmixed tone colors. Others prefer the richness of blended tone. Beethoven uses a great deal of octave doubling; note that it is most often related to moments of power need. Rimsky-Korsakov does much melodic tone-mixing, and there are striking examples of blend for subtlety in Ravel's *Rhapsodie espagnole*. The degree and type of doubling depend upon personal preference and artistic purpose.

The most common type of doubling is doubling for power. An intense and powerful sound results from multiple unison of timbres. This unison may be written either in a single line or in octaves. The more the doubling can be concentrated into one line (toward the middle register), the richer and more varied

the effect will be. The more the octave doubling is utilized, the more powerful the effect will be.

The musical notation illustrates three types of doubling for power in a 3/4 time signature. The first measure, labeled "(rich)", shows a single melodic line in the treble clef. The second measure, labeled "(strong)", shows the same melodic line in the treble clef with an octave doubling in the bass clef. The third measure, labeled "(massive)", shows the melodic line in the treble clef with two octave doublings in the bass clef, one an octave below the other. The notes are G4, A4, Bb4, and C5.

Project 17

Write examples which illustrate the three types of distribution shown just above: (a) actual unison, (b) unison with moderate octave doubling, and (c) unison with maximum octave doubling. As an exercise in transposition, score these illustrations of doubling with all parts correctly transposed.

Since the brass instruments tend to dominate, to become tiring, and do not have the natural agility of the woodwinds and strings, it is usually more effective in these unison passages for the brasses to sound only part of the time. This will make the impact of their power, when they do enter, much more fresh and telling (see p. 120).

This same limitation should be applied to the use of bell-toned percussion instruments (piano, xylophone, glockenspiel, etc.). In the orchestra their sounds are so attention-getting that the ear soon tires of them. This is also true of the piccolo. Such vivid timbres as these should be reserved for moments of surprise and brilliance and should be added to the unison only for a short spell.

A purely monophonic unison line is very effective, but it may be somewhat structurally dull. In many a score it will be

Woodwinds

Brasses (brass discontinues)

Strings (strings become thinner)

found that the structure has been livened by some small heterophonic enrichment or by a simple background. For example, to the above unison effect there might be added a simple reinforcement of the tonic center, to give a foundation or "floor" to the tonal structure — as in this example:

This music is still, in essence, doubling for power, even though a bit of additional structure has been supplied to keep it from being too spare. In fact, any effect is magnified by some slight supporting structure (like the setting around the diamond or the frame around the painting).

from TCHAIKOVSKY: *Romeo and Juliet* Overture (Bote and Bock)

PLATE XIX. DOUBLING FOR POWER

BLEND FOR SUBTLETY

The most subtle sounds result from the mixing of dissimilar timbres. A striking instance of the mixture of opposites is found in *Ibéria* by Debussy. At the beginning of the second movement, "Les Parfums de la nuit," Debussy blends the soft gentleness of the low register of the flute with the commonplace, solid "clink-clank" of the xylophone. The result is an unusual new sound, rich and alluring like a distant bell. Another striking instance of subtle blend is found in Tchaikovsky's *Romeo and Juliet* Overture, where viola and cor anglais are doubled in the famous melody. The blend of the mellowness of the viola tone with the "bite" and brooding "graininess" of the cor anglais tone, creates a sound of moving and memorable richness.

It seems that the most striking blends are derived from the combination of *only two* opposing timbres or, at most, the timbres of two contrasting melodic instruments combined with one dryer, percussive sound such as snare drum or *pizzicato* strings. When three or more sustained timbres are heard in unison, vividness of tonal character seems to merge into a general sound usually identified with reinforcement rather than subtlety.

The most usual type of blend for subtlety is doubling which uses contrasting timbres sounding as a single line.

Horn

Strings

pizz.

When a line is doubled with contrasting timbres an octave apart, there is less blend, but a striking freshness results.

Allegro ritmico

Piccolo

Trpt. (muted)

mf

from MCKAY: *Tlingit Suite*

When exact doubling is applied to choirs of contrasting timbre, the harmonic resonance has a less blended effect than that which results from a slight differentiation of action in the

Flutes

Trpts. (muted)

choirs (see the two examples above). Richard Wagner applied such a differentiation in his scoring. His main lines (main melody, bass line and counter melody) are doubled fully, but each supporting harmonic unit has its own independent design and spacing. This differentiation produces a delicately blended, yet not routinely exact mixing of resonances, which gives the impression that a superior type of tone-blending is being heard.

from RAVEL: *Rapsodie espagnole* (Permission for reprint granted by Durand et Cie, Paris, France, copyright owners; Elkan-Vogel Co., Inc., Philadelphia, Pa., agents)

III. — Habanera

(1895)

Assez lent et d'un rythme las $\text{♩} = 40$

2 PETITES FLÛTES
2 GRANDES FLÛTES
2 HAUTBOIS
1 COR ANGLAIS
2 CLARINETTES en LA
1 CLARINETTE BASSE en LA
3 BASSONS
1 SACROSOPHONE
4 CORN (Chromatiques) en FA
3 TROMPETTES en UT
2 TIMBALES SI \flat , FA \sharp
TAMBOUR DE BASQUE
TRIANGLE
TAMBOUR
CYMBALES
GROSSE-CAISSE
CÉLESTA
1^{re} HARPE UT \sharp , RÉ \sharp , MI \flat , FA \sharp , SOL \sharp , LA \sharp , SI \sharp
2^{de} HARPE UT \sharp , RÉ \sharp , MI \flat , FA \sharp , SOL \sharp , LA \sharp , SI \sharp
Assez lent et d'un rythme las $\text{♩} = 40$
Bourdoise
1^{er} VIOLONS Divisés à 3
2^{es} VIOLONS Divisés à 2
ALTO
VIOLONCELLES
CONTREBASSES

CONTRAST OF PITCH LOCALE

Contrast between high and low pitch is a basic form of tonal interest. Extreme contrasts, such as piccolo and bass clarinet, produce a special bizarre effect:

Piccolo
Bass Clar.

Contrast of pitch can be applied antiphonally: e.g.,

High strings
Low strings

It can be used in simultaneous action as part of any textural type, as shown on the next page.

Project 19

Write examples using some contrast of high and low pitch. Write principal melodies and motives in extreme pitches. If any supplementary structure is added, place it in middle register to avoid interference with the main material.

Allegro moderato

Piccolo
Bassoons

from TCHAIKOVSKY: *Nutcracker Suite*

BLEND OF DIFFERENTIATED MOTION

If differing versions of a melody are played at the same time, or if a rhythm is diversified by the playing of one or more variants simultaneously, a special kind of tonal attractiveness is created. This attractiveness springs from a certain motor enrichment, a subtle complexity of seemingly simultaneous yet partially alternated activity.

Moderato parlando

Flute
Oboe
Trpt. (muted)
Violin

from BERLIOZ: *Symphonie fantastique* (Kalmus)

PLATE XXI. CONTRAST OF PITCH LOCALE (high and low)

This heterophonic type of interest was common to primitive music and has become more and more a characteristic of Twentieth-Century orchestration. In the works of Debussy, Stravinsky, Martinu and others there is a subtle and glamorous quality to the motion that seems to come from elaborate design. In trying to equal this the novice composer will often write a page with too many unrelated patterns of activity and motion. The elaboration in the music of the master composers is usually unified by the central force of principal rhythmic motives which have been expanded by simultaneous heterophonic variants.

To illustrate this procedure, a principal rhythmic motive is shown first in its elemental form, and then expanded into heterophonically elaborate complexity (opposite page).

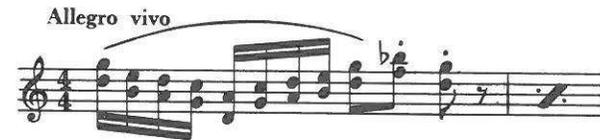
Note that in the latter example the essentially rhythmic character of the principal motive has been retained in the variants to produce an over-all unity of rhythm. Although the second version is greatly diversified, it has the impact of a single unified action.

Project 20

Experiment separately with two types of heterophonic blend: (1) melodic, and (2) rhythmic. In accordance with the great central artistic principle of balancing complexity against simplicity, it is preferable that both melody and accompaniment not be complex at the same time. If the melody is heterophonically complex, keep the accompaniment simple (even sketchily delicate). Conversely, if the accompaniment is to be heterophonically elaborate, the melody should be stable and direct.

EXTREME REGISTERS

The interest created by use of extremes of register results from a certain stringency of timbre rather than from vividness



of pitch. The high register of the cello and the low register of the piccolo are really medium pitches, but both of these have unusual appeal because of the peculiarly individualistic and expressive timbre produced. Become acquainted with all the extreme high and low registers on the several instruments, such as the pedal-tone sound of the horn with its fantastic, subterranean excitement, the lyricism of the high tones of the tuba, and the "allure" of the flute in low register.

from MARTINU: *Sinfonia Concertante* (Copyright 1953 by B. Schott's Soehne, Mainz, by permission of the original copyright owner and its United States representative, Associated Music Publishers, Inc., New York)

The musical score is arranged in three systems. The first system includes Piccolo, Flute 1, Clarinet (Soprano), Bassoon 2, Cor Anglais (3/4), Trumpet 1/2, Trombone 1/2, and Timpani. The second system includes Oboe 1/2, Bassoon 1, Cor Anglais (1/2), Violin 1/2, Viola, Violoncello, and Contrabass. The third system includes Violin 1/2, Viola, Violoncello, and Contrabass. The score features complex rhythmic patterns and dynamic markings such as *mf*, *ppoco f*, *ppoco*, *f*, and *sempre*.

PLATE XXII. BLEND OF DIFFERENTIATED MOTION

The opening measures of *Sacre du printemps* by Stravinsky make extraordinary use of the extreme upper tones of the bassoon. *The Afternoon of a Faun* by Debussy begins with a flute solo in the exceedingly attractive lower register. In the first movement of *The Pines of Rome* Respighi achieves a stunning effect by piling up the intensity of many vivid instruments all sounding in high register.

In some of Debussy's music there is to be found a specialized use of non-extreme register. If all voices are restricted to use of the normal middle part of their ranges an impression of delicacy, sweetness, and gentleness is effected.

Project 21

Listen to the qualities of the extreme registers of the instruments as played by individual instrumentalists, and to music by contemporary masters of orchestration who employ extreme registers. Make some use of these choice timbres in experiments of your own. Ordinarily the extremes of register will be used either for melody or for accompaniment, not for both. The object of experimentation for Project 21 will be to explore the use of clear unmixed tone color, rather than blend, which has been dealt with in Project 18.

CONTRASTED ARTICULATION

The drier percussion instruments like snare drum and wood block are stringent in their attack, and supply a harshness and vigor that is akin to dissonance. The plectrum (plucked) instruments (*pizzicato* strings, guitar, etc.) are pointed and immediate in articulation and supply a vigor of attack second only to the drier percussions. The strings when bowed produce a moderately stringent attack and can effect either *staccato* or *legato* with little effort. The brasses are instruments of sustained tone,

from STRAVINSKY: *Petrouchka* (Kalmus)

МУЖИКЪ ИГРАЕТЪ НА ЛУДКЪ - МЕДВѢДЬ ХОДИТЪ НА ЗАДНИХЪ ЛАПКАХЪ.
 LE PATSAN JOUE DU SVALNEAU - L'OURS MARCHE SUR SES PATTES DE DERRIERE.

100 *Sostenuto* (♩ = 69)

100

МУЖИКЪ СЪ МЕДВѢДЬНЪ УДАЛЯЮТСЯ.
 LE PATSAN AVEC L'OURS S'ÉLOIGNENT.

37

PLATE XXIII. EXTREME REGISTERS

but have some degree of articulative vigor. The bell-toned percussion instruments (glockenspiel, celesta, etc.) have a lesser degree of articulative vigor because of the softening effect of the harmonic (consonant) impression that they make. The woodwinds, especially the flutes, have the softest and gentlest articulation.

There are, therefore, six degrees of articulative intensity, ranging from harsh and vigorous to soft and gentle.

TABLE III

1. Harsh and vigorous	(dry percussion)
2. Pointed and vivid	(plectrum instruments)
3. Moderately intense	(bowed strings)
4. Less intense	(brass instruments)
5. Softened by harmonic resonance	(bell-tone percussion)
6. Soft and gentle	(woodwinds)

This scale of intensities leads to a formula for tonal interest:

The most striking blends of articulative types will result from combinations of the most extreme opposites.

Next in interest will be combinations of relatively opposite types. Least interesting will be combinations of the most nearly similar in articulative intensity.

Two examples of contrasted articulation are shown on page 136. Flutes (blown) are mixed with celesta (percussive), and trombones (blown) are mixed with cymbals (struck). Both of these examples illustrate combination of articulative types.

It is in the music of the Orient that the most imaginative articulative resources can be found, particularly in the use of percussion instruments. Fascinating examples of mixture of articulative intensity may be heard in the Louisville recording *And the Fallen Petals*, by Chou Wen-Chung. In this work, by blending harsh percussive sounds with those of the blown instru-

Flutes

Celesta

Cymbal struck (hardstick)

Trombones

ments, the composer has added an exciting dissonance to harmonies which, by themselves, are relatively consonant. Another good example of articulative mixture is the Louisville recording *Concerto No. 7*, by Hovhaness, which brings in the bell sounds in an original way. "The Festival at Bagdad" from Rimsky-Korsakov's *Scheherazade*, and *The Fountains of Rome* by Respighi are also notable — the former for its vigorous combination of articulative types, and the latter for certain delectable blends (flute and harp, for instance).

Project 22

Experiment in the realm of articulative mixture. It will not be necessary to write full orchestral textures, since the knowledge about combinations could be tried out on a single melodic line. A single brass chord to which the roll of a snare drum is added offers a concentrated experience in the effects of articulative mixture. Try out many combinations in concentrated form.

OVERLAPPING

The tonal interest of overlapping stems from a type of "light and shade" which comes from alternation of blended and clear tone.

from RESPIGHI: *The Fountains of Rome* (By permission of G. Ricordi & Co., copyright owner)

Fl.

Cl. (Sib)

Corn. (Fa)

Tr.

Arpa I.

Arpa II.

Celesta

P.

Viol. I.

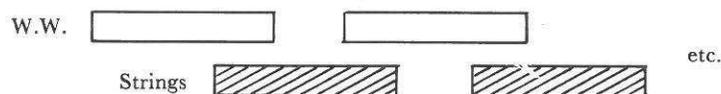
Viol. II.

Vcllo

C. B.

PLATE XXIV. CONTRASTED ARTICULATION (flute and harp)

The process may be symbolized by the following visual design:



At first, only the woodwinds are heard. At another point, woodwinds and strings are heard together. At a third point, only the strings are sounding.

Allegro commodo

Project 23

In reduced scoring, invent some illustrations of overlapping: (a) between woodwind and string choirs, (b) between

the three choirs (woodwind, brass and strings), and (c) between two melodic voices over an accompaniment (homophonic texture). It is desirable to have interesting varieties in overlapping. That is, as in polyphony, the entrances must not be too monotonously regular or mechanical. The freedom and variety of the overlapping action of cloud forms, as they pass through the sky, will have an affinity to the values of overlapping in orchestration.

For practice in this technique it is best to use choirs of sound rather than single lines, although overlapping succeeds equally when applied to melodic lines. Study some of the examples of overlapping listed in the chart of examples for reference (see Table IX in the Appendix on page 220).

Study as many other scores as you can, to find and analyze examples of overlapping. Ability to apply this principle should result from skill and insight acquired from ordinary contrapuntal studies. The scores of Sibelius, for example, show very little formal polyphony, but they have a wealth of the larger polyphony of overlapping (entrance and departure of the various choirs and design elements); this is an important element in any scoring.

POINTILLISM

Pointillism is a technique borrowed from the "Impressionistic" style of painting and transferred to music by Debussy and others. In such a painting, when seen from a distance, points of design seem to merge into a single impression; separated primary colors form an impression of a subtle blend.

To approximate this in music, a series of fragmentary designs must be sounded in clear timbres and in differing registers. Entrances should be heard only briefly and in rapid order. These splashes or points of sound are separated in space and time, but in the mind of the listener, they merge into an impression of blended tonal beauty. Analyze the use of this technique in

from BLACHER: *Studie im Pianissimo* (With authorization of Bote & Bock, Berlin/Wiesbaden, Germany)

A detailed musical score for 'Studie im Pianissimo' by Blacher. The score is arranged in a standard orchestral format with multiple staves for each instrument family. The key signature is one flat (B-flat major/D minor) and the time signature is 3/4. The score features overlapping melodic lines across various instruments, with dynamic markings such as *pp*, *sf*, *pp gliss.*, and *dim.* indicating the texture and volume. The score is divided into two systems, with a change in time signature from 3/4 to 2/4 in the second system.

PLATE XXV. OVERLAPPING

La Mer and *Ibéria* by Debussy. Successful pointillism demands a special clearness of timbre. Too much sustained sound should be avoided, but sometimes a very thin background of sustained motion may be added. This will give an underlying unity which will balance a certain "scrappiness" inherent in pointillism. This supplementary thread of motion must be subtle and delicate. A bit of overlapping in the pointillistic entrances helps give continuity to the sound, but is not essential. Observe these two "pointillistic" measures:

A musical score for 'Allegro fantastico' by Debussy, illustrating pointillistic techniques. The score is for a woodwind section, horns, violins, piano, and snare drum. The key signature is one flat (B-flat major/D minor) and the time signature is 3/4. The tempo is marked 'Allegro fantastico'. The score features pointillistic textures with overlapping notes and rests, creating a shimmering effect. Dynamic markings include *mf* and *pp*. The score is divided into two systems, with a change in time signature from 3/4 to 2/4 in the second system.

Project 24

Study Plate XXVI and the scores of Debussy for further illustration of "pointillistic" techniques. Write a page of score

which employs this technique. Use points of clear, unmixed tone color; have them enter rapidly and briefly. Locate each entry of new timbre in a non-competing pitch locale. Some supporting motion of a delicate continuing sort may be added. For this project it will be advisable to write in full score, since "pointillistic" tone-mixing demands such constant shifting to fresh tone color. It is best to have a large palette of orchestral color before the imagination, to ensure a variety of resources.

To supplement the study of Debussy scores, French impressionist paintings might also be studied and analyzed. This will heighten an understanding of the relationship of "pointillism" in orchestration to "pointillism" in painting.

TOTAL MIXTURE

There has already been a discussion of mixture by doubling (p. 118). Mixture without doubling has a significantly different, more rarefied sound which results from clear points of tone color sounding simultaneously in separate designs and pitch locales. Theoretically, all the basic tonal ingredients, if heard in a maximum combination, should produce a blend which is uniquely rich and full.

There are eight basic tonal ingredients. An objectively calculated total mixture would include the following types:

TABLE IV

1. "Soft" woodwinds	(flutes and clarinets)
2. "Harsh" woodwinds	(oboes and bassoons)
3. "Warm" brass	(horns and muted brasses)
4. "Clear" brass	(trumpets, trombones)
5. The string tone	(violins, violas, cellos)
6. Plectrum sounds	(harp, harpsichord, guitar, <i>pizzicato</i> strings)
7. Bell-tone percussion	(piano, celesta, etc.)
8. "Dry" percussion	(snare drum, woodblock, tambourine, etc.)

from RAVEL: *Rhapsodie espagnole* (Permission for reprint granted by Durand et Cie, Paris, France, copyright owners; Elkan-Vogel Co., Inc., Philadelphia, Pa., agents)

PLATE XXVI. POINTILLISM

The most complete small instrumental group would, therefore, include one player for each of the above timbres.

Through small combinations, which can include unusual bell-tone and plectrum instruments such as vibraphone and guitar, certain orchestrators—following in the footsteps of Webern—seem to be striving toward an ideal of total mixture. The smallness of the groups used ensures vividness, while the addition of unusual instruments adds vigor and allure through variety and contrast.

All eight basic ingredients will not necessarily be present in the instrumentation of such small groups, but the tendency is toward completeness through the use of the contrast potentialities latent in the eight basic categories. How complete would a combination of xylophone, harpsichord, flute, viola, snare drum and contralto voice be? How complete would a combination of accordion, guitar, trombone and double bass be? Try to think of several such ensemble combinations with relative completeness of mixture in mind.

Project 25

To experiment with the effect of total mixture, choose one instrument from each of the eight categories listed above. Write a piece (a few measures) in which, at some point, all eight basic types of timbre are sounding simultaneously, as in the example on page 145. Listen to *Le Marteau sans maître* by Boulez, and to the complete works of Webern (recorded by Robert Craft). Also compare the instrumentation of various modern dance bands and other small combinations, in order to make objective theoretical judgments as to their relative degrees of “total mixture.”

Britten’s *Serenade for Tenor, Horn and Strings*, Varèse’s *Octandre* and the symphonies of Milhaud are valuable for such analytical comparison.

It is interesting to observe how certain ingredients of “total mixture” have come into and gone out of fashion. Plectrum in-

Category Moderato

① Bass Clar. *mp*

② Oboe *mf*

③ Horn *p*

④ Trpt. *p*

⑤ Violin *mf*

⑥ Harp *mf*

⑦ Xylophone *mp*

⑧ Tambourine (struck) *mf*

struments such as lutes and mandolins, now seldom used, were an important part of early Italian orchestras. The harpsichord was very prominent in the time of Bach, but practically disappeared until revived in the Twentieth Century. The *Petite Symphonie Concertante* by Frank Martin, which features harp, harpsichord and piano in combination with strings, is typical of the revived Twentieth-Century interest in plectrum sound.

Handel's *Water Music* was played on a barge floating down the Thames. The orchestra was made up of oboes, bassoons and strings, a jolly but incomplete instrumentation. In the Classical Period, there was almost an over-emphasis on the strings. In America, in the early Twentieth Century, the strings almost withered away and disappeared from dance bands. The symphonic band has shown a one-sided over-emphasis on the clarinet and brass sounds.

CONTRAST OF CHORD AND LINE

When a melodic line cuts through a mass of sound, the contrast which is effected has inherent tonal interest. The usual homophonic manifestation of melody and accompaniment is a contrast of chord and line, but its choicest sound comes from the subtle tone-mixing that results when the line cuts through a chordal structure which is in a similar pitch locale. This brings about a blend of tone and action that can be derived in no other way.

The *Midsummer Night's Dream* Overture of Mendelssohn (shown in the first two examples on p. 149) shows considerable use of this principle, as does the *Tannhäuser* excerpt of Wagner (shown in the third example). The result in each case is a strangely appealing warmth and richness. Analyze the examples on p. 149.

from MARTIN: *Petite Symphonie Concertante* (Universal)

The musical score is arranged in two systems. The first system includes staves for Harp, Harpsichord, Piano, and strings (I, VI, II, A., Vc., Cb.). The second system repeats the string parts. The Harp part begins with a 'sol b' marking. The Harpsichord part features a '+16' marking. The Piano part is marked 'mp'. The string parts (I, VI, II, A., Vc., Cb.) are marked 'mp' and include 'pizz.' (pizzicato) markings. The score is written in a key with one flat and a 3/4 time signature.

PLATE XXVII. UNUSUAL INSTRUMENTATION

from WEBERN: *Fünf geistliche Lieder* (Universal)

V.

[Doppelcanon in motu contrario]

Fließend (♩ = ca 60)

Gesang *pp*
Fahr hin, o Seel, zu deinem

Flöte 1 2 3 4

Klarinette mit Dämpfer *pp* *p* *pp*

Trompete *p* *pp* *p* *pp* *ppp*

Harfe Fließend (♩ = ca 60)

Geige *pp*

Gott, der dich aus nichts ge-stal-tet, der dich er - löst durch sei-nen

Fl. 5 6 Flatterz. 7 8 Flatterz. 9

Kl. *pp* *pp* *p* *pp* *pp*

Trp. *pp* *pp* *pp* *pp* *pp*

Hr. *pp*

G. *p* *pp* *pizz.* *pp cresc.*

PLATE XXVIII. TOWARD TOTAL MIXTURE (vertical)

Allegro di molto

Chordal mass *p* (Woodwinds, Horns, Cellos)

Internal line (Viola) *pp*

Allegro di molto

Chordal mass Woodwinds *pp*

Internal line (Violins) *pp*

Allegro

Chordal mass *p* Woodwinds

Internal line (Viola) *p*

Project 26

In reduced scoring, invent some examples of chord contrasting with line. Use contrasting timbres in similar registers: e.g., string harmony, with cor anglais in a line cutting through it; or woodwinds in harmony, with a violin line cutting through (sounding in the same pitch locale).

Oboe

Strings

* point of dissonance

The above example shows how dissonance can be absorbed and softened by contrast of timbre and contrast of chord and line. Try this out.

MOTION AS A SUSTAINING FACTOR

When Sibelius said, "The orchestra has no pedal," he meant: if you want the sound in the orchestra to ring the way it does on the piano, you will have to add sustaining tones or choirs to the scoring. When Wagner said, "The secret of good orchestral sound is sustained tone," he had the same general problem in mind.

Unsustained, fragmented or "pointillistic" sound tends to "dry out" and apparently to lack a "floor" or "foundation." It is true that the addition of too much sustaining sound tends to

from FRANCK: *Symphony in D minor* (Kalmus)

20

Fl.

Ob.

Cor angl.

Cl.

Cl. b.

Fg.

Cor (F)

VI.

Vla.

Vel.

Ctb.

cresc.

p

mf

a 2

div.

PLATE XXIX. CONTRAST OF CHORD AND LINE

obscure delicacy of design, but there is a way to achieve foundational feeling without adding actual sustaining material. This can be done through the use of some simple continuous motion pattern: e.g.,

(Violin)
or
(Viola)
or
(Piano)

The image shows three musical staves. The top staff is for Violin, showing a continuous eighth-note pattern with a slur over the first four measures. The middle staff is for Viola, showing a similar eighth-note pattern with a slur. The bottom staff is for Piano, showing a continuous eighth-note pattern with triplets indicated by '3' under the notes.

If there is some stabilizing motion of this kind in the score, the rest of the music may be very “fragmentary” or “pointillistic,” and it will still seem satisfyingly unified. Without this thread of motion there might be a feeling of breathlessness and uncertainty.

The line of motion may be in any pitch locale, but should remain thin and delicate (a unit of one or two voices only).

Respighi makes effective use of this principle in *The Fountains of Rome*.

This principle is still another representation of contrast in action — fragmentariness contrasted to stability and steadiness (as shown opposite).

Without the stabilizing action of the violas, the sound would be very fragmentary.

Project 27

Experiment with the balancing of fragmentariness against a thin line of continuous motion, as in the following example.

Allegro moderato

Woodwinds
Trpts. (muted)
Violas
Cellos and Bases

mf (flutter)
mf
mf
pizz.
mf >

The image shows a musical score for four parts: Woodwinds, Trpts. (muted), Violas, and Cellos and Bases. The tempo is marked 'Allegro moderato'. The Woodwinds part has a flutter marking. The Trpts. part has a muted marking. The Violas part has a pizzicato marking. The Cellos and Bases part has a pizzicato marking and a dynamic marking of *mf* with an accent (>). The score includes triplets in the Viola and Cello/Bass parts.

PERCUSSION AS BACKGROUND

Because of its aural vividness, the pulsating timbre of a percussive element can supply a stabilizing effect. The striking sound and penetrating force of percussion rhythm so engages the attention and so definitely — and almost hypnotically — fills up the sound space that everything else seems almost incidental. If a drum beat such as the following is begun,

The image shows a rhythmic pattern consisting of four groups of eighth notes. Each group has an accent (>) under the first note.

even random shouts and noises, if added, seem to merge into meaning, through the unifying power and dominating energy and impact of such a motor pedal (rhythmic *ostinato*).

from RESPIGHI: *The Fountains of Rome* (By permission of G. Ricordi & Co., copyright owner)

7 Più vivo ancora $\text{♩} = 128$

Fl.
Ob.
Cl. (Sopr.)
Cl. B. (Sopr.)
Corni
Tr. Sopr.
Tr. Sopr.
Car.
Arpa I.
Arpa II.
Celeste
P.
Vcl. I.
Vcl. II.
Viola
Vcllo
Cb.

PLATE XXX. MOTION AS A SUSTAINING FACTOR

Primitive peoples knew about this principle, and used drums in this way as a strong unifying force. "Jazz" musicians understand its power, and use percussion as a foundation for improvisatory freedom. Much tonal interest results from the variety of timbre made possible by the unifying percussive background.

Project 28

On any vivid percussion instrument, start a "beat," or rhythmic pattern, and then add any random or fragmentary material. Use only small combinations, as in this example, and write several short examples of your own.

Allegro grottesco

Trpt.
Timp.

STRINGS AS BACKGROUND

Throughout the Classic and Romantic Periods, the strings were used as the mainstay of orchestral sound. The woodwinds were secondary in importance and often doubled or reinforced the strings, while the brass and percussion were used as supporting strength on *forte* passages. Mozart and von Weber began to break through its limited use, but it was only in the Debussy "impressionistic" style and after invention of certain mechanical improvements (Boehm system fingerings for the woodwinds and valve systems for the brasses), that a more developed use of brass and woodwinds began.

from VILLA-LOBOS: *Chôros No. 10*, "Rasga o Coração" (Copyright 1928, by Editions Max Eschig, Paris. Copyright renewed 1956. Used by permission of the original copyright owners and their United States representative, Associated Music Publishers, Inc., New York)

PLATE XXXI. PERCUSSION AS BACKGROUND

As the woodwinds and brasses became more soloistic and individually capable, the roles of the instruments were reversed. The strings became background (they can, indeed, make a wonderful background) and the brasses and woodwinds (particularly the woodwinds) became foreground. As will be explained later, this use of the woodwinds as foreground, with strings as background, is a more nearly natural balance of the idiomatic characteristics of the choirs.

Debussy nearly always included the harp in his orchestrating; and Manuel de Falla included the piano to make a more complete balance of character in the sound, and to approach the "total mixture" (non-doubled) already discussed.

String sound can be so delicate and varied that the invention of string patterns for background has endless and fascinating possibilities. As this naturally fluent, vague and active background material combines with a foreground of definite woodwind and brass timbres, there is a new liveness and attractiveness of sound in the whole orchestra.

Listen, with score in hand, first to a classic work and then to a Debussy work, in which strings recede to the background and woodwinds take over the foreground. The live and luminous quality of the Debussy score will be immediately apparent.

Study many contemporary scores to analyze the techniques that produce this special type of tonal interest, to see how subsequent composers have utilized the ideas explored and revealed by Debussy. Scores especially recommended for this are *La Mer* and *Ibéria* by Debussy, *Escales* by Ibert, the *Daphnis and Chloé* Suites by Ravel, and *Trois Poèmes Juifs* by Bloch.

Project 29

Invent a background of string motion, using the entire string section; then add woodwind and brass melodies, as in the following illustration:

Allegro leggiero

Flute *mf*

Horn *mf*

Strings *p*

pizz.

PUNCTUATION

An accented point or important entrance can be intensified or highlighted by reinforcing it briefly with additional design. This will be referred to as *punctuation*. This effect is somewhat related to the heterophonic unison, but is more briefly applied, and the punctuating factor has little consecutive meaning. The point of punctuation is merely a touch of emphasis, but the tonal effect gives extra strength and variety to an orchestral idea. Strik-

from SCHUMANN: *Symphony No. 1 in B-flat Major, "Spring"* (Kalmus)

Fl. 1. *mf*

Ob. 1. *mf*

Cl. *mf*

Fg. *mf*

Cor. a 2 *mf*

Trb. 1.2.

Timp. *tr*

VI. I *mf*

VI. II *mf*

Vla. *mf*

Vlc. *mf*

Cb. *mf*

250 *p*

PLATE XXXII. "STRINGS AS BACKGROUND"

ing suddenness can bring a feeling of pleasant surprise. The two examples below show this principle in action.

Allegro pesante

Timp. *f*

Unison strings *ff*

Flutes *ff*

Strings *ff*

Project 30

Search in various scores for illustrations of punctuation; then write some examples of your own. See the novel use of flutes for punctuation at the very opening of *L'Apprenti sorcier* by Dukas; the single explosive chord at the beginning of "Ronde du Sabbat" from *Symphonie fantastique* by Berlioz; and the woodwind *sforzando* effect at measure 297 in the *Symphony No. 8* by Beethoven. It will take some searching to find other examples, but almost any well-written score will make some use of this principle.

from GUARNIERI: *Prologo e Fuga* (Copyright 1951 by Associated Music Publishers, Inc., New York — used by permission)

70

Fl. I *ff*

Fl. II *ff* *Pizz.*

Obo. I *ff*

Obo. II *ff* *Pizz.*

Cl. I *ff*

Cl. II *ff*

B. Cl. *ff*

Tr. I *ff*

Tr. II *ff*

Tbn. I *ff*

Tbn. II *ff*

Tbn. III *ff*

Tuba *ff*

78

Tr. I *ff*

Tr. II *ff*

Tr. III *ff*

Tbn. I *ff*

Tbn. II *ff*

Tbn. III *ff*

Tuba *ff*

PLATE XXXIII. PUNCTUATION

BALANCE OF IDIOMATIC CHARACTERISTICS

Each family of instruments has a particular kinaesthetic personality. The brasses are slower in articulation and are naturally harmonic. The woodwinds are more moderate in speed and tend naturally toward melody. The strings are accurate and rapid in articulation and are well suited to florid design.

If this comparison is followed through, it will lead to the conclusion that there is a normal "good sound" which results when these three main families of instruments are used together, fulfilling their naturally supplementary and somewhat contrasting kinaesthetic roles (woodwind melodic — brass sustaining — strings in active design). This "good sound" can be said to result from simultaneous fulfillment of natural "roles" or, in other words, from a *balance of idiomatic characteristics*.

For special effects this normal interplay of kinaesthetic qualities may be reversed. The brass might become melodic, the strings harmonic and slow-moving, and the woodwinds agile and decorative. The effect would be striking, as are all intentional distortions and grotesques.

Composers differ considerably in their uses of this principle of balance. Sibelius, for instance, uses a normal balance of articulative speed and makes much of it. Hindemith, on the other hand, prefers to have the instruments on an equal footing much of the time, with all instruments busy, in a sort of musical democracy. In one sense, this is musically progressive and tends to liberate and develop the slower-moving instruments into more challenging activity; but it also loses the simple strength of normal balance. The following excerpt from Beethoven's *Symphony No. 6* shows an old-fashioned, but healthy, balance of articulation and motion. Note that the strings are active, the woodwinds moderate in speed, and the brass slow and sustaining.

Allegro

The musical score is arranged in a system with the following parts from top to bottom: Piccolo, Flutes, Oboes, Clarinet, Bassoons, Horns, Trumpets, and Strings. The key signature is three flats (B-flat, E-flat, A-flat) and the time signature is 4/4. The tempo is marked 'Allegro'. The woodwind parts (Piccolo, Flutes, Oboes, Clarinet, Bassoons) feature long, sustained notes with a dynamic marking of *ff* (fortissimo). The brass parts (Horns, Trumpets) also feature sustained notes with a dynamic marking of *ff*. The string parts are more active, with the upper strings playing a rhythmic pattern of eighth notes and the lower strings playing a similar pattern. The score is divided into two measures, with a repeat sign at the end of the second measure.

Project 31

Write pages of full score which begin by illustrating the normal balance of idiomatic characteristics. On the first page exemplify ordinary balance, as in the Beethoven example shown above; then try out some variation of the normal balance with strings sustaining, and the brass active; or with the brass moderately active and melodic, while woodwinds are active.

CONTRAST OF STACCATO AND LEGATO
(Consecutive)

All effective phrasing, bowing or shaping of ideas will make some use of contrast of *staccato* and *legato* in consecutive action. To illustrate this, an ordinary scale passage will do.

Sawed out by the violins in this expressionless *détaché* bowing, the result is quite dull:



Almost equally dull is this version, in which there is a uniformly smooth and eventless *legato*:



How much more character even an ordinary scale takes on when *staccato* and *legato* contrast is added to its shaping!



from DVOŘÁK: *Symphony No. 4 in G Major* (Novello)

A full orchestral score for the beginning of Dvořák's Symphony No. 4. The score is arranged in a standard orchestral layout with staves for strings, woodwinds, brass, and piano. The music features a mix of staccato and legato passages, with dynamic markings such as *mf*, *dim.*, and *p*.

PLATE XXXIV. BALANCE OF IDIOMATIC CHARACTERISTICS

from MENDELSSOHN: *The Hebrides Overture* (Kalmus)

Musical score for *The Hebrides Overture* by Mendelssohn. The score includes parts for Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Fg.), Cor (Cor.), Trumpet (Tr.), Timpani (Timp.), Violin I (VL I), Violin II (VL II), Viola (Vla.), Violoncello (Vic.), and Contrabass (Cb.). The woodwinds and strings play a rhythmic pattern of eighth notes. The woodwinds have a melodic line with a trill-like figure. The strings play a steady eighth-note accompaniment. The score is in 2/4 time and features dynamic markings such as *f* and *a 2*.

PLATE XXXV. BALANCE OF IDIOMATIC CHARACTERISTICS

This inner contrast within a line is one way to create enjoyable sound; all successful composers make use of it. Haydn, in particular, was especially creative with this process, and all the composers of the Classic Period made much of this "architectural" contrast. Contrast of *staccato* and *legato* is particularly necessary in the writing of string parts. With the many alternatives of bowing available, there are wonderfully rich possibilities for invention in the shaping of string design. Study the classic string quartets to get a feeling for subtleties of bowing. Observe the *staccato* and *legato* design in this excerpt from Beethoven's *Symphony No. 6*:

Musical score excerpt from Beethoven's *Symphony No. 6*, showing the string parts: Violin I, Violin II, Viola, Cello, and Bass. The score is in 6/8 time. The Violin I part features a trill-like figure. The Violin II part has a melodic line with *sfz* markings. The Viola, Cello, and Bass parts provide a rhythmic accompaniment. The score is in 6/8 time and features dynamic markings such as *sfz*.

Project 32

Invent a page of score, in which contrast of *staccato* and *legato* is applied to melodic line. Also write any number of unison or single lines featuring *staccato* and *legato* in contrast.

STACCATO AND LEGATO (Simultaneous)

Nothing sounds more live and interesting than a musical structure in which continuous *staccato* and continuous *legato* sound simultaneously, as in this excerpt from Brahms's *Piano Concerto No. 2*:

Allegro appassionato

Fl., Ob., Violins

Viole, Celli, Horns

The scores of Saint-Saëns are particularly vivid in their use of this principle. Composers vary in their uses of *staccato* and *legato*. Some, like Franck, Delius, and Wagner, tend to be somewhat monotonously *legato*; whereas others, like Scarlatti and Prokofiev, are more *staccato*. The ideal or norm should be a balance of *staccato* and *legato* and sufficient use of the simultaneous contrast, as in the above example.

Project 33

Invent some structures using simultaneous *staccato* and *legato*. Keep in mind that the individual lines need not be as

from MOZART: *Symphony No. 25 in G minor*, K. 183 (Heugel & Cie, Editeurs, Paris)

180

190

PLATE XXXVI. *Staccato and Legato in Contrast* (consecutive)

thematically important as are the two themes in the above example. In a homophonic texture, the accompaniment could be quite subordinate, and still supply a very vital *staccato* element against a *legato* melody; or there could be a *legato* accompaniment against a *staccato* melody.

EXPANDED TONAL GROUPS

The rich full-sounding harmonies of Wagner and other late-Romantic composers brought about an expansion in orchestral instrumentation. To the wind choirs, new and deeper timbres were added; the strings were often divided and the number of voices multiplied in both high and low registers.

To the woodwind section Wagner added a third flute, the cor anglais, bass clarinet, and a third bassoon. Each woodwind timbre could then have its own independent three-part harmony, as shown below. This created a new depth and richness in the

(Classic) (Wagnerian)

Flutes

Oboes

Clarinets

Bassoons

from SAINT-SAËNS: *Danse macabre* (Kalmus)

1^{re} Fl.

Cl.

Bass.

1^{re} et 2^e Cor.

Tromb.

Xyloph.

Timb.

leg.

Div.

p^{izz.}

PLATE XXXVII. *Staccato AND Legato IN CONTRAST (simultaneous)*

woodwind choir. Villa-Lobos and others have occasionally added saxophones for even further deepening.

It was in scoring for the string section that the most significant expansion took place; here, again, Wagner was an important innovator. The string unit in the classic orchestra was essentially like a string quartet, but with a little extra strength in the center and with the cello doubled by bass (sounding an octave lower). Wagner at times wrote for an ensemble in which each string timbre sounded as an independent choir—as shown here:

(Classic) (Wagnerian)

Violin 1

Violin 2

Viola

Cello

Bass

(actual sound)

There are a great many possibilities for spacing such *divisi* strings. It is largely a matter of personal choice and dramatic

fitness, but each harmonic grouping must have structural and harmonic consistency. Wagner's *Lohengrin* Prelude shows a highly effective use of divided strings; so does *The Swan of Tuonela* by Sibelius. Another major work for strings is *Fantasia on a Theme by Thomas Tallis* by Vaughan Williams, which employs two string orchestras and a string quartet to create unusual variety in string writing. Still another outstanding work of this type is the *Concerto for Two String Orchestras* by Martinu.

Divided strings produce an enjoyably full and creatively expressive tone quality. A significant enrichment takes place from the strengthened lower registers. On the other hand, when the higher strings are divided without the foundation of the lower string tone they become particularly "etherealized," as in the opening of the famous *Lohengrin* Prelude.

While there were important additions to the woodwind choir and expansions in the string choir during the Wagnerian period, the groupings in the brass section showed less change.

The band profits from the use of flügelhorns because of the more truly deep trumpet sound; but, as a general rule, the piling up of brass timbres too often results in a heavy, qualitatively inferior sound. The power of the brass is so striking that two trumpets and one trombone can create the illusion of a multitude and "blow down the walls of Jericho" without further aid. For this reason the brass choir has not often been expanded.

The baritone horn, or tenor tuba, is an unusual brass instrument which is sometimes added. For an illustration of expanded brass section, study the final movement of *The Pines of Rome* by Respighi. For an example of the use of both cornets and trumpets in the brass section, study the Franck *Symphony in D minor*. For illustration of the use of baritone horn, examine *The Planets* ("Mars") by Holst and the arrangement of *When Johnny Comes Marching Home* by Roy Harris.

The tuba must be used sparingly. It is most valuable for doubling of the lower trombone part when deep power is needed,

but it is inevitably slow in articulation, and its too constant use will tend to retard action and blur sonority.

Project 34

The most effective exercise in the use of an expanded choir will come from writing small compositions for: (1) the full woodwind choir, (2) the full brass choir, and (3) the string orchestra. For the woodwind group use the full-fledged Wagnerian or "modern orchestra" woodwinds, with the inclusion of third flute, cor anglais, bass clarinet and third bassoon. Add any saxophones that you need for experiment. Use the chordal texture for these expanded unit exercises, as this will supply additional concentrated practice in organizing for unit consistency.

In the brass example use the standard "modern orchestra" grouping — four horns, three trumpets, three trombones and tuba. Add baritone horns if you wish. Here again, use a texture which is "chordal" in type. This will give additional experience in spacing and unit organization.

For the string ensemble use the string section of the standard symphony orchestra — first violins, second violins, viole, celli and bassi. Experiment with some *divisi* multiplication of parts. Because the strings have so many possibilities of distribution, more textural variety and imagination will be in order.

Any of the separate timbres of the string group may be expanded into independent choirs (first violins, second violins, viole or celli). Or some may be harmonic groups while others are not. This gives the orchestrator much more freedom of choice.

The basses are usually used for doubling of the bass line, but in rare instances have also been used for harmonic choirs.

Such bass harmonies have usually been scored to sound separately, so that their rather delicate timbre will not be obscured.

from R. STRAUSS: *Till Eulenspiegels lustige Streiche* (Kalmus)

PLATE XXXVIII. EXPANDED WOODWIND SECTION

from SIBELIUS: *The Swan of Tuonela* (Kalmus)

PLATE XXXIX. EXPANDED STRING SECTION

FRONTIERS

Throughout the future the fundamental need for new tonal interest will stimulate a search for new resources in timbre differentiation. The tendency toward expanded units, explored in Project 34, is only one of the "frontiers" of tonal interest. Other newer techniques still in early stages of exploration are: fuller and more subtle use of percussion instruments; total mixture (horizontal); total mixture (vertical); "music concrete"; electronic music, and the addition of human voices, as wordless timbres, to the orchestral sound. Every young musician will certainly want to explore these developing areas.

There is some possibility that these new resources are partially overrated, and that they may turn out to be not "revolutionary" but only "evolutionary." The various new effects and resources may not replace the effects of the traditional orchestra, but may only merge into a total technique, with all the established instruments still playing their fundamental and nourishing roles.

Nevertheless, the composers who have been most strikingly inventive and who have therefore dominated the realm of famous orchestrators are those like Berlioz, Wagner and Debussy, who kept abreast of mechanical improvements and opportunities and turned them into musical magic. Beethoven, in his day, also drove players to new levels of technical skill by demanding increased independence and writing works of more technical difficulty.

Although no specific technical projects are offered, it is recommended that the study of orchestration include experimentation in these several "frontier" areas. If electronic devices are not available, young composers might band together to procure equipment and initiate joint experimental projects.

THE FULL AND SUBTLE USE OF PERCUSSION INSTRUMENTS

Although, for centuries, the music of primitive, ancient and oriental peoples had a highly developed art of percussion, the familiar European orchestral music has been somewhat underdeveloped in its use of percussive timbre. At some point in history European composers began to introduce certain Turkish military instruments into their music to simulate the exotic. The habit became established in bands and orchestras without being fully understood or explained — a striking example of “cultural lag” for the sociologist to consider.

A commonplace set of sounds — the snare drum, bass drum, cymbal and timpani — continues to dominate our music. One of the saddest of this writer’s memories is the performance of *Londonderry Air* by a high school band, with the full percussion section idiotically playing along with the familiar “chunk-a-chunk” of the military instruments, almost completely negating the poetry of this beautiful folk song.

Carlos Chávez and others have made use of unusual native Latin-American percussion (e.g., *Sinfonia India*), and certain “avant-garde” composers, notably Cage, have made use of various unheard-of combinations with emphasis on the shockingly unorthodox (“lion’s roar,” “typewriters,” “tin pans,” etc.). What the art of percussion still lacks is a sufficient scientific analysis of the potentialities of percussion timbres and a systematic categorization which will make available to the composer a much wider choice of percussion types. The future will also certainly bring into our music the already established and extraordinarily varied and subtle timbres of Asian and African musical traditions.

There is a most valuable section in the *Thesaurus of Orchestral Devices* by Gardner Read, in which he has listed the

many subtle ways of treating the familiar percussion instruments. This book includes references to specific measures in many scores where particular usages can be found. Complete knowledge and experimentation should eventually “cure” Western music of its too frequent addiction to the Turkish military instruments and too many mere “noise makers,” such as the rattle, the whistle, the whip, and other approximations of “everydayness.” The University of California at Los Angeles and The University of Washington have instituted special courses in the techniques of oriental music, and there are other evidences that music is nearing a “break-through” into a new and experimentally vital attitude toward idiophonic values.

TOTAL MIXTURE (Horizontal)

This terminology best describes a technique applied by Anton von Webern in orchestration. If a given line maintains a tone color only briefly and kaleidoscopically changes from one timbre to another, a horizontally applied total mixture is effected. This is a rarely used technique, rich in possibility. In the Columbia recording of Webern’s complete works there is an example of this technique in his orchestration of a Bach fugue — listen to this recording. The ordinary orchestrator would have shown a tendency to follow through with the same tone color throughout a given segment of melody, but Webern changes the melodic timbre frequently and rapidly. The result is a sound that possibly violates the sturdy spirit of the music of Bach, but no one can deny the richness and tonal interest of this variegation, or fail to note that it is of “frontier” significance.

In a much more expansive way *Concerto for Orchestra* by Bartók sets out to ensure that all the instruments of the orchestra will be heard in turn as melodic voices. Over a very large span, this achieves a similar total mixture.

from MILHAUD: *Les Choéphores* (Copyright by Heugel, 1926-1947, Heugel, Editeur, Paris)

IV - PRÉSAGES

Modéré $\text{♩} = 76$ environ
avec des baguettes de Timbales en peau

CYMBALE			
GRELOTS			
TRIANGLE			
CASTAGNETTES de FER			
CASTAGNETTES de BOIS			
FOUET			
TAMBOUR à BASQUE			
TAMBOURIN PROVENÇAL			
CAISSE MOURANTE			
CAISSE CLAIRE			
TAMBOUR VOILÉ			
TAM TAM	<i>pp</i>		
1 ^{re} GROSSES CAISSES	<i>pp</i>		
2 ^e GROSSES CAISSES		2 ^e avec la mailloche	<i>pp</i> (trôle)
COUPS de MANTEAU sur une planche			
Chœur CHOÉPHORE	<p style="text-align: center;">Modéré $\text{♩} = 76$ environ</p> <p>Que de fois la terre a enfanté la terreur et les bras de la mer sont pleins de cho... us à</p>		
SOPRANI		<i>(pp)</i> A	A
CONTRALTI		<i>(pp)</i> FT	FT
LE CHŒUR			
TÉNORS			<i>(pp)</i> O
BASSES			

PLATE XL. FULL AND SUBTLE USE OF PERCUSSION INSTRUMENTS



TOWARD TOTAL MIXTURE: A PERFORMING GROUP CONDUCTED BY STANLEY CHAPPLE, AT THE WEBERN FESTIVAL, UNIVERSITY OF WASHINGTON, 1962.

TOTAL MIXTURE (Vertical)

This has already been discussed as a principle of tonal interest (total mixture non-doubled) but it also needs to be emphasized as a "frontier" potentiality. Webern is also an innovator in the use of this technique, and his orchestral pieces should be studied as illustrations of total mixture, along with those of Boulez and other Twentieth-Century French composers. Mention must also be made of the way in which the American "Jazz" movement is similarly, but rather gropingly, reaching out in this direction by exploiting a great variety of small combinations.

"MUSIC CONCRETE"

The term *music concrete* refers to a music which makes use of sounds recorded from nature — bird calls, waterfalls, car brakes screeching, water gurgling out of a bottle, etc. These sounds are transformed by tape recorder techniques. New effects are created by transposing realistic sounds to higher and lower octaves. This distortion, by slowing down and speeding up the vibration, results in a new, sometimes sensational and grotesque tonal character. The Louisville recording *Music for Tape Recorder and Orchestra*, by Ussachevsky and Luening, is an attempt to reach out in this direction.

ELECTRONIC MUSIC

This is machine-produced music, with the tones played and created by electronic devices. Electronic music, as composed by Stockhausen and others, envisions a music which is no longer limited to the tonal systems of the various instruments. Such a

music explores a world of sounds and timbres no longer limited by human inabilities. Almost any rhythm, any pitch, or any timbre that can be scientifically calculated can be manufactured by combining various frequencies. Sound and motion will be completely freed from the human limitations of the orchestra player.

This revolutionary possibility will be deplored and combatted by those who treasure "humanism" in its old-fashioned sense, but it will be welcomed by those who see in it a new "humanism" in terms of the expressive possibilities of the controlled machine. Here, again, is a grand hope which may eventually be only partially realized. Perhaps electronic timbres will merely merge with already established sounds, to make a newly enriched total orchestral art. As mankind entered the age of science, it was natural that the artists and theorists should try to create new tonal types by scientific and mechanical means. For a time, around 1920 to 1930, there was much experimentation with such things as electrically produced tone, scratchings on the sound track, aluminum violins, glass clarinets, the Theremin, the Ondes Martenot, and the Hammond organ.

At this time there was great machine-age hopefulness that a whole new world of timbre would arise from new inventions such as these. Some of these temporarily exciting and unusual sounds were tentatively used for dramatic purposes, and serious composers began to be interested in them. These inventions and experimental sounds failed, however, to make a very lasting impression. Why was this? A comparison of basic timbres with the primary colors will help to explain this relative failure.

In visual experience, we are familiar with the seven colors contained in the rainbow (violet, indigo, blue, green, yellow, orange, red). Other colors, however marvelous and subtle they may be, are merely combinations of these. In the world of sound, there seem to be timbres which are similarly basic. These have been chosen as archtypes after centuries of musical evolution. The flute, the oboe, the horn, the trumpet, the harp, etc., are

basic types of timbre so positively selected by the ear from hundreds of early timbre types that any tonal effect or combination of tone, or newly invented device, will inevitably sound like a mixture of these prototypical timbres. The Theremin and other electrical instruments sound like odd, imperfect flutes, while the Hammond organ too often sounds like a generalized mixture of strings and oboe. The saxophone is an interesting case in point: it disappears into the ensemble sound because it is neither a brass nor a woodwind but a relatively bland mixture of the two.

It would be no surprise to find that all future inventions of timbre must inevitably refer back to the present ones for qualitative definition, just as all colors must refer back to the spectrum. Nevertheless, as more analytical experimentation takes place and as psychological knowledge about "attributes" of tone becomes firmer, there will be constant attempts to invent new sounds and tonal devices.

Successful use of electronic devices can be heard in *Turangalila* by Messiaen, *Poème Electronique* and *Deserts* by Varèse and *Differences* by Berio. The latter can be especially commended for opening up new frontiers in application of stereophonic listening and for a more musically gifted treatment of timbre and motion that are typically electronic.

ORCHESTRAL USE OF HUMAN VOICES

In his *Three Nocturnes*, Debussy adds a choir of feminine voices to the instruments of the orchestra. In the movement "Sirènes" they sing harmonically as though they were a choir of instruments but use only syllables such as "ah," "la," etc. Holst in *The Planets* ("Neptune") makes similar harmonic use of human voices. Vaughan Williams uses the human voice as a solo instrument in the *Pastoral Symphony* and uses choral sound instrumentally in *Flos Campi*.

from VARÈSE: *Deserts* (By permission of G. Ricordi & Co., copyright owner)

EDGARD-VARESE

DESERTS

INSTRUMENTATION

- 2 Flutes (Alt. Piccs.)
- 2 Clarinets in Bb (one Alt. Eb Cl., one Alt. Bass-Cl.)
- 2 Horns
- 3 Trumpets
 - 1st in D
 - 2nd and 3rd in C
- 3 Trombones
 - Bass Tuba
 - Contra-Bass Tuba
 - Piano
- Percussion:
 - I. 4 Timpani (with pedals) — Vibraphone — 2 Suspended Cymbals (high and low) — Side Drum — Claves
 - II. Glockenspiel — Snare Drum — Field Drum — Side Drum — 2 Timbales or Tom-toms — 2 Suspended Cymbals (high and low) — Cencerro — Tambourine — (take Chinese Blocks from V. at Bar 200)
 - III. 2 Bass Drums (medium and low) with Attached Cymbals — Field Drum — Side Drum — Cencerro — Guiro — Claves — Tambourine — Chimes (Tubular Bells)
 - IV. Vibraphone — 3 Gongs (high, medium and low) — 2 Lathes — Guiro — Tambourine
 - V. Xylophone — 3 Chinese Blocks — 3 Wooden Drums (Dragon Heads) — Guiro — Claves — 2 Maracas — (take 2 Lathes from IV. at Bar 135)
- 2 Magnetic Tapes of electronically organized sounds transmitted on 2 channels by means of a stereophonic system.

The instruments and the interpolations of organized sound are never heard simultaneously, but must follow each other without a break, alternating as follows:

1. Instruments — from beginning to bar 82
2. 1st interpolation of organized sound enters on 4th beat of bar 82
3. Instruments enter bar 83 ($\frac{3}{4} = \downarrow = 100$)
4. 2nd interpolation of organized sound enters on 2nd beat of bar 224
5. Instruments enter bar 225 ($\frac{7}{4} = \downarrow = 132$)
6. 3rd interpolation of organized sound enters on 4th beat of bar 263
7. Instruments enter bar 264 ($\frac{5}{4} = \downarrow = 84$)

The engineer at the magnetophone will signal the conductor for entrance of instruments.

This work may also be performed instrumentally without the interpolations of the tapes (electronically organized sound) if these are not available.

PLATE XLI. INSTRUCTIONS FOR THE USE OF ELECTRONICALLY PRODUCED SOUNDS

from RAVEL: *Daphnis et Chloé* (Permission for reprint granted by Durand et Cie, Paris, France, copyright owners; Elkan-Vogel Co., Inc., Philadelphia, Pa., agents)

91

1^{re} Fl. *pp*

2^{de} Fl. *pp*

Cl. *pp*

Viol. *pp*

Viola *pp*

Cello *pp*

Bass *pp*

Sop. *pp* cre - scen - do

Cont. *pp* cre - scen - do

Ten. *pp* cre - scen - do

Bas. *pp* cre - scen - do

Div. *pp* sur la touche

Alt. Div. *pp* sur la touche

Div. *pp* sur la touche

C. B. Div. *pp* sur la touche

Une fleur sourde. Ou est un camp des pirates. Côte très accidentée. Au fond, la mer. A droite et à gauche, perspective de rochers. Sur tryfour se découvre, près de la côte. Par endroits, des cyprès. On perçoit les pirates, courant çà et là, chargés de butin. Des torches sont apportées, qui jettent par éclairs violemment la scène.

PLATE XLII. ORCHESTRAL USE OF HUMAN VOICES

from SCHÖNBERG: *Pierrot Lunaire* (Universal)

Mäßige ♩ (ca. 84)

Flöte. *pp*

Klarinette in A. *pp*

Geige. (mit Dämpfer) *pp* col legno gestrichen immer col legno gestrichen

Violoncell. (mit Dämpfer) *pp* col legno gestrichen immer col legno gestrichen

Rezitation. *Mäßige* ♩ (ca. 84)

5 mit der Rezitation

Fl. *pp*

Kl. (A) *pp*

G. *pp* arco am Griffbrett flautando

Vi. *pp*

5 streng im Takt weiter

Ro - te, fürstli - che Ru - bi - ne, blutge Trop - fen al - ten Ruh - mes

Fl. *pp*

Kl. (A) *pp* *espress.*

G. *pp* col legno gestrichen arco am Griffbrett flautando

Vi. *pp* arco

schlummern in den Ta - tenschreinen, drunten in den Grab - gewölben. (tonico) Nachts,

PLATE XLIII. SMALL EXPERIMENTAL COMBINATION

Theoretical analysis of the characteristics of vocal timbre might lead to the conclusion that voices are not really suitable as orchestral ingredients, if judged by what they add to the concept of "total mixture." Nevertheless, there are interesting frontiers in the possibilities for combining orchestral and vocal timbres.

Project 35

Write at least one example which explores a "frontier" area.

Have open-mindedness toward all new possibilities, but at the same time keep alive an understanding of fundamental values. Stravinsky, in his *Six Lessons in the Poetics of Music*, defines tradition as that which still succeeds in bringing forth the miracle of artistic value. All of the principles of clarity and tonal interest will still "work" as long as man is psychologically the creature that he is. However, language always grows and, since musical expression is also a "language," it will similarly grow throughout the future, as new sounds and new ways of producing them are constantly sought.



IV

Structural Values

*I*N ADDITION TO CLARITY AND TONAL EXCITEMENT, THE best orchestration will also have effective structural design. Since structure is so organically related to musical form and techniques of composition, a complete analysis of what makes appealing structure would require a separate treatise. Nevertheless, it is important to consider a few of the larger generalizations that underlie such a complete analysis.

Fundamental sources of imaginative structure are: (a) sufficient instrumental motion; (b) sufficient vigor of design; (c) sufficient overlapping of choirs; (d) "light and shade" through variegation of "thickness and thinness" of texture, and (e) sufficient variety within general design.

SUFFICIENT INSTRUMENTAL MOTION

The structural vividness or challenge of orchestration will depend greatly upon the ability of the composer to invent instrumental motion which is appealingly alive and natural to each

instrument. Simple motion can be characterful, but even within a simple action there must be a purposeful design and a sense of latent spontaneity. In scores which manifest elaborate motion there is nearly always a simple inner design which is the real unifying force. The score of Ravel's *Daphnis and Chloé* (Suite No. 2) is an illustration of this. At first glance there seems to be unparalleled elaboration; but upon further analysis it can be seen that the elaboration coalesces into unified main streams of tonal action which are essentially simple, in spite of all the apparent surface "busyness."

SUFFICIENT VIGOR OF DESIGN

The value of sufficient design is illustrated in the following three examples:

Allegretto ritmico

Flutes *mf*

Viola *mf*

Here the viola design is rather blank and has almost no significant structure. If a mere grace note is added to the viola part, as in the next example, the design is strengthened and made more tangible, and the musical feeling immediately becomes heightened.

sfz

If the viola part is further strengthened by more definite design, as shown below, the result will be even more striking.

sfz

SUFFICIENT OVERLAPPING OF CHOIRS

If the entrance of the choirs (woodwind, brass and strings) is merely antiphonal, or if the choirs constantly enter together, the result may be somewhat crude or monotonous. Such primitively simple unity of action can be used intentionally with strong and purposeful effect. However, most of the time there must be an essentially polyphonic plasticity of choir action derived from overlapping.

There is always a need for open space in any musical design, and this can be effected by the entry and departure of choirs from the fabric of sound. Such "sculptured silence" gives the mind of the listener more time to fasten upon the tangibilities of motive and pattern. Also, pauses for breath are always desirable for the various players.

"LIGHT AND SHADE" THROUGH VARIATION OF "THICKNESS AND THINNESS" OF TEXTURE

Thickness or thinness can be regulated and varied by increasing or reducing the number of voices. A too thin scoring, too long continued, becomes disappointing. A scoring with too many voices, too long continued, becomes wearing. Structural eventfulness is dependent upon a balance between these two extremes. Such a variegation of thickness and thinness can be

STRUCTURAL VALUES

applied to any of the textures. Even a monophonic texture can be thickened by adding octave doubling, or thinned by reducing the sonority to a single line. Sudden change from thick to thin brings about a feeling of relaxed clarity and pleasant surprise. Sudden change from thin to thick brings both surprise and excitement (as in the overtures of Weber). Debussy creates *crescendi* and *diminuendi* by gradually adding or taking away various instruments.

In general, however, the problem is to create a relaxed variety of thickness and thinness of texture that is fitting to each kaleidoscopic change of musical mood. The *Brandenburg Concerti* by Bach illustrate the application of such variety to polyphonic texture. In certain movements of these *concerti* the rhythmic and motival unity is so intense that variety through light and shade is a natural necessity; Bach takes advantage of this organic need by creating a marvel of "cameo-like" variation in the number of voices.

SUFFICIENT VARIETY WITHIN GENERAL DESIGN

Maintenance of structural attractiveness depends upon sufficient variety in the organizational plan. A too long-continued use of any one general plan, when applied to contiguous segments of form, will cause monotony. There are four prototypical organizations which can be alternated to prevent this. Beethoven's music is the best source for illustration of such prototypes in creative action. His scores show an alternation of four basic organizational plans. These are shown on p. 196.

Such a balanced relation in structural organization may be defined as *normal alternation of organizational prototypes*.

Study as many scores as you can, to become familiar with this principle. Every composer must use some degree of variety

from BACH: *Brandenburg Concerto No. 5 in D Major* (By permission of Universal Edition A.G., Vienna)

PLATE XLIV. VARIED THICKNESS AND THINNESS OF TEXTURE

TABLE V

(1) Monophonic statement	(unison line)
(2) Twofold organization	(woodwinds and strings in supplementary contrast)
(3) Oneness of organization of harmony and design	(full orchestra with only one melodic component strongly doubled)
(4) Antiphonal organization	(alternation of entry of choirs)

within general design. Study the symphonies of Beethoven particularly. He, more than any other composer, proved the classic strength of this procedure.

Four excerpts from Beethoven's *Symphony No. 6* illustrate these four types of prototypical organization:

(Twofold)

Woodwinds (secondary component) *f*

Horns (non-motival) *3 f*

Strings (primary component) *f*

(Monophonic)
Allegro ma non troppo

Woodwinds

Strings *p cresc. f*

(Full orchestra with one melodic component)

Woodwinds *ff*

Brasses *ff*

Strings *ff*

STRUCTURAL VALUES

(Antiphonal)

Woodwinds and Horns

Strings

Another good illustration of the normal alternation of organizational prototypes is to be found in the *Symphony No. 4* by Brahms. At the beginning of the slow movement (page 64, Kalmus Edition) the first few measures are monophonic. These are followed by a oneness of organization of harmony and design (one melodic component), in which the woodwind and horn theme is doubled by the *pizzicato* strings. At measure 15 a two-fold organization appears (two supplementary melodic components); this is followed by a return of the "onfold" statement. At measure 36 a striking antiphonal passage enters the scene. A study of this sequence of organizational prototypes will supply a clear and inspired example of balanced use.

Study other scores, particularly recent ones, to observe the continuing vitality of this stabilizing principle (normal alternation of organizational prototypes).



V

Orchestral Types

THE COMPOSER MAY BE EITHER EXPERIMENTAL OR traditional in his choice of instrumentation. In either case, it will be valuable to have in mind some knowledge of the history of the orchestra and the evolution of the standard instrumentations.

The earliest instrumental groups were probably random sets of instruments which accompanied dancing or singing. There was no standard orchestral instrumentation inherited from earlier centuries. At the time of Bach and his contemporaries (1700-1750), the *concerto grosso* type of instrumentation was established. This orchestral ensemble included a body of accompanimental strings, a few featured solo instruments, and the plectrum sound of the harpsichord.

Haydn's period (1750-1800) crystallized the orchestra into its classic division of three major families of sound: woodwind, brass, and strings. In Haydn's orchestra the woodwinds were in pairs (two flutes, two oboes, two clarinets, two bassoons) and the brass was limited to two natural horns and two natural trumpets (without valves).

from BACH: *Brandenburg Concerto No. 2 in F Major* (Kalmus)

J. S. Bach
(1685 - 1750)

(Allegro)

Tromba in F

Flauto

Oboe

Violino

(Allegro)

Violino I di ripieno

Violino II di ripieno

Viola di ripieno

Violone di ripieno

(Allegro)

Cembalo e Violoncello

Detailed description: This page contains the musical score for the first movement of J.S. Bach's Brandenburg Concerto No. 2. The tempo is marked 'Allegro'. The score is arranged for a pre-classic orchestra. The instruments listed are Tromba in F, Flauto, Oboe, Violino, Violino I di ripieno, Violino II di ripieno, Viola di ripieno, Violone di ripieno, and Cembalo e Violoncello. The music is written in F major and 3/4 time. The score shows the first few measures of the piece, with various dynamics and articulations.

PLATE XLV. THE PRE-CLASSIC OR BAROQUE ORCHESTRA

from HAYDN: *Symphony No. 94 in G Major, "Surprise"* (Kalmus)

Symphonie N^o 6

Joseph Haydn
(1732-1809)

Adagio cantabile

Flauti

Oboi

Fagotti

Corni in G Sol

Trombe in C Do

Timpani in D G Re Sol

Adagio cantabile

Violino I

Violino II

Viola

Violoncello e Contrabbasso

Fl.

Ob.

Fg.

Vl. I

Vl. II

Vla.

Vic. e Cb.

10

Detailed description: This page contains the musical score for the first movement of Joseph Haydn's Symphony No. 94 in G Major, 'Surprise'. The tempo is marked 'Adagio cantabile'. The score is arranged for a classical orchestra. The instruments listed are Flauti, Oboi, Fagotti, Corni in G, Trombe in C, Timpani in D and G, Violino I, Violino II, Viola, Violoncello e Contrabbasso, Fl., Ob., Fg., Vl. I, Vl. II, Vla., and Vic. e Cb. The music is written in G major and 3/4 time. The score shows the first few measures of the piece, with various dynamics and articulations. The page number 10 is visible at the bottom.

PLATE XLVI. THE CLASSICAL ORCHESTRA

from PROKOFIEV: *Classical Symphony in D Major* (Copyright 1926 by Editions Russe de Musique—reprinted by permission of Boosey & Hawkes, Inc., assignees of the copyright; also by permission of Kalmus)

Allegro con brio $\text{♩} = 100$ Serge Prokofieff, Op. 25

2 Flûtes
2 Hautbois
2 Clarinettes
2 Bassons
2 Trompettes
2 Cors
Timbales
Violons I
Violons II
Altos
Violoncelles
Basses

PLATE XLVII. THE CLASSICAL ORCHESTRA USED BY A 20TH-CENTURY COMPOSER

The Romantic Period (1800-1850) added the standard brass grouping (four horns, two trumpets and three trombones), and in the late Romantic Period (1850-1900) Wagner expanded the woodwinds to groups of three (three flutes, two oboes and cor anglais, two clarinets and bass clarinet, three bassoons). He also experimented with the addition of various types of tubas. In the music of Wagner the French horn came into its own with the invention of the valves, and brought in new melodic possibilities. Berlioz, in the early Romantic Period, was a great innovator who introduced many special effects, such as muted strings, valve cornets, harps, and strings *pizzicato*, and began a tendency toward "gigantism" which continued until Schönberg's *Gurre-Lieder* with its mammoth instrumentation (ten horns, for instance).

The next major development in orchestral instrumentation came from Russia in the late Nineteenth Century, through the music of Tchaikovsky, Rimsky-Korsakov, and—eventually—Stravinsky. The orchestra was not significantly expanded by these composers, except in certain works by Stravinsky which demanded larger brass and woodwind resources. What these composers were most significant for was their pioneering of a new consciousness of the vitality of tone color and instrumental motion, and for an emphasis on instrumental action for its own sake.

Debussy and the other "Impressionists" brought a new development to orchestration by putting the strings into the background and bringing the woodwinds into the foreground. They also gave new life and motion to the brass designs, and established the harp as an indispensable part of the total timbre. The reappearance of the "plectrum" sound supplied by the harp brought back into music an ingredient that had formerly been supplied by the harpsichord.

Today, all of the orchestral types mentioned in this short historical survey continue to influence composers to some degree, but the most recent tendencies are toward smaller, more varied,

from MILHAUD: *Symphony No. 1 for Small Orchestra*, "Le Printemps"
(Universal)

Darius Milhaud.
1917.

Allant.

Petite flûte.

Flûte.

Clarinete en Sib.

Hautbois.

Harpe.

1^{er} Violon.

2^e Violon.

Alto.

Violoncelle.

PLATE L. THE CHAMBER ORCHESTRA

and intensely clear groups. Villa-Lobos, in Brazil, set an example by using very unusual groups of instruments, with the instrumentation constantly varied to suit the meaning of the composition or the adventurous interest of the composer. A tendency among the imitators of Webern, and exemplified by Pierre Boulez, is the use of small groups which contain almost the total mixture of basic tonal ingredients.

The American "jazz" groups have also added to the history of instrumentation. Worthy of notice are certain extended brass and woodwind ranges, the several brass mutes, new percussion effects, novel small and experimental combinations of instruments, and a certain textural fantasy that results from gifted improvisation.

Appendix A

THE 21 MEASURES IN THE EXAMPLE BELOW illustrate instrumentation for a typical small laboratory ensemble of the type recommended for the 35 projects listed in this book.

These 21 measures also furnish a concentrated exercise in analysis, and show how it is possible to illustrate a large number of basic principles in one exercise.

TABLE VI

Measure	Principle
1	Punctuation and Heterophonic Unison
1-5	Contrast of Extreme Registers (high clarinet followed by low horn)
1-3	Contrast of <i>Staccato</i> and <i>Legato</i> (horizontal)
5-6	Pointillism
6-11	Overlapping
1-21	Restriction of Harmony (thin harmony throughout)
16-17	Unison for Power Monophonic Texture
19-21	Contrast of Timbre (antiphonal)
7-11	Homophonic Texture
9-11	Total Mixture (non-doubled)
14	Instrumental Activity
9-11	Polyphony
7-15	Unit Consistency (two-voice units — in strings and horns)
19-21	Motion as a Sustaining Factor
16-18	Contrast of Articulation
7-15	Strings as Background
5-6	Percussion as a Sustaining Factor
7-15	<i>Staccato</i> and <i>Legato</i> in Contrast (vertical)
1-21	Normal Alternation of Organizational Prototypes (monophonic 1-4, twofold 7-11, "onefold" 16-18, antiphonal 19-21)

Locate these several specific illustrations, and analyze them for use of the principles indicated in Table VI.

Moderato ritmico
(Piccolo)

Fl. *mf*

Oboe *mf*

B♭ Cl. *mf*

Horn in F *mf* 1°

Violin *f* pizz.

Viola *f* pizz.

Piano *f*

Perc. *f*

measures 1 2 3

Fl. *mf*

Oboe *mf* 6

B♭ Cl. *mf*

Horns in F *mf*

Violin *mf* arco *8va*

Viola *mf* arco

Piano *mf*

Perc. *mf* S. Drum or Tom-tom

4 5 6

Musical score for measures 7-10. The score includes parts for Flute (Fl.), Oboe, B♭ Clarinet (B♭ Cl.), Horns in F, Violin, Viola, Piano, and Percussion (Perc.).

- Fl.:** Measures 7-10 feature a melodic line with a slur over measures 8-10. Measure 7 has a whole rest.
- Oboe:** Measures 7-10 feature a melodic line with a slur over measures 8-10. Measure 7 has a whole rest.
- B♭ Cl.:** Measures 7-10 feature a melodic line with a slur over measures 8-10. Measure 7 has a whole rest.
- Horns in F:** Measure 7 has a triplet of eighth notes marked "(muted)". Measures 8-10 have whole rests.
- Violin:** Measures 7-10 feature a rhythmic accompaniment of eighth notes.
- Viola:** Measures 7-10 feature a rhythmic accompaniment of eighth notes.
- Piano:** Measures 7-10 feature a bass line with eighth notes.
- Perc.:** Measures 7-10 feature a rhythmic accompaniment of eighth notes.

7 8 9 10

Musical score for measures 11-14. The score includes parts for Flute (Fl.), Oboe, B♭ Clarinet (B♭ Cl.), Horns in F, Violin, Viola, Piano, and Percussion (Perc.).

- Fl.:** Measures 11-14 feature a melodic line with a slur over measures 13-14. Measure 11 has a whole rest. Measure 12 has a dynamic marking *f*.
- Oboe:** Measures 11-14 feature a melodic line with a slur over measures 13-14. Measure 11 has a whole rest.
- B♭ Cl.:** Measures 11-14 feature a melodic line with a slur over measures 13-14. Measure 11 has a whole rest.
- Horns in F:** Measures 11-14 feature a rhythmic accompaniment of eighth notes. Measure 13 has a triplet of eighth notes.
- Violin:** Measures 11-14 feature a rhythmic accompaniment of eighth notes.
- Viola:** Measures 11-14 feature a rhythmic accompaniment of eighth notes.
- Piano:** Measures 11-14 feature a bass line with eighth notes.
- Perc.:** Measures 11-14 feature a rhythmic accompaniment of eighth notes.

11 12 13 14

Musical score for measures 15-18. The score includes parts for Flute (Fl.), Oboe, B♭ Clarinet (B♭Cl.), Horns in F, Violin, Viola, Piano, and Percussion (Perc.). The Percussion part is labeled "S. Dr." and features a snare drum pattern. The dynamic marking *f* is present in the Flute, Oboe, B♭ Clarinet, and Violin parts. The Horns in F part has a marking "(open)".

Musical score for measures 19-21. The score includes parts for Flute (Fl.), Oboe, B♭ Clarinet (B♭Cl.), Horns in F, Violin, Viola, Piano, and Percussion (Perc.). The dynamic marking *mf* is present in the Flute, Oboe, B♭ Clarinet, and Violin parts. The Piano part features a triplet pattern in the bass clef, marked *mp*.

Appendix B

Examples for Reference

A MOST IMPORTANT PART OF ORCHESTRATION STUDY IS the examination of scores to analyze the orchestration techniques of outstanding composers. The three charts which follow list numerous examples of the use of basic principles, systematically arranged to supply several examples of each principle. To find the page number for an example, first locate the column listing the principle in which you are interested. At the point where this column converges with the column listing the composer, you will find the specific page number.

The miniature scores chosen for this list are all standard works which should be obtainable in most music libraries. To ensure uniformity of page reference, all scores are E. F. Kalmus editions. The charts refer to examples from these scores.

TABLE VII

Bach	<i>Brandenburg Concerto No. 5 in D Major</i>
Haydn	<i>Symphony No. 101 in D Major</i> ("The Clock")
Mozart	<i>Symphony No. 40 in G minor</i>
Beethoven	<i>Symphony No. 8 in F Major</i>
von Weber	<i>Oberon Overture</i>
Berlioz	<i>Symphonie fantastique</i>
Schumann	<i>Symphony No. 1 in B\flat Major ("Spring")</i>
Brahms	<i>Symphony No. 4 in E minor</i>
Wagner	<i>Tristan und Isolde</i> (Prelude and "Isolde's Love Death")
Tchaikovsky	<i>Symphony No. 6 in B minor</i> ("Pathétique")
Rimsky-Korsakov	<i>Scheherazade</i>
Debussy	<i>Prélude à L'après-midi d'un faune</i>
Stravinsky	<i>Petrouchka</i>

TABLE VIII

	Bach	Haydn	Mozart	Beethoven	von Weber	Berlioz	Schumann	Brahms	Wagner	Tchaikovsky	Rimsky-Korsakov	Debussy	Stravinsky
One-Voice Unit	—	25	—	—	—	133	—	64	—	72	154	1	51
Two-Voice Unit	51	24	57	3	19	139	25	109	—	38	74	—	7
Three-Voice Unit	10	12	45	—	—	159	—	125	3	122	13	23	113
Multiple Unit	—	—	—	46	—	165	—	—	33	168	—	27	—
Monophonic	—	47	54	—	—	100	—	64	—	29	154	1	41
Chordal	—	41	9	45	24	94	63	91	2	195	202	31	14
Polyphonic	34	65	42	—	—	35	—	145	8	215	—	—	—
Homophonic	13	28	3	57	16	63	77	1	40	96	50	3	89
Polythematic	39	31	41	104	20	205	15	111	—	40	—	13	131
Polyrhythmic	17	—	—	—	—	47	71	156	—	54	219	17	10
Heterophonic	—	—	—	99	10	207	117	79	—	50	209	27	85
Onomatopoeic	—	24	—	55	—	178	—	—	—	180	243	7	22
Pitch Distribution	—	14	37	104	11	167	6	127	—	190	75	10	115
Harmonic Limitation	—	14	41	75	21	177	61	131	—	86	70	11	87
Vivid Timbre	—	24	29	46	2	171	6	111	1	214	30	9	90
Two Components	48	32	34	33	22	71	31	111	12	72	180	13	131
Control of Dynamics	—	—	—	—	20	70	4	129	13	32	146	28	53

TABLE IX

	Bach	Haydn	Mozart	Beethoven	von Weber	Berlioz	Schumann	Brahms	Wagner	Tchaikovsky	Rimsky-Korsakov	Debussy	Stravinsky
Antiphonal Contrast	25	47	37	49	11	156	88	155	5	159	32	23	63
Instrumental Activity (flurry of motion)	30	29	—	56	2	121	76	137	12	180	139	23	99
Doubling for Power	1	41	41	33	35	151	112	109	15	197	200	18	44
Blend for Subtlety	9	24	—	64	—	71	68	65	—	77	171	29	80
Contrasted Pitch	—	31	—	50	—	22	49	—	—	170	84	9	115
Blend of Differentiated Motion	—	39	2	99	33	41	32	—	21	58	209	18	53
Extreme Registers	—	—	—	—	—	131	—	—	—	71	83	—	115
Contrasted Articulation	17	24	11	46	—	51	71	64	—	80	187	9	88
Overlapping	53	35	5	37	19	105	84	3	1	11	—	20	155
Pointillism	—	—	29	50	—	179	84	73	—	130	—	9	43
Total Mixture	—	—	—	—	—	—	—	—	—	—	—	17	12
Chord and Line	—	15	—	46	—	25	—	25	—	213	—	14	—
Motion as a Sustaining Factor	15	31	57	1	—	101	158	165	—	178	84	3	125
Percussion as Background	—	—	—	—	—	134	—	115	—	96	118	—	83
Strings as Background	—	45	—	75	—	101	33	48	49	22	86	27	89
Punctuation	—	25	11	51	21	158	47	153	2	140	177	25	51
Balance of Idiomatic Characteristics	—	29	11	41	17	143	52	134	45	25	192	27	65
Staccato and Legato (consecutive)	47	44	11	65	36	90	47	87	—	95	—	—	55
Staccato and Legato (simultaneous)	3	29	17	37	20	117	71	64	—	79	28	26	42
Expanded Tonal Groups	—	—	—	—	—	160	—	—	50	—	—	27	136

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