Music Theory IV

version 3.0

Lon W. Chaffin, Ph.D.

Table of Contents

Contemporary Music: Change or Repetition?

by Lon W. Chaffin

When considering contemporary music, several old clichés come to mind. The first two are: "The only thing constant is change" and "History repeats itself". Which of these is really true? Well, actually, both of them are when it pertains to contemporary music.

Even though the same could apply to popular music, I'm going to deal strictly with what we consider "art music" -- those pieces that are composed for their artistic value with no intent for commercial success. To borrow another phrase, they are "art for art's sake."

Let's consider those first statements. If change is inevitable, how could history repeat itself? To answer that question, let's look back briefly on the way music developed. It has constantly changed through the ages, as every living language must. Each generation of musicians inherited a tradition, an established technique, a recognized system of doing things. They enriched it, molded it, "improved" it, put their mark on it and passed it along to the next generation. Change seemed a lot slower in coming than it does now. But, there have always been those who feel an urge, a drive, an obsession to speak the language of the day; to find a new voice; to "march to a different drummer". Those voices at the time were often labeled as heretical, blasphemous, and revolutionary.

Arnold Schoenberg, a musical innovator of the 20th century wrote, " I hold that it was an error to regard me as a revolutionary. If one only need break habit in order to be labeled revolutionary, then every artist who has something to say and who in order to say it steps outside the bounds of the established convention could be considered revolutionary."

Through every age, there have been those who relished and pursued change and those who have planted their roots even deeper into the soil of tradition. From this we can see how history marches forward and stays in place at the same time -- through the attitudes and actions of people.

The musical development of the 20th century has had both the new, avant-garde voices, and the traditionalists, but probably more so in this age than in those gone before, more have chosen to seek change, innovation, and a musical language that speaks to modern man. This, I believe, is not a trait isolated to the musical arts, but a common tendency typical of our century.

It seems that in 20th-century music, with every innovation came a reaction and a new direction. Like no other period in music history, our century has spawned a more diverse range of developments than ever before.

As a brief overview of some of the major developments, let's look at which composers have shaped our musical world. Reacting to the German Romanticism of the late 19th century, Debussy found new ways to use harmony and alternate scale forms to create his "impressions" of the world around him. Ravel did the same but found more daring ways to use dissonance.

As a reaction to the Impressionists, Erik Satie became a prophet of simplicity and began a movement away from pretentiousness and sentimentality. Stravinsky also reacted to the Post-Romantic chromaticism and reached into the past, pulled out traditional tonality and found new ways to use it with his technique of polytonality.

Arnold Schoenberg discarded all sense of tonality and developed his 12-tone system in which every pitch within an octave is of equal importance. With his music, there was no distinction between consonance and dissonance.

John Cage went so far as to do away with conventional compositional technique and allowed some parameters of the music to be left up to chance.

Stockhausen somewhat abandoned traditional instruments in favor of electronic sound production.

Philip Glass, Steve Reich and others attempted to "wipe the slate clean" and initiated a movement called minimalism in which a limited harmonic and melodic vocabulary is used to create music with slow subtle changes.

Along conventional lines, some composers worked with a more traditional harmonic vocabulary and incorporated the original American style - jazz. George Gershwin and Leonard Bernstein were two that fell in this camp. The list and the innovations continue to grow.

With contemporary music, as with so many other things in our world today, change is inevitable. We take what was once history, reinvent it and make something new, and what was once new then becomes old and the cycle continues.

Compositional, Theoretical, and Analytical Concepts

Other Types of Modulation

There are types of tonal modulation, other than the common chord method, that are found in the tonal music of the late 19th and early 20th centuries. Within these methods, other types of harmonic and non-harmonic elements are used to link one tonal center to the next. These common elements often involve enharmonic respellings.

These alternative types of modulation are commonly used to modulate to keys that are not closely related.

The **fully diminished 7th chord**, functioning like **vii°7**, can be respelled enharmonically to function in four different keys, allowing for a **vii°7** to **I** (or **i**) progression with four different resolutions.

   In each measure of the example below, the **vii°7** is just a respelling of the same four pitches.

The **German Augmented 6th chord** can be respelled enharmonically to function as a **V7** in the key of the Neapolitan. The opposite of that is also a possibility -- any **V7** can be respelled to function as a **Ger+6**.

   Example:

The **Neapolitan chord** can also be utilized as a common link between two tonal centers.

   Example:

5

F: I IV N₆ I⁶₄ V⁷ I   F: I IV N₆
                       D♭: (IV₆ V⁶₅ I

There is also the **common tone modulation** in which a single pitch becomes the link between two tonal centers. This common tone can also be used/respelled enharmonically.

Example:

G♭: I V⁶₅ I   d: V⁷ i₆ V⁶₅ i

Prelude: Tristan und Isolde

Richard Wagner

a) Introduction   b) Slowly and yearning   c) tenderly, gently

Extended Tertian Harmony

Around the turn of the 20th century composers began extending tertian harmony beyond the basic triads and 7th chords. A 9th chord is created by adding an additional third on the top of a 7th chord. An 11th chord adds a third on top of the 9th. The 13th chord adds one more third. An additional third (15th) would simply be two octaves above the root.

If the 9th is an octave plus a major second above the root, it is considered major. If it is an octave and a minor second above the root, it is considered minor. With 11ths and 13ths, the "major / minor" designations typically do not apply. The 11ths and 13ths, if they are not part of an underlying tonal center, are generally labeled simply as

or ♭. (See the examples below.)

The 9th chord is often seen as a dominant function (V_9) with the 9th being resolved similar to the 7th, down by step. When 11ths and 13ths are added, traditional resolutions and voice-leadings are no longer an issue.

These chords of extended tertian harmony can be found in the music of Debussy and Ravel, and have become part of the standard vocabulary of jazz.

Examples of 9th chords:

Often with extended chords, like the 11th and 13th, lower voices are omitted.

Examples of 11th and 13th chords:

Note: When a 13th chord omits no pitches, as in the example above, all the pitches from the related scale are included. In the **E13** above, all the pitches from the related **A major** scale are included in the chord.

Pelléas et Mélisande, Act I, scene 1
m. 178

Prelude to a Kiss

How my love song gen - tly cries___ for the ten - der - ness with -

in your eyes___ My love is a pre - lude that nev - er dies___

A PRE - LUDE TO___ A KISS.

Polytonality

Polytonality is the simultaneous combination of different melodic or harmonic patterns, each being characteristic of a different key. Polytonal passages were used on rare occasions in earlier centuries, either as curiosities or for humorous effect. They occur more frequently in 20th-century music, and are often a means to powerful expression. In most instances, bitonality is involved. Bitonality is the use of only two different keys at the same time. Some writers prefer to reserve the term polytonality for those few instances in which more than two keys are combined simultaneously.

A well known example is the fanfare at the beginning of Igor Stravinsky's ballet, *Petrushka*. The first clarinet plays a melody in C major, while the second clarinet plays a similar melody in F sharp major:

Although this example consists of just two melodic lines, some examples of bitonality contrast fully harmonized sections of music in different keys. Examples of this rather more dissonant kind of bitonality can be found in the work of Charles Ives, whose use of the technique in later additions (1909-1910) to his *Variations on America* (1891) is one of the first in classical music. Earlier examples, such as Wolfgang Amadeus Mozart's *Ein musikalischer Spass*, tend to use the technique for comic effect.

Debussy's works often employ nascent polytonality. Bitonality was used quite often by members of the French group, Les Six, and especially by Darius Milhaud, who perhaps used it more than any other composer. Many composers today who are interested in using tonality are also interested in bitonality, such as Philip Glass in his *Symphony No. 2*.

Although the word bitonality is most often used when talking about relatively modern classical music (written in the last one hundred years or so), it is quite a common technique in folk music, especially in eastern Europe.

Forty-Four Violin Duets, no. 33

Saudades do Brazil, no. 7: Corcovado
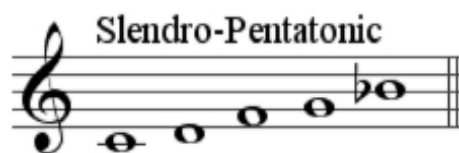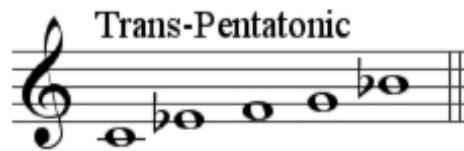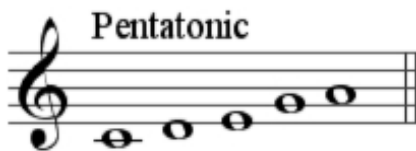### m. 19

Alternative Scale Structures

Alternative scale structures have been a significant resource for contemporary composers. Using scale forms ranging from the pre-tonal church modes to exotic folk scales and even synthetic (contrived) scales, composers have devised a multitude of linear, as well as vertical, sonorities to incorporate in their music.

Below are examples of some alternative scale structures.

Church Modes (see page 35 under Theory III)
    Dorian
    Phrygian
    Lydian
    Mixolydian

Pentatonic

Octatonic

    Click here to see a piece of music written exclusively with this scale.

Whole-tone

Whole Tone

Folk / Nationalistic

Hungarian-Bartok

Bulgarian-Bartok

Asian-Bartok

Synthetic

Synthetic Minor

Blues
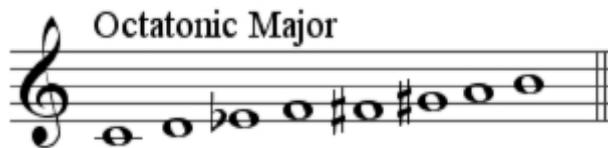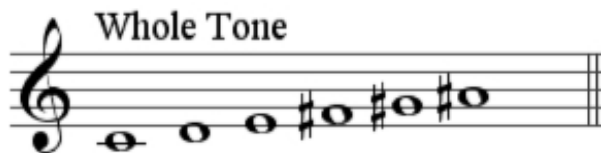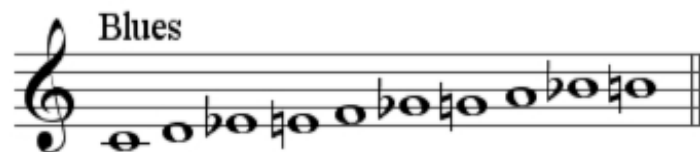
III.
Event Horizon

by Lon W. Chaffin

LA CATHÉDRALE ENGLOUTIE

from *Preludes*, Book I (1910)

Claude Debussy (1862–1918)

c) without nuances   d) Little by little emerging from the mist   e) marked, *marcato*
f) Increase progressively [in dynamics] (Without hurrying)

g) Sonorously without hardness   h) A little less slowly (With ever growing expression)   i) expressive and concentrated ("focused")

j) *au Mouvement,* "a tempo"   k) Floating and heavy   l) Like an echo of the phrase heard earlier

m) In the sonority of the beginning

19

Mikrokosmos, no. 136

Non-tertian harmony

Looking for new harmonic vocabulary, composers in the 20th century explored harmonies based on intervals other than thirds. This non-tertian harmony includes quartal (based on 4ths), quintal (fifths), and secondal (2nds).

Some composers went so far as to construct vertical sonorities in extremely dense clusters or sound masses.

Below are some examples of these types of constuctions.

Quartal Harmony

Quintal Harmony

Secondal Harmony

If the selection below is analyzed, it becomes apparent that its secondal harmony, as is often the case, is simply quartal / quintal harmony with inverted voicing. The example below contains exactly the same chords as in the example immediately above, with one voice displaced by an octave.

Click here to see an extended example containing this concept.

Cluster Harmony / Sound Mass

The effect of a cluster or sound mass is the minimization of individual pitches in favor of a dense timbre.

Cluster Harmony / Sound Mass

The effect of a cluster or sound mass is the minimization of individual pitches in favor of a dense timbre.

Fourths

Bela Bartok

Wozzeck, Act II

Sonata No. 9, Op. 68

Alexander Scriabin

Melody in the Mist

Tranquillo, ♩. = 46

Bela Bartok

[1 min. 10 sec.] 26

General William Booth Enters Into Heaven (©1935 Merion Music)
Charles Ives

Walk - ing lep - ers fol - lowed rank on rank, Lurch-ing brav - oes from the ditch - es dank

Drabs from the al - ley - ways and drug fiends

pale__ Minds still pas-sion rid - den, soul powers frail:__ Ver - min - eat - en saints with__ moul - dy

breath, Un - washed__ legions with the ways of _____ Death (Are__ you__ washed__ in the blood of the

Lamb? Are you washed in the blood of the Lamb?)_____

12-tone Technique

One of the most innovative developments in twentieth century music has been the technique for systematically ordering musical events, generally referred to as serialism. The first significant voice for this new approach to composition was the German composer Arnold Schönberg.

As this concept relates to pitch, Schönberg's principle orders all twelve pitches within an octave in such a way that no single pitch has dominance over another. This is contrary to tonal music in which there exists a hierarchy of pitch significance. Schönberg's 12-tone system was generally referred to as the atonal method of composition because of its lack of tonal center.

The ordering of pitches had very specific and strict procedures. They are as follows:

1. The row, or series, must contain all twelve pitch-classes of the chromatic scale in a specific and predetermined order with no repetitions of any one pitch-class.

2. The permissible row forms include a row's original (prime) form, inversion, retrograde, and retrograde-inversion as well as the twelve transpositions of each. The total number of row forms (permutations) is forty-eight and can be represented concisely in a chart called a matrix.

3. Strict atonal treatment of the row requires that:
    - no notes be doubled at the octave,
    - tonal melodic or harmonic elements (intervals) are to be avoided, and
    - no note should be sustained to the point where it becomes a focal pitch.

4. In order to maintain uniformity of musical material one must make exclusive use of one row per composition.

The matrix is a concise representation of all 48 possible row permutations in a 12x12 grid. The four possible row forms are given by the four directions in which one can read the row notes off of the matrix for a given row. (See the example below.)

Fugue for Three

matrix based upon the set 5 0 10 8 6 1 11 9 4 2 7 3

O = Original
R = Retrograde
I = Inversion
RI = Retrograde Inversion

O ==>   <== R

I (down) ... RI (bottom up)

5 / F	0 / C	t / A#	8 / G#	6 / F#	1 / C#	e / B	9 / A	4 / E	2 / D	7 / G	3 / D#
t / A#	5 / F	3 / D#	1 / C#	e / B	6 / F#	4 / E	2 / D	9 / A	7 / G	0 / C	8 / G#
0 / C	7 / G	5 / F	3 / D#	1 / C#	8 / G#	6 / F#	4 / E	e / B	9 / A	2 / D	t / A#
2 / D	9 / A	7 / G	5 / F	3 / D#	t / A#	8 / G#	6 / F#	1 / C#	e / B	4 / E	0 / C
4 / E	e / B	9 / A	7 / G	5 / F	0 / C	t / A#	8 / G#	3 / D#	1 / C#	6 / F#	2 / D
9 / A	4 / E	2 / D	0 / C	t / A#	5 / F	3 / D#	1 / C#	8 / G#	6 / F#	e / B	7 / G
e / B	6 / F#	4 / E	2 / D	0 / C	7 / G	5 / F	3 / D#	t / A#	8 / G#	1 / C#	9 / A
1 / C#	8 / G#	6 / F#	4 / E	2 / D	9 / A	7 / G	5 / F	0 / C	t / A#	3 / D#	e / B
6 / F#	1 / C#	e / B	9 / A	7 / G	2 / D	0 / C	t / A#	5 / F	3 / D#	8 / G#	4 / E
8 / G#	3 / D#	1 / C#	e / B	9 / A	4 / E	2 / D	0 / C	7 / G	5 / F	t / A#	6 / F#
3 / D#	t / A#	8 / G#	6 / F#	4 / E	e / B	9 / A	7 / G	2 / D	0 / C	5 / F	1 / C#
7 / G	2 / D	0 / C	t / A#	8 / G#	3 / D#	1 / C#	e / B	6 / F#	4 / E	9 / A	5 / F

TTOs

Twelve-tone operators represent those operations most frequently used to transform tone rows. They include:

Click here to download a blank **matrix form**.

Transposition (Tn)

Moves all the pitch classes in an ordered set or tone row up by the same number of semi-tones. We say a set is transposed upward by "n" semitones using the the designation Tn.

Inversion (I)

Vertically mirrors the original intervals in an ordered set or tone row. For example, E, a major third up from C, inverts to Ab, a major third below C.

Retrograde (R)

The reverse order of an ordered set or tone row

Retrograde Inversion (RI)

The reverse order of the inversion of an ordered set or tone row

Your Name

31
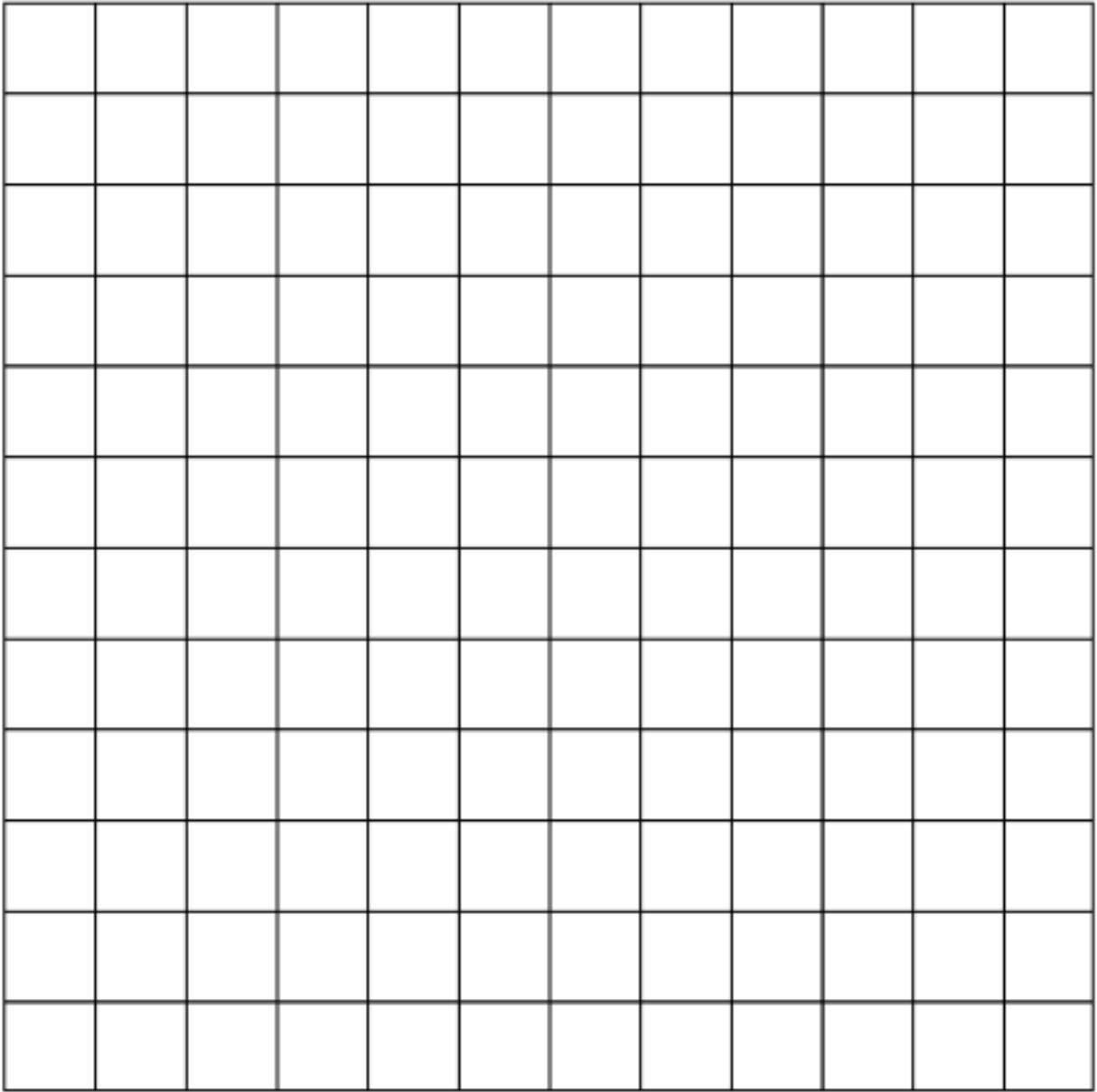
Fugue for Three

by Lon W. Chaffin

(Score in C)

34

VARIATIONS FOR PIANO

Op. 27 (1936), second movement

Anton Webern (1883–1945)

Sehr schnell ♩ = ca 160

Well-Known Twelve-Tone Rows

Berg, Lyric Suite

Dallapiccola, Quaderno Musicale

Nono, Il Canto Sospeso
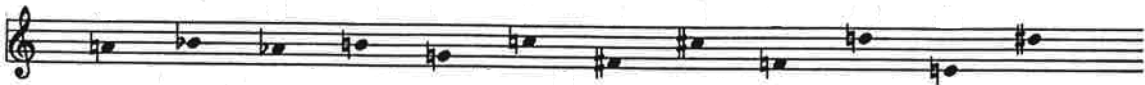
Schoenberg, Suite, Op. 25

Schoenberg, Op. 31

Webern, Symphonie, Op. 21
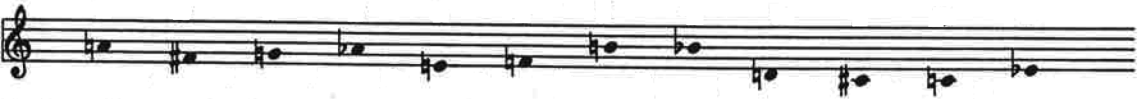
Webern, Concerto, Op. 24

Webern, Variations, Op. 27

Webern, Variations, Op. 30

Webern, Cantata, Op. 29

Stravinsky, Canticum Sacrum

Set Theory

What is Musical Set Theory?

After Brahms, tonality in Western music began to break down. Whereas before composers had relied upon a specific key area to organize the notes they wrote (e.g. a concerto in C-Sharp Minor). The idea of having such a tonal "home-base" had grown stale by the turn of the 20th century.

Composers needed a new system to organize their pitches. Arnold Schoenberg spearheaded the move away from tonality and began writing atonal music around 1908. By 1923, he had fully developed a "12-tone" system of pitch organization, in which the composer arranges all twelve unique pitches into an ordered row and performs various manipulations on that row to generate pitch content for a composition. This system is usually referred to as 'serialism.'

Set theory is not the same as serialism, but the two share many of the same methods and ideas. Set theory encompasses the notion of defining sets of pitches and organizing music around those sets and their various manipulations. Set class analysis refers to the efforts of music theorists to reveal the systems that composers like Schoenberg and his followers used to organize the pitch content of their works. Keep in mind that sets and set classes determined pitch content only; the composers remained free to fashion all other aspects of the music according to their artistic desires (at least until super-serialism, a philosophy of subjecting every aspect of the music to serial techniques, came into fashion in the 1950s).

In their day, Mozart, Haydn, and Beethoven were collectively referred to as "The Viennese School" of composers. Schoenberg's ideas about music were so unorthodox and so radically changed the face of music history, that together with two of his students from Vienna, Alban Berg and Anton Webern, they are called "The Second Viennese School."

What is a Pitch Class Set?

A Pitch Class Set is simply an unordered collection of pitches. The 12 unique pitches on the keyboard, or pitch classes, are numbered from 0 to 11, starting with 'C'. For example, the pitch class set consisting of the notes C, E, and G would be written as (047). It is a common practice to use the letters T and E for the numbers 10 and 11 to avoid confusion when noting sets. It also eliminates the need to use commas between the numbers.

C	C#	D	D#	E	F	F#	G	G#	A	A#	B
0	1	2	3	4	5	6	7	8	9	T	E

Set class (016) was so popular with Schoenberg and his disciples that it has been nicknamed "The Viennese Trichord."

What does it mean to invert a set?

A melody is inverted by swapping the direction of its intervals. If the original goes up a minor third, the inversion goes down a minor third. In set theory, any note can be inverted by subtracting its value from 12. (The inversion of 1 is 11, the inversion of 2 is 10, etc. 0 and 6 invert onto themselves.)

If you map a set onto a clockface, the inversion of that set is its mirror image on the clock. The axis of inversion lies on the line between the 0 and the 6 on the clockface, so when you invert a set it looks like it was flipped horizontally.

What is Normal Form?

Pitch sets can be put into Normal Form, which is an ordering of the pitches in the set which is deemed the most "compact." Compact ordering means that the largest of the intervals between any two consecutive pitches is between the first and last pitch listed. If you look at a pitch set graphed on a clock face, the normal form will be the clockwise spelling of the set that traverses the smallest distance on the circumference of the circle.

The set (2,9,10), for example, is not in normal form because the interval between 2 and 9 (7) is larger than the intervals between 9 and 10 (1) or between 10 and 2 (4). To put the set (2,9,10) into normal form, you would spell it (9,10,2). That way the largest interval is "on the outside."

If there is no single interval that is larger than all the others, then the normal form is the representation of the set that is "packed most tightly to the left," that is, the representation where smaller intervals are closer to the beginning of the set and larger intervals are nearer to the end.

For example, (0,2,3,7) is packed more tightly to the left than (0,4,5,7) because the largest interval on the inside of (0,2,3,7) is between the 3 and the 7 (or "to the right"), whereas the largest interval on the inside of (0,4,5,7) is between the 0 and the 4, closer to the left. Both of these sets are in normal form, but the first is "packed more tightly to the left."

What is Prime Form?

If you obtain the normal form of a set and the normal form of its inversion, then its prime form would be the more tightly packed of the two normal forms, transposed to begin on zero.

For example, consider the set (7,8,2,5), which we'll call set A. Here is how we would calculate its prime form:

1. The normal form of A is (2,5,7,8).

2. The inversion of A is (5,4,10,7).

3. The normal form of A inverted is (4,5,7,10).

4. Since (4,5,7,10) is packed more tightly to the left than (2,5,7,8), we transpose (4,5,7,10) to begin on zero and get (0,1,3,6) as the prime form.

Why is this useful?

Prime form is an abstraction of set classes that gives a unique "picture" of that particular collection of notes. If two sets have the same prime form, we can be assured that they will sound similar to one another. Sets with the same prime form contain the same number of pitches and the same collection of intervals between its pitches, hence they are in some sense aurally "equivalent," in much the same way that all major chords are aurally equivalent in tonal music.

Prime form representations are also referred to as "Set classes." Sets whose prime forms are identical are said to belong to the same set class. For example, the pitch class sets (127), (823), and (0E6) all belong to set class (016).

What is a Forte Number?

Allen Forte, perhaps the most important music theorist of our time, catalogued every possible prime form for sets with 3-9 members and ordered them according to their interval content. He gave each of these prime forms a name, like "5-35." The first number is an index of how many pitches are in the set, the second number was assigned by Dr. Forte.

The complement of a set consists of all notes not in the set. Complement sets share the same catalog number in Forte's classification system (e.g., the complement of 5-35 is 7-35).

Here is a brief list of just a few popular forte numbers:

	Prime Form	Forte Number
Viennese trichord	(0,1,6)	3-5
Major and minor triads	(0,3,7)	3-11
Major and minor scales	(0,1,3,5,6,8,10)	7-35
The octatonic scale	(0,1,3,4,6,7,9,10)	8-28

Allen Forte is on the music faculty at Yale University. He introduced this system of numbering the prime forms in his 1977 book titled *The Structure of Atonal Music*.

Chromatic Pitch Set (CPS) "Clock"

Traffic

Lon W. Chaffin

Prelude

Lon W. Chaffin

44

Paul Hindemith's Music Theory

and

<u>Ludus Tonalis</u>

Music theory and Composition technique

In his *Unterweisung im Tonsatz. I: Theoretischer Teil* Hindemith goes back as far as possible to what he terms *the natural state of tones*. From the overtone series intrinsic to every sounding note he derives the relations of the twelve notes of the chromatic scale, which has at the same time subsumed all the other scales: the major and minor scales or the church modes. He represents these relations by a sequence of notes which he calls *Row 1*[13]. With c^1 as a starting point (the fifth produces the closest affinity between notes, the tritone the most remote affinity), *Row 1* is as follows:
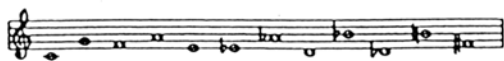
By incorporating the compound tones which always occur when two notes sound simultaneously Hindemith derives *Row 2*[14]. This systematically orders the intervals in terms of their distinct value and tension. Hindemith makes use of *Row 2* to formulate a *Phenomenology of all musical sounds*, which arranges all conceivable forms of chord in six categories[15]. *Row 2* is as follows:
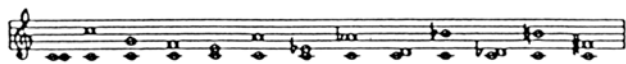
Hindemith terms the different values and tensions resulting from the sequence of different *sounds harmonic gradation*[16] ('*harmonisches Gefälle*'), while he calls the sequence of ground-notes which make up a larger harmonic context *step progression*[17] ('*Stufengang*').

Several of Hindemith's compositional principles strictly speaking go beyond the scope of the above theoretical exposition as formulated in the *Unterweisung im Tonsatz*. His term *generic two-part writing*[18] denotes a composition technique in which the bass part combines with the next most important part to form *immaculate two-part writing intelligible without any addition*. The term *sequence of seconds*[19] designates a principle involved in the structure of a melody whereby the primary notes of a melody should relate to one another in second steps. Finally, Hindemith sees three-part writing as marking the limits of the direct perception of independent part writing[20], while at the same time he regards three-part writing as a prerequisite for the unequivocal representation of harmonic relations.

Fundamental theoretical assumptions such as this left their mark on the *Ludus tonalis*, not merely indirectly but also directly: even in its external form the *Ludus tonalis* is closely bound up with Hindemith's basic theoretical principles.

1. Hindemith ignores the polarity of key relationships etc., recognizing only the relationship between a given note and the ground-note: he thus composes just one fugue for each of the twelve steps of the chromatic scale, designating each fugue by reference to the ground-note: *in C, in G* etc.
2. Hindemith arranges the twelve fugues in a sequence determined by the relationships between the ground-notes, in other words on the basis of *Row 1* (see above).
3. All the fugues are three-part fugues.

Having thus established the layout of the *Ludus tonalis* on the lines of his fundamental theoretical assumptions, Hindemith inserts the *Interludes* as planned. With a few exceptions, they modulate from one key to the next, progressing from a given ground-note to that which follows it in *Row 1*. Technically speaking they are absolutely free and untrammelled.

Within this overall context of theoretical premises directly determining the external form of the *Ludus tonalis* Hindemith then sets out to investigate a number of complex problems relating to composition technique. He evolves technical paradigms of polyphonic thinking as articulated by a certain choice of theme.

Each of the *Interludes* is conceived as a character piece, although Hindemith gave only three *Interludes* titles designating them as such: *Pastorale* (*Interludium* 2), *Marsch* (*Interludium* 6) and *Walzer* (*Interludium* 11). The pianist Franzpeter Goebels[21] lists the following designations: 1 — *Improvisation*; 2 — '*Pastorale*'; 3 — *Moment musical*; 4 — *Etude*; 5 — *Intermezzo*; 6 — '*Marsch*'; 7 — *Funeral march*; 8 — *Capriccio*; 9 — *Elegy*; 10 — *Ostinato*; 11 — '*Valse*'. Other designations are, of course, perfectly conceivable. The pianist Emma Lübbecke-Job, for instance, who was closely acquainted with Hindemith from his earliest years as a composer, noted in her copies of the *Ludus tonalis*[22] the following descriptions or expression marks: 1 — *taut, rounded, energetic, concise*; 2 — *delicate poetry, beautiful, not flabby, flowing*; 3 — *light jazz rhythm, all very concise, not stopping on the way, no lingering or delaying anywhere*; 4 — *toccata-like*; 5 — *very flowing, regular and precisely co-ordinated playing*; 6 — *very cheerful*; 7 — *absolutely regular*; 8 — *like a pistol shot*; 9/10 — no description; 11 — *rhythmic, temperaments, gently forwards, not elegaic*.

While the *Interludes* evince the greatest possible diversity in technique, form and expression, in the *Praeludium — Postludium* and the fugues Hindemith combines the most stringent discipline in his composition technique with a formal diversity[23] reminiscent less of the *Well-Tempered Clavier* than of the *Art of Fugue*. We should remember, though, that Bach did not write the *Art of Fugue* with a specific instrument in mind and did not therefore address those problems of translating notes into sound which Hindemith emphatically deals with.

The toccata-like *Praeludium* breaks down into three components: a prefatory section (Prelude) whose 'preludizing' as it were explores the compass of the instrument (bars 1-14); a two-part *Arioso* (bars 14-25/25-32); and an Ostinato (bars 39-47) preceded by a transitional passage (bars 33-39) which introduces the two elements to be dealt with in the Ostinato itself. The Prelude and the *Arioso* are largely in C major, while the transition to the Ostinato leads quite

abruptly to F sharp which is then established in the Ostinato. Thus, the *Praeludium* delineates the tonal dimensions of the work as a whole.

Hindemith derives the *Postludium* from the *Praeludium* by means of a special type of cancrizans inversion: the score of the *Praeludium* is rotated by 180°. In tonal music which generally takes into account the different values of the intervals this variant of the cancrizans inversion is particularly difficult to execute, because of the displacement of the intervals in relation to each other and because enharmonic modulation is not possible (which explains why pieces of comparable dimensions and significance employing this inversion technique are very rare). By rotating th page the major second c^2-d^2 becomes the leading note step B-c; the tritone f sharp^1-c^2 is transformed into the augmented fifth c-g sharp etc. In his quest for solutions to these extremely complex technical problems Hindemith arrived at two fundamental insights without which the piece could not have been written: a) c as a sound value remains c even when the page is rotated; and b) there are five scales which encompass all the original sound values after they have been turned upside down, so that the available notes are the same either way up[24]:

Hindemith proceeds principally from the scales of A flat, A and C. Bars 15-18 of the *Arioso*, for example, relate to A flat, bars 18-19 to C, bars 19-23 to C, bars 25-31 to A flat and bars 31-32 to C.

With the exception of *Fuga septima* in A flat und *Fuga octava* in D, the fugues vary widely in the way they are realised (cf. the relevant passages in the 'Detailed Notes' on the interpretation of the work.

However distinctly Hindemith may have lent the individual components of *Ludus tonalis* their own identity in terms of both the composition technique and the character of the pieces, he also employed a number of musical techniques to invest the work as a whole with a cyclical continuity. The composer's intentions can therefore be conveyed fully only by a performance of the entire *Ludus tonalis* (because the majority of the *Interludes* modulate, they are anyway unsuitable for performance on their own). Not that, given

thoughtful preparation, a partial performance of the work is completely out of the question. The *Praeludium* — *Postludium* provide a framework whose two parts relate absolutely coherently to each other and which delineate the tonal poles of the work (C-F sharp), G sharp-C). *Row 1* quoted in the *Unterweisung im Tonsatz* lays down the tonal progression which is apparent principally in the *Interludes*, while the three-part writing of all the fugues lends the composition regularity and homogeneity. Moreover, some of the fugues and *Interludes* are closely linked in terms of the sound qualities of the harmonic structure and — less frequently — the-

matically. The *Fuga sexta* in E flat, for instance, ends on D sharp (= E flat); *Interludium* 6-7 begins and ends in E flat — in other words, it does not modulate. *Fuga septima* in A flat immediately takes up the principal theme of *Interludium* 6-7 and is thus thematically rather than harmonically linked to the preceding *Interludium*. *Fuga septima*, in its turn, surprisingly does not close in A flat but in C. The expected A flat does nor occur until the beginning of *Interludium* 7-8. In this way Hindemith creates coherent musical correlations between the individual pieces by setting up a network of direct and indirect relationships which avoids any suggestion of schematic rigidity.

LUDUS TONALIS

Paul Hindemith

Praeludium

October 1942

from Ludus tonalis

Hindemith

Essays, Articles, and Lists

20th-Century Movements

Impressionism

Impressionism was a term at first used mockingly to describe the work of the French painter Monet and his circle, who later made use of the word themselves. It was similarly used to describe an element of vagueness and imprecision coupled with a perceived excess of attention to color in the early music of Debussy, who did not accept the criticism or the label, although his harmonic innovations and approach to composition have points in common with the ideals of Monet.

It was a style whose artistic language included suggestive colors, lines, words, melodies, and harmonies. The listener, viewer, and reader were called upon to supply the details and complete the images. Led by Debussy, composers denied both the objectivity of programmatic composers and the pathos of the Romantic idealists. Impressionistic music was a music of coloristic effects, of vague harmonies, and loosely knit forms.

Composers / Examples

- **Debussy**
  - Prelude to the Afternoon of a Faun (1894)
  - Pelleas et Melisande (1902)
  - La Mer
  - Estampes (1903)
  - Images (1905)
- **Ravel**
  - Miroirs (1905)
  - Gaspard de la nuit (1908)
  - Jeux d'eau (1911)
- **Delius**
  - Sea Drift (1904)
  - On Hearing the First Cuckoo in Spring (1912)
- **Respighi**
  - The Fountains of Rome (1917)
  - The Pines of Rome (1924)
  - Roman Festivals (1929)

Primitivism

Primitivism was a reaction from the over-refinement of such artists as Debussy and Ravel. Its adherents favored simple, clear-cut tunes of folk character that revolved around a central note and moved within a narrow compass; massive harmonies based on block-like chords moving in parallel formation with harshly percussive effect; ostinato rhythms repeated with an almost obsessive effect and a rugged orchestration featuring massed sonorities which contrasted sharply with the coloristic subtleties of the Impressionists.

20th-century composers found inspiration not only in African music but also in the songs and dances of the borderlands of Western culture -- southeastern Europe, Asiatic Russia, and the Near East. Out of the unspoiled, vigorous folk music of these regions came rhythms of an elemental power that tapped fresh sources of feeling and imagination.

Composers / Examples

- **Bartok**
  - Allegro barbaro (1911)
- **Stravinsky**
  - The Rite of Spring (1913)

Expressionism

Term taken over from the visual arts and used, more or less metaphorically, for music written in a deeply subjective and introspective style. The composition of such music is roughly lined in inspiration with the German school of expressionist painters. These painters sought to go beyond the purely visual appearance and to depict the artist's subjective interpretation of reality, using distortion, exaggeration, symbolism, etc.

Composers / Examples

- **Schoenberg**
  - Verklärte Nacht
  - Pierrot Lunaire (1912)
  - Erwartung
- **Berg**
  - Wozzeck (1922)
  - Lulu
- **Webern** (to some extent)

Neoclassicism

Neoclassical style in music indicates a 20th century eclectic return by some composers to various styles and forms of earlier periods, whether classical or baroque. One of the main achievements of Neoclassicism was the revival of the absolute forms -- symphony, concerto, sonata, and various types of chamber music. Equally significant was the return to the forms of the pre-romantic eras such as suite, divertimento, toccata, concerto grosso, fugue, passacaglia, and chaconne.

(See the article **Neoclassicism**)

Composers / Examples

- **Stravinsky**
  - Pulcinella (1920)
  - Octet (1923)
  - Symphony of Psalms (1930)
  - Symphony in C
  - Concerto for Piano and Wind Orchestra
- **Hindemith**
  - Ludus Tonalis (1942)
- **Schoenberg**
  - Suite for Piano Op. 25 (1923)
- **Satie**
  - Socrate
- **Prokofiev**
  - Classical Symphony

Serialism

Serialism is the important 20th century compositional technique that uses, as a basis

of unity, a series of pitches (the original concept was to use all twelve semitones in the octave) in a certain order, which may then be taken in retrograde form, in inversion and in retrograde inversion, and also in transposition. The technique, an extension of late romantic chromaticism, was formulated by Arnold Schoenberg in the 1920s followed by his pupils Alban Berg and Anton Webern, and thereafter by many other composers. Problems arise for the listener in the difficulty of hearing the series, however visually apparent from the written score.

Serialism may also extend to the other elements of musical construction, such as vertical sonorities (harmony), rhythm, dynamics, timber, etc.

Composers / Examples

- **Schoenberg**
  - Suite for Piano Op. 25 (1923)
- **Berg**
  - Lyric Suite (1926)
- **Webern**
  - Three Traditional Rhymes Op. 17
- **Boulez**
  - Structures I for Two Pianos
- **Stockhausen**
  - Piano Pieces I-IV
- **Stravinsky**
  - Canticum Sacrum (1955)
  - Threni (1958)
  - Movements (1960)
- **Luigi Nono**
  - Il Canto Sospero (1956)
- **Messiaen**
  - Mode of Values and Intensities
- **Babbitt**
  - Three Compositions for Piano (1947)
  - 2nd and 3rd String Quartets
  - Canonical Form (1983)

Indeterminacy / Aleatory (Chance) Music

Music of the mid-20th century in which the composer assigns a major creative role to the performer. In such music, the composer may provide a set of detailed materials or a vague outline of the entire piece, leaving the order of execution or the filling in of details to the performer. If the performer is to work out the actual pitches and rhythm, the composer will normally abandon traditional musical notation and work out one that will convey his particular ideas. The shape of a musical gesture (phrase) may be suggested by a line, for example, or intensity or duration by the size of the figure. Different performances of the same work may vary greatly, and the receptivity and imagination of the performer becomes of far greater importance than in traditional music.

Since neither composer nor performer is necessarily bound by the limitations of metrical rhythm, great rhythmic freedom may be achieved in chance music. In addition to traditional vocal and instrumental sound, tonal resources comprise also vocal and instrumental sounds produced in abnormal fashion and sounds from extramusical sources (e.g., striking or dragging of chairs or stands). Intensive interest in chance music began in the 1950's with works of such diverse composers as Stockhausen and Cage.

Composers / Examples

- **Milhaud**
    - Cocktail (1921)
- **Stockhausen**
- **Cage**
    - Music of Changes (1951)
    - Music for Piano (1956)
    - 4' 33"
    - Concert for Piano and Orchestra

Minimalism

The Minimalist concept began in the 1960's with a group of young composers who began exploring the possibilities of working with extremely reduced resources from which to draw. They limited themselves to very basic, "minimal" musical elements. Although they were influenced by John Cage, these composers moved off in a completely different direction, rejecting indeterminacy and attempting to bring music back to a more elemental basis.

(See article **Minimalism**)

Composers / Examples

- **LaMonte Young**
    - String Trio (1958)
    - Composition 1960 No. 7
    - Death Chant (1961)
    - I Can't Stop (1963)
- **Terry Riley**
    - In C (1963)
- **Steve Reich**
    - Piano Phase (1967)
    - Music for 18 Musicians (1976)
    - Vermont Counterpoint (1982)
    - Nagoya Marimbas (1994)
    - City Life (1995)
    - Proverb (1996)
- **Philip Glass**
    - Music in 5ths (1969)
    - Music in Similar Motion (1969)
    - Einstein on the Beach (1975)
    - Satyagraha (1980)
    - Akhnaten (1983)
    - Monsters of Grace (1998)
- **John Adams**
    - Harmonium
    - Harmonielehre
    - Shaker Loops
    - The Chairman Dances
    - Fearful Symmetries
    - Nixon in China (1987)
    - The Death of Klinghoffer (1991)
    - I Was Looking at the Ceiling and then I Saw the Sky

Electronic Music

Music drawing on tonal resources made available through modern recording techniques and electronic generation of sound. Composers began to draw on these resources shortly before the mid-20th century, and have already evolved a variety of compositional procedures and styles.

Musique concrete

Employs primarily material gathered from sources previously considered as nonmusical -- that is, noises of all varieties. These are dissected, transposed, amplified, and otherwise manipulated electronically. The resultant sounds are recorded on tape and then assembled to form musical patterns.

- **Pierre Schaeffer**
  - Etude aux chemins de fer (Study on a Railway) (1948)
- **Messiaen**
  - Timbres-dureés
- **Varèse**
  - Poème electronique (1958)

Electronic Sound Production

European composers of electronic music made extensive use of sound produced by electronic means. Electronic generators, used in combination with filters, modulators, and similar devices may produce either nearly pure sounds or complex ones, with any number of harmonics, with any given order of emphasis. They may also produce irregular sounds or noises. Any of the resources listed above may be combined with traditional sources of musical sounds, such as voice or orchestra.

- **Karlheinz Stockhausen**
  - Kontakte
  - Gesang der Jünglinge
- **Luigi Nono**
- **Pauline Oliveras**
  - Bye Bye Butterfly

Neoclassicism

Principles

Neoclassicism had its most articulate spokesman in **Igor Stravinsky**. He moved from the Post-Impressionism of "The Firebird" through the Primitivism of "The Rite of Spring" to a more controlled classicism of his maturity. He consistently preached the formal above the emotional elements in art. "I can not compose until I have decided what problem I must solve." The problem was always aesthetic, not personal. He wrote, "I evoke neither human joy nor human sadness."

Stravinsky's doctrine represented an effort on a grand scale to purge music of pictorial, literary, and ethical meanings. His aim was to draw the listener's attention away from his own emotions and to concentrate it on the tones instead, although in the later phase of his career he departed from this doctrine to a philosophy which no longer separated life from art.

One of the main achievements of Neoclassicism was the revival of the absolute forms -- symphony, concerto, sonata, and various types of chamber music. Equally significant was the return to the forms of the pre-romantic eras such as suite, divertimento, toccata, concerto grosso, fugue, passacaglia, and chaconne.

The music of the romantics had adhered to a melodic style based on the voice, but the neoclassicists favored an instrumental melody that made use of wider intervals and a more extended range. Harmonically, they moved away from the chromaticism of the post-Wagnerian style to pandiatonicism, based on the seven tones of the diatonic scale. In contrast to the multitude of sharps and flats in the early 20th century, it favored a sparing use of accidentals and showed an affinity for the key of C major. Many pages of neoclassic music were prime examples of the term "white music" coined during this period.

The composers of the Neoclassic period focused their attention on elegance of style and purity of taste. In exalting the how over the what, they were led to the classical virtues of order, discipline, balance, and proportion.

Composers

The New Classicism attracted musicians of a certain taste and temperament -- especially those who were fascinated by formal perfection and inclined to separate art from life. It drew artists as dissimilar as **Schoenberg** and **Hindemith**, **Bartok** and **Milhaud**, **Honegger** and **Prokofiev**, **Aaron Copland** and **Roger Sessions**. Taken in its broadest sense, it can be seen to have influenced most of the prominent figures of the 1920's and 30's.

Examples

The Neoclassical aesthetic dominates **Stravinsky's** "Symphonies of Wind Instruments" (1920). The instrumental works that followed incarnate the principle of the old concerto grosso -- pitting contrasting tone masses against each other. This "return to Bach" crystallized in the "Octet," the "Piano Sonata," the "Concerto" for piano and wind orchestra, and the "Serenade in A," all of which date from the years 1923-25.

Stravinsky's classical period culminates in several major compositions. Three of these are "Oedipus Rex" (1927), an opera-oratorio, the ballet "Orpheus" (1947),

and the "Symphony in C" (1940) which pays tribute to Haydn and Mozart. His ballet "Pulcinella" (1920) is based on an 18th-century theme by Pergolesi. "Symphony of Psalms" contains a double fugue in the 2nd movement and the third movement is in a version of Sonata-Rondo form.

In respect to form **Hindemith** was a traditionalist. His models were the great contrapuntal forms of the Baroque: concerto grosso, passacaglia and chaconne, toccata and fugue; also the balanced form of the Classical sonata. His work "Ludus Tonalis" (1942) for piano,was modeled after Bach's "Well Tempered Clavier." It contains 12 fugues in 12 different key centers, along with 11 interludes, a prelude and a postlude (the postlude being the retrograde of the prelude).

Chamber music occupies a central place in Hindemith's output. The compositions entitled "Kammermusik," for various combinations of instruments, are flanked by a long list of solo sonatas, duo, trios, quartets, quintets, and concertos.

Hindemith helped revive the spirit of Classical chamber music in unpretentious works that could by played by amateurs at home as well as by professionals on stage. A fine example of this is his "Kleine Kammermusik" (Small Chamber Music), Opus 24, No. 2, for five winds, which he wrote in 1922. The five instruments are flute, oboe, clarinet, horn, and bassoon. The following is a brief overview of this work.

> The first movement is in common time (4/4) and boasts a strong energetic rhythm. The opening melody, marked by broad, undulating curves, is rich in motives that are capable of growth and development. Hindemith weaves a closely knit texture where each of the motives can work out its own destiny.

> The second movement is a kind of parody-waltz with a roguish lilt. The main idea is a wide-ranging melody introduced by clarinet and echoes a tone lower (in sequence) by the piccolo, which replaces the flute in this movement. The lower wind instruments mark the waltz rhythm very effectively without the use of percussion.

> In the third movement we encounter a structure typical of Hindemith -- a slow movement that encloses a faster, more eventful middle section. There's a hushed ostinato rhythm, repeated over and over again under a flowing melody.

> The fourth is a brief interlude which alternates cadenza-like passages in each of the instruments. The effect of this movement is a dialogue between strict and free rhythm and an exchange of color.

> The final movement utilizes syncopated passages and the subtle shifting of metrical accents.

The Second Viennese School of Composers

At the beginning of the 20th century, Vienna, the city that had seen the birth of the classical symphony, was to become the center of the transformation of classical tonality. The author of that transformation was

Arnold Schoenberg.

His music is steeped in:

- contrapuntal principles,
- complex relationships between the vertical and the horizontal,
- and in concepts of total form.

He is credited with the idea of the twelve-tone system of composition.

Schoenberg was the only one of the major composers of the early part of the century to have had pupils, and two of these, Alban Berg and Anton Webern, have played a major role in the development of modern creative ideas. These three composers were so closely associated, both musically and personally, they came to be referred to as "The Second Viennese School". Even after their formal training ceased, both students still considered Schoenberg their mentor and advisor.

(See **An Overview of Schoenberg's Music**)

Despite their common musical attitudes and links with Schoenberg, both Berg and Webern developed unique musical styles in separate directions.

- **Berg**
    - expanded Schoenberg's chromatic vision
    - into large forms,
    - dependent on tradition
    - and psychological insight.
- **Webern**
    - worked in almost the opposite direction --
    - towards the isolation of the single event,
    - the disassociation of adjacent events
    - into the context of the total interrelationship of the whole.

Although the tendency toward more concise compositions was evident in the school, Schoenberg and Berg only briefly maintained this approach while Webern seems to have had a life-long obsession with this concept.

Webern

responded to the radical portion of Schoenberg's doctrine. Building on his mentor's doctrine of perpetual variation, Webern:

- suppressed all repetitive material.
- He abandoned the spacious Classical forms in favor of extreme compression.
- He placed the utmost expressive value on each sonority
- and the most precise instructions as to how the individual tone is to be produced.
- He applied Schoenberg's principle of the nonrepetition of pitches of color. There are passages in his works where each tone in a melodic line is played by a different instrument.

Webern was the one who cut himself off most completely from the tonal past. He never accepted

even the limited coexistence of tonal and atonal elements which is to be found in the works of Schoenberg and Berg. The interval became the basic structural element in his music, ultimately taking the place of the theme. Major sevenths and ninths, major and minor thirds and their derivatives are the most important intervals in his music.

His Music

Like Berg, he developed rapidly under Schönberg's guidance, achieving a fusion of Brahms, Reger and tonal Schönberg in his orchestral **Passacaglia**, already highly characteristic in its modest dynamic level and its brevity.

His songs of 1910-25 show a reintroduction of traditional formal patterns before the arrival of serialism. His adoption of the 12-note method can be seen in the **Three Traditional Rhymes** (1925).

Webern soon recognized that the 12-note principle sanctioned a severity and virtuosity of polyphony that he could compare with that of the Renaissance masters he had studied. Unlike Schönberg, he never again sought to compose in any other way. Rather, the highly controlled, pure style of his **Symphony** appears to have represented an ideal which later works could only repeat, showing different facets. His use of the series as a source of similar motifs, especially in instrumental works, merely emphasizes the almost geometrical perfection of this music.

Unlike Webern,

Berg:

- exploited the more conservative elements of Schoenberg's doctrine.
- His art issues from the world of German Romanticism.
- He tends to incorporate tonal elements into the twelve-tone language.
- For him, the musical gesture is bound up with character and action, mood and atmosphere.
- Where Berg showed himself as a true Schoenbergian is in his mastery of contrapuntal structure and perpetual variation.

Berg's unique achievement was to humanize the abstract procedures of the Schoenberg technique and to make them more accessible to listeners.

His Music

He wrote songs as a youth but had no serious musical education before his lessons with Schoenberg, which began in 1904.

Berg's **Piano Sonata op.1** (1908) is still tonal, but the **Four Songs op.2** (1910) move away from tonality and the **op.3 String Quartet** (1910) is wholly atonal; it is also remarkable in sustaining, through motivic development, a larger span when the instrumental works of Schönberg and Webern were comparatively momentary.

Then came the **Five Songs for Soprano op.4** (1912). This was Berg's first orchestral score, and though it shows an awareness of Schoenberg, Mahler and Debussy, it is brilliantly conceived and points towards "Wozzeck" - and towards 12-note serialism, notably in its final passacaglia.

Berg produced another set of compact statements, the **Four Pieces for clarinet and piano op.5** (1913), then returned to large form with the **Three Orchestral Pieces op.6** (1915), a thematically linked sequence of prelude, dance movement and funeral march.

The Golden Mean and Fibonacci Series

Some 20th-century composers and writers have been interested in the "golden mean" or "golden section," a proportion used for centuries in art and architecture to obtain aesthetically pleasing designs. The golden mean is the division of a whole into two unequal parts such that the ratio of the smaller to the larger is the same as that of the larger to the whole.

To understand this ratio, consider a line AC with line segments AB and BC. If the proportion of AB to BC is the same as the proportion of BC to the whole line, AC, then AC is segmented according to the golden mean. This relationship can be expressed as:

$$\frac{AB}{BC} = \frac{BC}{AC}$$

Integers (whole numbers) that approximate the golden mean can be generated by means of a **Fibonacci Series**, an endless series of numbers in which each number is the sum of the previous two. The farther you go in the sequence, the closer you get to the true value of the golden mean.

Integers:	1	2	3	5	8	13	21	34	etc.
Ratios:		.5	.67	.6	.625	.615	.619	.618	

The most obvious way that this ratio can be applied musically is in the proportions of a musical form. For example, the beginning of "Minor Seconds, Major Sevenths," from Bartok's Mikrokosmos, could be subdivided in this way:

meas. 8 = Strong cadence; first whole-note chord
meas. 21 = Strong cadence; first appearance of "glissando"
meas. 34 = End of long accelerando and of the first main section
(Click here to see the printed music.)
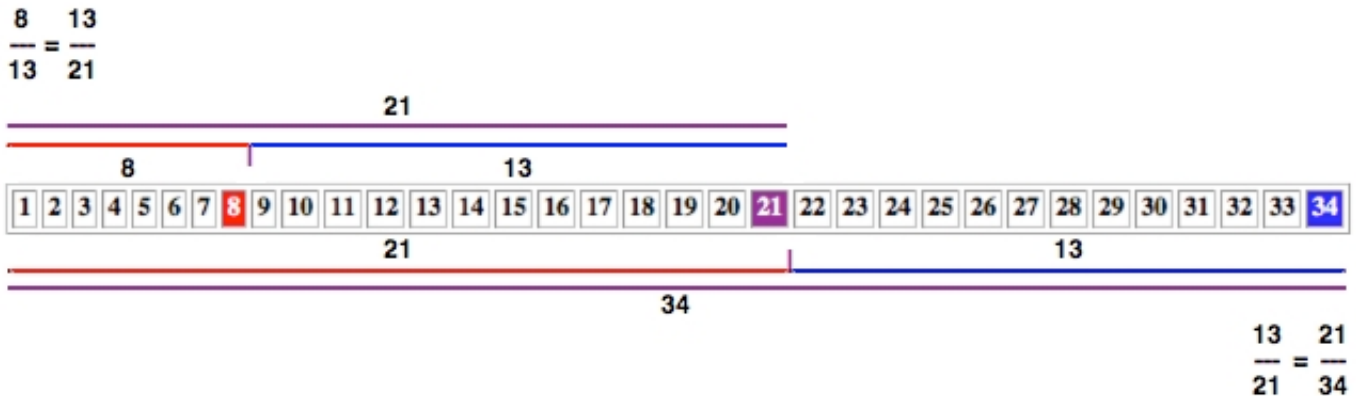
There is some evidence that Bartok (and Debussy) used the golden mean not only in formal proportions but in other aspects of his music as well, and this is also true, if to a lesser extent, of some other 20th-century composers.

Musical frequencies are based on Fibonacci ratios

Notes in the scale of western music have a foundation in the Fibonacci series, as the frequencies of musical notes have relationships based on Fibonacci numbers:

Fibonacci Ratio	Calculated Frequency	Tempered Frequency	Note in Scale	Musical Relationship	When A=432 *	Octave below	Octave above
1/1	440	440.00	A	Root	432	216	864
2/1	880	880.00	A	Octave	864	432	1728
2/3	293.33	293.66	D	Fourth	288	144	576
2/5	176	174.62	F	Aug Fifth	172.8	86.4	345.6
3/2	660	659.26	E	Fifth	648	324	1296
3/5	264	261.63	C	Minor Third	259.2	129.6	518.4
3/8	165	164.82	E	Fifth	162 (Φ)	81	324
5/2	1,100.00	1,108.72	C#	Third	1080	540	2160
5/3	733.33	740.00	F#	Sixth	720	360	1440
5/8	275	277.18	C#	Third	270	135	540
8/3	1,173.33	1,174.64	D	Fourth	1152	576	2304
8/5	704	698.46	F	Aug. Fifth	691.2	345.6	1382.4

The calculated frequency above starts with A440 and applies the Fibonacci relationships. In practice, pianos are tuned to a "tempered" frequency to provide improved tonality when playing in various keys.

* A440 is an arbitrary standard. The American Federation of Musicians accepted the A440 as standard pitch in 1917. It was then accepted by the U.S. government its standard in 1920 and it was not until 1939 that this pitch was accepted internationally. Before recent times a variety of tunings were used. It has been suggested by James Furia and others that A432 be the standard. A432 was often used by classical composers and results in a tuning of the whole number frequencies that are connected to numbers used in the construction of a variety of ancient works and sacred sites, such as the Great Pyramid of Egypt. The controversy over tuning still rages, with proponents of A432 or C256 as being more natural tunings than the current standard.

Minor Seconds, Major Sevenths

Bela Bartok

Minimalism

Concept

The Minimalist concept began in the 1960's with a group of young composers who began exploring the possibilities of working with extremely reduced resources from which to draw. They limited themselves to very basic, "minimal" musical elements. Although they were influenced by John Cage, these composers moved off in a completely different direction, rejecting indeterminacy and attempting to bring music back to a more elemental basis.

Composers, Techniques, and Examples

The initial leading figure in this movement was **LaMonte Young**. He was drawn to the music of Webern but focused on the sparseness of texture and the basic static quality of his music.

While still a student in California, Young wrote his "String Trio" in 1958. The work's opening five minutes contains only three notes, one for each of the instruments. Each instrument slowly enters, one by one, until all are playing. They sustain the three pitches for a very long time before dropping out, slowly, again, one by one. After a long silent break, a new event begins the next section.

In Young's Death Chant (1961), A diatonic melody is sung in unison by a male chorus. It begins with two notes, then adds one more note each time it is repeated, until it reaches five notes then the process is repeated.

A fellow student and friend of Young, **Terry Riley** was probably the first minimalistic composer to concentrate almost exclusively on constantly repeating melodic patterns, which he recorded and played by way of a tape loop.

Steve Reich took up Riley's idea of repetition with tape loops and expanded it to encompass multiple loops and instrumental performance. He became fascinated with the possibilities of "phase shifting" where identical loops were played simultaneously but at slightly different speeds. The result was a pattern that started together, then the two gradually moved apart, "out of phase," then ultimately rejoined in synchronization. Reich's earliest instrumental piece to incorporate this technique was "Piano Phase" (1967) for two pianos.

Reich's "Nagoya Marimbas" (1994) is similar to his work of the 60s in that there are repeating patterns played on both marimbas, one or more beats out of phase. His work "City Life" (1995) incorporates live instruments with digitally sampled and repeated "natural" sounds such as speech, jack hammers, car horns, door slams, air brakes, subway chimes, car alarms, heartbeats, and fire and police sirens. "Proverb" (1996) is a piece, based on the phrase "How small a thought it takes to fill a whole life," for three sopranos, two tenors, two electric organs and vibraphones. The sopranos sing the text in a canonic setting in which the canon actually gets longer with each repetition; the tenors sing duets in short rhythmic phrases; the organs double the voices and fill in the harmony; and the vibraphones emphasize the shifting meter.

The music of **Philip Glass** is similar to Reich's in that it incorporates steady rhythmic pulsation, constant repetition, and a limited range of pitch material. It also utilizes the concept in Young's "Death Chant" of additive melody, but expands it to a melodic-rhythmic framework.

Since the middle 1970's, Glass has focused his creative forces toward works for the stage, Einstein on the Beach (1975), Satyagraha (1980), and Akhnaten (1983). His most recent work is another stage piece with "Einstein" collaborator Robert Wilson, entitled Monsters of Grace. (See the article **The Operas of Philip Glass**)

Glass has described the kind of response required of listeners to fully appreciate his music as "one in which neither memory nor anticipation has a place in sustaining the musical experience. It is hoped that one would then be able to perceive the music as a 'presence,' freed of dramatic structure, a pure medium of sound." In this type of listening, the listener loses himself, thus the popular term, "trance music."

Although Reich and Glass have in recent years included larger and larger resources in their music, the term "minimalism" is still the label most often used.

The "new" minimalism is championed by the composer **John Adams**. His creative output spans a wide range of media: works for orchestra, opera, video, film, and dance, as well as electronic and instrumental music. Such pieces as Harmonium, Harmonielehre, Shaker Loops, and The Chairman Dances are among the best known and most frequently performed of contemporary American music. In these works he has taken minimalism into a new and fresh terrain characterized by luminous sonorities and a powerful and dramatic approach to form. Adams has, in his mature work, harnessed the rhythmic energy of Minimalism to the harmonies and orchestral colors of late-Romanticism. Concurrently he has introduced references to a wide range of 20th century idioms - both 'popular' and 'serious' - in works such as his two operas and the wittily eclectic orchestral piece "Fearful Symmetries", which touches on Stravinsky, Honegger, and big-band swing music.

Adams's two operas, Nixon in China (1987) and The Death of Klinghoffer (1991) have been among the more controversial and widely seen stage events in recent history. His newest stage work is a collaboration with Peter Sellars and librettist June Jordan; entitled "I Was Looking at the Ceiling and then I Saw the Sky", it is described by its creators as a 'song play', scored for seven singers and an onstage band of eight instrumentalists.

TEXTURALISM

from <u>New Directions in Music</u> by David Cope

PRINCIPLES

Cluster chords (often called sound-mass), in contrast to serialism, minimize the importance and order of individual notes while maximizing the importance of texture, rhythm, dynamics, and/or timbre (Dallin 1974; Marquis 1964; Persichetti 1961). Using cluster chords challenges the differentiation between sound and noise—a derogatory term applied to sounds perceived to be antithetical to music.

Mainstream composers have used cluster chords in a variety of ways (Erickson 1975; Goldstein 1974). Gustav Mahler, for example, used panchromatic chords (inclusive of all twelve tones) in the first movement of his *Tenth Symphony* (1910) and Béla Bartók employed clusters in his 1926 *Piano Sonata*. However, Igor Stravinsky used sound-mass most challengingly in his *Le Sacre du Printemps* (1912), where a repetitive string mass of sound is charged with difficult-to-predict harsh accents. The rhythm of the accents drives the *Danse des Adolescentes*, significantly reducing the importance of individual pitches. Figure 3.1 shows the Fb (enharmonically E) ninth chord of the *Danse* and the resultant increased importance of rhythm (accents).

Henry Cowell's *The Tides of Manaunaun* (1911) and Charles Ives's *Majority* (piano and voice, 1921), present some of the first uses of what some might consider traditional noise as an acceptable musical element (Boatwright 1962; Burkholder 1985; Cowell 1930; Rudhyar 1986). Cowell's *The Hero Sun* (1922) includes a right forearm cluster on the piano's black keys (see Figure 3.2; note that the sharp above indicates black keys while a natural indicates white keys). This use of clusters as both a melodic and percussive device contrasts the open consonances of the left-hand harmonies. Cowell's notations for clusters differ from piece to piece, but the basics appear with explanation in Figure 3.3, taken from the performance notes to his *What's This* (1922). These works, along with Cowell's innovative works such as *The Banshee* (discussed in chapter 4) impressed a large number of composers (Béla Bartók in particular) and culminated in his authorship of *New Musical Resources* (Cowell 1930). Figure 3.4 reveals some of the depth with which Cowell studied both the musical properties and notation of clusters (Higgins 1986; Weisgall 1959). About this example he wrote: "Clusters that do in a certain sense move are, however, quite possible, and it is interesting to consider the vari-
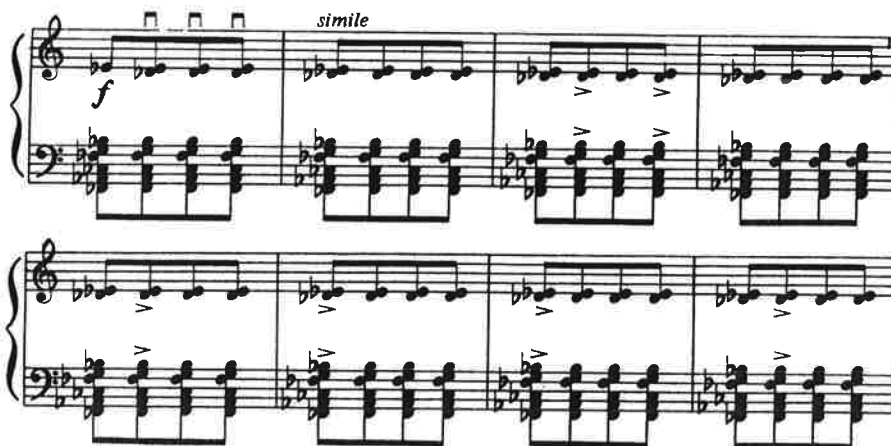
Figure 3.1. From Igor Stravinsky's *Le Sacre du Printemps* "Danse des Adolescentes." Piano reduction of the string parts.

Allegro con brio

Figure 3.2. Page 3 from Henry Cowell's *The Hero Sun*. Copyright © 1922 (renewed) by Associated Music Publishers, Inc. (BMI). International copyright secured. All rights reserved. Reprinted by permission.

The Symbol (◊, ♩, ♪, etc.) represents a silent pressing down and holding of the key in order that the open string may be subjected to sympathetic vibration.

The Symbol [music notation] should be played as [music notation]

With a Sharp [music notation]

With a Natural [music notation]

Figure 3.3. Explanation of symbols in Henry Cowell's *What's This*. Copyright © 1922 (renewed) by Associated Music Publishers, Inc. (BMI). International copyright secured. All rights reserved. Reprinted by permission.

a) [music notation]

b) [music notation]

c) [music notation]

Figure 3.4. From Henry Cowell's *New Musical Resources* (1930), p. 128. © Copyright Alfred A. Knopf, Inc. All rights reserved. By permission.

Figure 3.5. Henry Cowell. BMI Archives. Used by permission.

ous ways in which such movement can be introduced." (Cowell 1930, p. 126) Cowell notates both additive and subtractive clusters (subtractive in Figure 3.4), and thus predates similar uses by Penderecki (see Kagel 1959).

John Becker (1886–1961), a regrettably unnoticed innovator of the 1920s and 1930s, included large clusters in most of his works (Riegger 1959). Becker's *Symphonia Brevis* (*Symphony No. 3*, which first appeared in Cowell's *New Music* in January of 1930) derives large clusters from long sustained chords built of seconds using instruments of similar color. Often Becker's clusters integrate entire sections of the orchestra as single percussion-like timbres by means of articulation (short, very loud, and with heavy accents). Figure 3.6 shows the final five bars of the opening section from *Symphonia Brevis*. As the rich contrapuntal fabric unfolds, the music becomes pantonal with the F♯ rooted chord spread over five octaves.

Edgard Varèse uses brass, organ, and Ondes Martenot in his *Equatorial* (1934) to achieve clusters (Cowell 1930). In reference to this work, Robert Erickson writes: "These highly individual sound-blocks are images, ikons, in their own right. They exist as entities in the same way as a melody can be felt to be an entity." (Erickson 1969, p. 144) Many consider Varèse's music an extension of Stravinsky's primitive period (i.e., period extending to the mid-1920s when Stravinsky's so-called neoclassic period began). The massive dissonances of Varèse's *Hyperprism* (1923) and *Octandre* (1924) also have important incidences of clusters.

In *Octandre*, Varèse creates mirror-type clusters as shown in Figure 3.7a and b. In Figure 3.7a, Varèse balances the stacked chromatic pitches with a B♮, a minor third from each end of the cluster. In Figure 3.7b, Varèse separates two small groupings of chromatic half-steps by major thirds. Each of these clusters (bars 15 and 20 respectively) includes octave transpositions and inverted orchestration (e.g., flute over an octave below the clarinet) to create harsh dynamic textures.

Wallingford Riegger's *Music for Brass Choir* (1949) was one of the first large ensemble works to use extended closed clusters. This work opens with ten trombones a half-step apart encompassing the range of a diminished seventh. The final panchromatic chord—ten trumpets, eight horns, ten trombones, two tubas, and percussion—has subtle dynamic shadings with the final four bars marked *lento e pianissimo*.

Cluster Techniques

Apart from the aforementioned Becker work, clusters appear in orchestral works like *Metastasis* (1955) by Iannis Xenakis, and *Threnody for the Victims of Hiroshima* (1960) by Krzysztof Penderecki. Probably one of the best-known orchestral works of the past forty years, *Threnody* utilizes a wide variety of string techniques (fifty-two string parts), surprisingly few of which are actually new. More immediately recognizable are the solid bands of sound which widen and contract by means of glissandi. These clusters, some involving quarter tones, create bands of sound often resolved by movement to a single pitch. Many of these clusters contain such heavy overtone influence that, even though only the area of a fifth may actually be covered, one gets the aural impression that all audible sounds are occurring simultaneously. Figure 3.8 shows the final 54 seconds of *Threnody*. Even though the notation is proportional (see Appendix III), the visual cluster bands resemble those suggested by Cowell in his *New Musical Resources* thirty years earlier (refer to Figure 3.4).

Luigi Nono's three choral works *Il canto sospeso* (1956), *La terra e la campagna* (1957), and *Cori di Didone* (1958) are based almost entirely on twelve-tone aggregate choral clusters. These clusters create massive textures within which the voices move as fish through water.

Iannis Xenakis utilizes clusters that result from his use of stochastic processes (see chapter 8 for more detailed discussion). Most of Xenakis's works incorporate incredibly dense sound mass resulting from large numbers of individual instruments of like timbres (pizzicato or glissando clusters, for example). Most of Xenakis's works make elegant use of sound-mass both in terms of rhythm and pitch. Xenakis has had considerable impact in Europe and many have attributed Penderecki's and the Polish School's use of clusters to Xenakis's influence. In a 1955 article, "The Crisis of Serial Music," Xenakis remarks:

> Linear polyphony destroys itself by its very complexity; what one hears is in reality nothing but a mass of notes in various registers. The enormous complexity prevents the audience from following the intertwining of the lines and has as its macrocosmic effect an irrational and fortuitous dispersion of sounds over the whole extent of the sonic spectrum. There is consequently a contradiction between the polyphonic linear system and the heard result, which is surface or mass. (Xenakis 1955, p. 23)

Henryk Górecki's (b. 1933, Poland) *Scontri* for orchestra (1960), includes graphically notated blocks and bands of tones—large black boxes overlapping entire sections of the score. In *Sonant* (1960), Mauricio Kagel calls for speaking and whispering from the ensemble at various pitch levels ad libitum resulting

Figure 3.6. Page 3 of John Becker's *Symphonia Brevis* (Symphony No. 3). Copyright © 1972 by C. F. Peters Corporation. By permission.
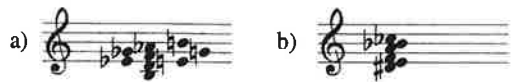
Figure 3.7. From Edgard Varèse's *Octandre* (1924).

in sound-mass. The consequence of such experimentation is not only new notations, but direct applications of partially indeterminate procedures: though clusters are inevitable, exact duplication of the numerous highly variable factors involved causes unpredictable results (Kagel 1959; Persichetti 1961).

Improvisation ajoutée (1962) by Mauricio Kagel, for a four-manual organ and two or three adjunct performers, includes block clusters of sound, performed with hands, forearms, feet, and rapid multichanges in registration with, as the composer states, ". . . improvi-

sation arising through the statistical nature of timbre transformations."

The *Trois Poèmes d'Henri Michaux*, for mixed chorus and orchestra (1963) by Witold Lutosławski, includes cluster chords resulting from extensive use of approximate pitch notation. The rhythmic clusters in the second part ("Le grand combat") involve extremely complex composite rhythms. Stockhausen's *Mixtur* (1964) uses huge cluster effects spatially, as five groups surround the audience. Motivic imitation occurs, yet each performer's independent choice of pitch and timing creates extremely complex sound masses.

Penderecki's *Passion According to St. Luke* (1965) combines simple melodies into dense twelve-tone textures. A continuous thread of contrapuntal material contributes to the cluster effects. Half-sung, half-spo-

Figure 3.8. From Krzysztof Penderecki's *Threnody for the Victims of Hiroshima* (1960). The notes for each cluster band appear in traditional form beneath them in this proportional notation. Copyright © 1961 Deshon Music, Inc. & PWM Editions. All rights reserved. The two systems here are 24″ and 30″ in duration respectively.

ken backgrounds to crowd scenes produce equally massive clusters that owe their intensity to the text setting as well as to the resulting dissonance.

Pauline Oliveros uses sound-mass in her *Sound Patterns* (1961). Voices, whispers, tongue clicks, lip pops, and improvised pitches within areas of high, middle, and low registers result in thick clusters of sound. The music often resembles the choral effects in Penderecki's *Passion*, yet utilizes timbre more than pitch to achieve the clusters.

György Ligeti's *Atmosphères* (1961) uses a full complement of winds, strings, and percussion, orchestrated to create unique clusters with combination and resultant tones (Christiansen 1973). In *Lux Aeterna* (1966) and *Requiem* (1965, for soprano, mezzosoprano, two mixed choirs, and orchestra), Ligeti calls for effects in which instruments and individual voices become timbrally unrecognizable. Ligeti's *Lontano* (1967) for orchestra often requires over fifty separate instrumental voices creating evolving sonic textures. Ligeti's music, unlike Penderecki's, is traditionally notated. While seeming to lack recognizable melodic direction, *Lontano* creates an enormous dynamic and timbral impact.

"The important tones, the ones that are most plainly heard, are those of the outer edges of a given cluster." (Cowell 1933, p. 122) Theodore Lucas, in *Aberrations No. VII* for piano (Figure 3.9), uses a system of cluster notation (white and black keys) denoting duration by visual horizontal length. Graphic music need only show approximate pitch and relative motion (notice here that the two sets of clusters remain static). Stanley Lunetta includes various cluster effects in his *Piano Music*. Notice the interpretative possibilities for the performer (especially with the indication "wiggle all fingers" in Figure 3.10).

Figure 3.9. From Theodore Lucas's *Aberrations No. VII* for piano. Copyright 1969 by the composer.

INSTRUCTIONS:

Great care has been taken to space all other notes to indicate the rhythmical relationships. After each page-turn play each system completely, following all instructions and playing all visible notes.

Figure 3.10. Performance instructions from Stanley Lunetta's *Piano Music*. Composer Performer Edition, Davis, CA.

TIMBRALISM AND TUNING

from <u>New Directions in Music</u> by David Cope

TRADITIONAL INSTRUMENT EXPLORATION

The desire for new and different sounds, an important driving force behind experimental music, continued to provoke controversy (Clough 1961; Read 1953, 1976; Rossi and Choate 1969). John Cage refers to such controversies in his 1937 lecture, "The Future of Music: Credo." "Whereas, in the past, the point of disagreement has been between dissonance and consonance, it will be, in the immediate future, between noise and so-called musical sounds" (Cage 1961, p. 4). Interestingly, few actual new sounds have developed that have not coexisted with music since its beginning. The fact that these sounds are now considered musical, however, often creates a division between composers and audiences (Cogan and Escot 1981; Cowell 1933; Garland 1982).

As early as 1912, a group of Italian composers, called Futurists, composed music for machine guns, steam whistles, sirens, and other noisemakers (Payton 1976). Deriving their name from Marinetti's 1909 term *futurismo* (referring to extreme radicalism in all the arts), the Futurists were among the first composers to include noise as an inherent part of their music, not merely as a side effect. Francesco Pratella's theoretical "Musica Futurista" (reprinted in Nicolas Slonimsky's *Music Since 1900*) describes the "music" of steamboats, automobiles, battleships, railways, shipyards, and airplanes. Luigi Russolo (1885–1947), the most noted Futurist composer, constructed many of his own "noise instruments." Though his music and most of the other music of this movement did not achieve popular success and approval in his time, it laid a foundation for experimentation by other composers. Varèse, for example, used sirens and anvils in his *Ionisation*. Mossolov, in his more imitative *Symphony of Machines– Steel Foundry* (1928), includes the rattling of a metal sheet throughout. The Futurist movement in France (*bruitisme*) embraced noise as a viable musical source.

George Antheil's *Ballet mécanique* (1924), probably the most infamous of noise pieces, was largely influenced by this French movement (Pound 1968). The first Carnegie Hall performance of *Ballet mécanique* (April 10, 1927) brought about a violent audience reaction reminiscent of the first performance of Stravinsky's *Le Sacre du Printemps*. Antheil established a paradigm for the avant-garde to come as expressed in "An Introduction to George Antheil" by Charles Amirkhanian:

> Here is a man who once drew a pistol during a piano recital to silence a restive audience; a man who, in 1923, composed a piece of music calling for the sound of an airplane motor; a man who was mistakenly reported by the news media to have been eaten alive by lions in the Sahara Desert; and a man who collaborated with Hedy Lamarr in the invention and patenting of a World War II torpedo. (Amirkhanian 1973, p. 176)

Interestingly, Ezra Pound remarks that Antheil was possibly the first American-born musician to be taken seriously in Europe. This might explain John Cage's later successes there. The *Treatise on Harmony* by Antheil (a 25-page book) details the need for a reappraisal of rhythmic ideas equal to those of melody

Figure 4.1. George Antheil arriving in New York City for the U.S. premiere performance of his *Ballet méchanique* (1927).

Figure 4.2. Bertram Turetzky.

and harmony: "A sound of any pitch, or combination of such sounds, may be followed by a sound of any other pitch or any combination of such sounds, providing the time interval between them is properly gauged; and this is true for any series of sounds, chords or arpeggios" (Pound 1968, p. 10).

In few other periods of music history have performers played such an important role in the development of new sound resources and instrumental techniques as in the past eighty years. Bruno Bartolozzi, in his now famous book *New Sounds for Woodwind*, classifies the contemporary performer's role in new music as well as the role of instruments:

> Their continued existence in the world of creative composition therefore depends to a very large extent on just what they have to offer the composer, just how much they can rouse his interest and provoke his fantasy. Some composers already show an obvious lack of interest in conventional instruments and have no hesitation in using the most unusual means in an effort to find new sonorities. . . . (Bartolozzi 1967, p. i)

No traditional instrument has escaped the imagination of the composer's creativity. Some performers, however, steadfastly maintain that anything but traditional performance on their instrument violates inherent intention. One must wonder why plucking (*pizzicato*) and muting (*con sordino*), two often-used traditional effects, also do not violate this inherent intention. Certainly, however, short of physical damage to the instrument itself, even the most traditional performer must admit that traditional performance techniques themselves evolved from such experimentation. Donald Erb sums it up well:

Music is made by a performer. It comes from him rather than from his instrument, the instrument being merely a vehicle. Therefore it seems logical that any sound a performer can make may be used in a musical composition. (Turetzky 1969b, p. 169)

Strings

Four major categories of new string techniques currently exist (Verkoeyen 1970):

(1) percussive effects such as knocking, rapping, tapping, or slapping the strings or body of the instrument—especially in the works of Meyer Kupferman, Eugene Kurtz, and Sydney Hodkinson (Turetzky 1969a, 1969b, and 1974);

(2) singing, speaking, or humming while playing—particularly apparent in the works of Russell Peck, Jacob Druckman, Charles Whittenberg, and Richard Felciano;

(3) unusual bowings inclusive of circular bowing, bowing on or across the bridge, bowing between the bridge and tailpiece, bowing directly on the tailpiece, and undertones (subharmonics) created by bowing with great pressure on a harmonic node—used extensively in the works of Krzysztof Penderecki, Karlheinz Stockhausen, Mauricio Kagel, and George Crumb, among others;

(4) combinations and extensions of traditional techniques (e.g., harmonics, glissandi, fingering without bowing, pizzicati, etc.)—especially notable in the works of Krzysztof Penderecki, György Ligeti, Donald Erb, and Mauricio Kagel (Sallis 1996).

In Figure 4.3, Krzysztof Penderecki requires performers to play between the bridge and tailpiece (⊤ and ⫼), highest note pizzicato (↑), and irregular tremolo (⫪) in his *Threnody for the Victims of Hiroshima* (for explanation of the proportional notation used here, see Appendix III).

Notable performers of innovative works for strings include Paul Zukofsky and Max Pollikov (violin), Walter Trampler (viola), Siegfried Palm (cello), and Bertram Turetzky, Barry Green, and Alvin Brehm (contrabass). String groups particularly dedicated to new music and techniques include the Fine Arts Quartet, the Kronos Quartet, and the Composers' Quartet, among others.

Winds

Although differences exist between the ways in which innovative techniques apply to brass and woodwinds and to individual instruments—particularly between the various single-reed, double-reed, and non-reed instruments of the woodwind section—these instru-

ment groupings are combined here due to their basic similarities (Bartolozzi 1967; Howell 1974; Livingston and McCarty 1971). Similar effects fall within six major categories:

(1) Multiphonics—the creation of more than one pitch simultaneously on a monophonic instrument. Multiphonics are created by two basic methods: singing along with playing and/or forcing the strong overtone content of a given fundamental to become audible by altering embouchure, fingerings, overblowing, or dynamics. Figure 4.4 shows Toru Takamitsu's use and notation of open and closed holes for fingering in his *Voice* (1971) for solo flute. Multiphonics can also be found in works by Donald Erb, Roger Reynolds, Russell Peck, and Jacob Druckman, among others;

(2) Color fingerings involve pitch and timbre fluctuations by changing the available fingerings on the instrument for the same note (Rehfeldt 1977). Color fingerings are particularly notable in the works of George Crumb;

(3) Jazz effects include a large variety of traditionally avoided sounds such as rips, fall offs, bends, and so on (Rehfeldt 1977)—particularly in the brass works of William Sydeman, Phil Winsor, Donald Erb, and David Cope;

(4) Percussion effects, such as rapping, tapping, fingering without blowing, fingernails on the bell tremolo, and hand-pops (the palm of the hand slapping the open bore of the mouthpiece)—notably in the works of Aurelio de la Vega, Iannis Xenakis, and many others (Rehfeldt 1977);

(5) Use of mouthpiece alone or instrument without mouthpiece, both performable with actual or approximate pitch—occurring in works by Donald Erb, Krzysztof Penderecki, and György Ligeti, among others (Cummings 1974, 1984);

(6) Extension of traditional techniques such as glissandi, harmonics, speed rates of vibrato, pedal tones, flutter tongue, circular breathing, and many others—found in works by composers listed under 1–5 as well as Luciano Berio, Lukas Foss, and Gunther Schuller.

Figure 4.5 shows a particularly good example of a work for solo instrument exploring techniques such as those just described. Donald Scavarda's *Matrix* for solo clarinet (1962) contains a wide variety of new wind techniques including multiphonics (one of the first such uses), smears, breath noise, overtone clusters, use of inverted mouthpiece, and undertones. Scavarda speaks to this point:

> It was in trying to find sounds that were most natural to the clarinet that I discovered what are

now called multiphonics in April 1962. Gradually I began to realize the exciting potential of the simultaneity of sounds that could be produced by the instrument. It was necessary first, however, to discard old habits and attitudes about what the clarinet should sound like. It required an open mind and much hard work and patience to explore and mine these rich, natural complex sounds and eventually to bring them to the surface. (Scavarda 1962, p.1)

Notable performers of woodwind and brass works of the avant-garde include: Aurèle Nicolet, Pierluigi Mencarelli, Savarino Gazzeloni, and Harvey Sollberger—flute; Joseph Celli, Lawrence Singer, and Heinz Holliger—oboe; Phillip Rehfeldt, Detalmo Corneti, and William O. Smith—clarinet; William Scribner and Sergio Penazzi—bassoon; Ken Dorn and James Houlik—saxophone; Gerard Schwarz, Robert Levy, and Marice Stith—trumpet; James Fulkerson, Stuart Dempster, and Vinko Globokar—trombone; and Barton Cummings and Roger Bobo—tuba.

Figure 4.4. Each small vertical line equals 4.5" in Toru Takemitsu's *Voice*. Beamed notes are slurred. Special fingerings above some notes indicate particular timbres or multiphonics (last two chords of the first system). © 1971 Editions Salabert. With kind permission of Editions Salabert. All rights reserved.
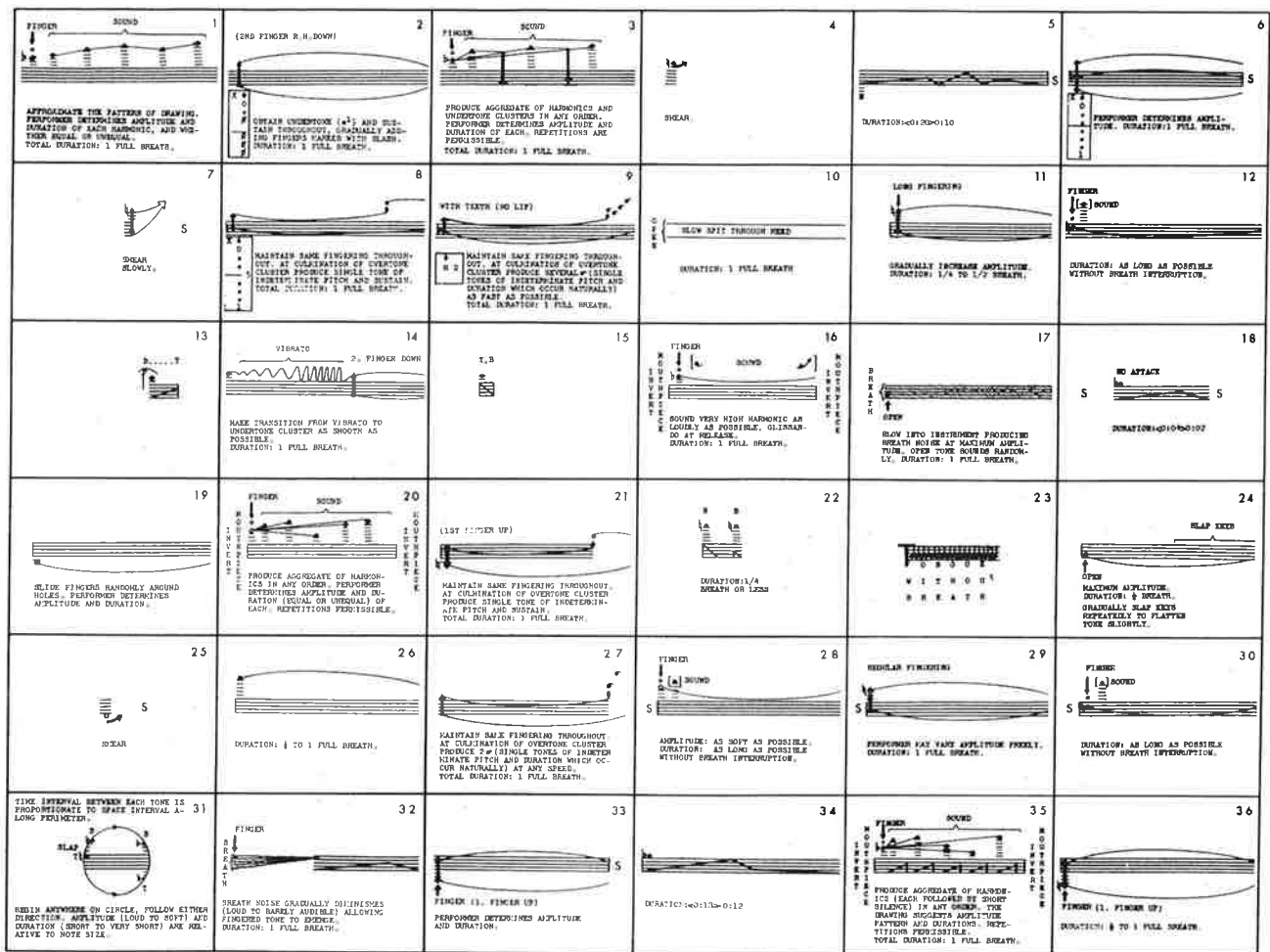
Figure 4.5. Donald Scavarda, *Matrix* (1962) for clarinet.

Percussion

The percussion section includes almost any instrument, whether string (e.g., piano), wind (e.g., slide whistle), or other classification (Brindle 1970; Finkenbeinger and Meyer 1987; Reed and Leach 1969; Varèse 1967). Surprisingly, considering the *noises* many percussion instruments emit, most mainstream composers who use them still refuse to consider the musical potentiality of other less noisy instruments, such as the brake drum, which often appears in pitched collections of different sizes.

Early experimenters in percussion music include John Cage, Edgard Varèse, Carlos Chavez, and especially John Becker, whose *Abongo* (1933) marks one of the first serious efforts in percussion music. Percussion sections since the late nineteenth century have also required new approaches to notation, necessitated by the fact that performers must read as many as six instrumental parts simultaneously, and five-line staves are often impractical (see Figure 4.6). Compos-

ers using more traditional percussion instruments such as timpani, snare drum, xylophone, and so on have developed a variety of unusual techniques including experimenting with various sizes and types of mallets (metal, wood, cloth, glass).

The increasing need for explicit performance directions indicating type of mallet, the action of the mallet, and its exact placement on instruments often requires new notations as well. Figure 4.7a shows the movement of a mallet across a timpani head within a certain period of time. Figure 4.7b demonstrates the exact direction and striking surface on crash cymbals. Figure 4.7c shows the sweep action of wire brushes on a bass drum. Since significantly varying timbres as well as intensity can result from mallet direction and placement on percussion instruments, flexible notations become inevitable and often graphic (see Appendix III).

Notable avant-garde composers using percussion experimentally include Larry Austin, Karlheinz Stockhausen, Frederic Rzewski, Harry Partch, Edward

78

Figure 4.6. An example of traditional (left) and contemporary (right) percussion notation.
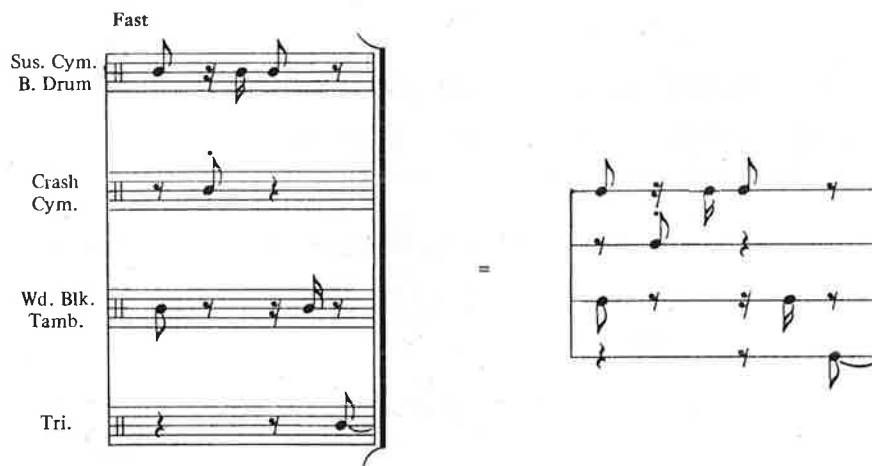
Figure 4.7. Avant-garde percussion notations.

a)

Timpani: mallet motion

b)

Cymbals: striking procedure

c)

Bass drum: wire brush motion
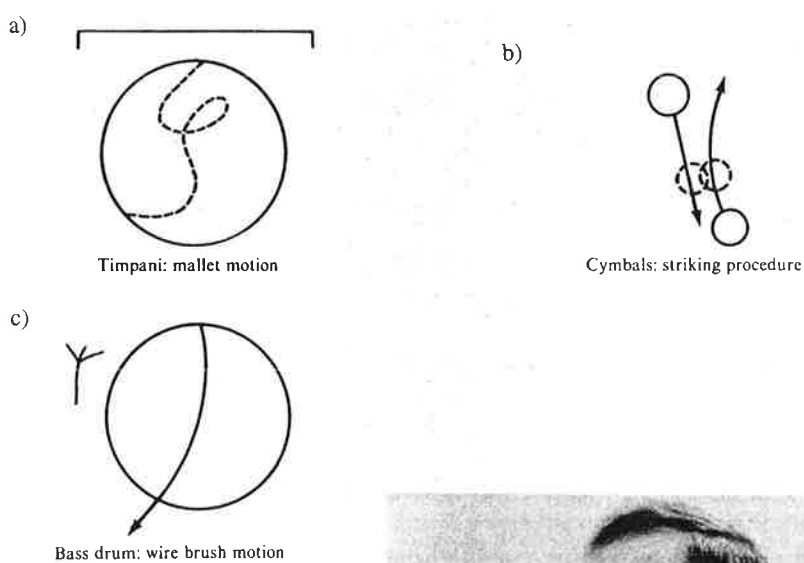
Figure 4.8. Blackearth Percussion Group.

Figure 4.9. William Kraft. Photo by A. A. Friedman.

Miller, Mario Bertoncini, Peter Garland, William Kraft, and many others. Percussionists performing experimental music include Max Neuhaus, Christoph Caskel, Willy Winant, and William Kraft. Often, percussionists tend to be composers as well. William Kraft, for example, is both a percussionist and a gifted and well-known composer.

Voice

The voice, both in solo and choral situations, has in recent years become a focal point of innovation realized both in terms of dramatic use of text and as an independent instrument (Pooler and Pierce 1973). The ability of the voice to act as a percussive string and wind instrument gives it nearly all of the timbre potential of standard orchestral instruments. Only the physical limitations of individual performers pose obstacles to the composer's imagination.

Most vocal experimentation has taken place in three basic areas:

(1) Effects such as panting, whistling, sucking, kissing, hissing, clucking, laughing, talking, whispering, and so on appear in the works of Hans Werner Henze, Krzysztof Penderecki, György Ligeti, Karlheinz Stockhausen, Mauricio Kagel, Pauline Oliveros, Folke Rabe, Richard Felciano, Luciano Berio, and David Cope;

(2) Multiphonics—especially notable in the *Versuch über Schweine* (1969) by Hans Werner Henze;

(3) Muting in the forms of humming, hands over mouth, and slowly opening and closing the mouth—notable in works by Donald Erb and Robert Morris.

Figure 4.10, the *Aventures* of György Ligeti, shows breathing in and out in measures 1–6 indicated by the symbols ▶ = inhale and ◀ = exhale as well as muting

Figure 4.10. From György Ligeti's *Aventures*. Copyright © 1964 by Henry Litoff Verlag. Reprinted by permission of C. F. Peters Corporation.

80

with a closed mouth *m* in the second system. This work is notable for its lack of text, replaced by a 112-letter alphabet, and alternating metric and proportional notations, shown clearly here between braces one and two. Hans Werner Henze's *Versuch über Schweine* for voice and orchestra is equally impressive in its use of dramatic vocal gymnastics.

Singers known for their performance of new music include Roy Hart, Catherine Rowe, Jan DeGaetani, Bethany Beardslee, Elaine Bonazzi, Joan La Barbara, Neva Pilgrim, Paul Sperry, and the late Cathy Berberian. The New Music Choral Ensemble (NMCE), founded by its director Kenneth Gaburo in 1966, reigned as one of the world's foremost choral ensembles dedicated to the performance of new music.

David Hykes, founder and developer of the Harmonic Choir (1975), practices the art of Harmonic Chant, the singing of more than one note simultaneously by one singer. While Tibetan Buddhist monks and Mongolian throat (*hoomi*) singers have produced music in this manner for centuries, Western singers only have begun using this approach in the past few decades. By performing and recording only in highly resonant spaces such as large churches and abbeys, including New York City's Cathedral of St. John, the Harmonic Choir uses certain singing techniques to produce high harmonics simultaneously with fundamentals. With his colleague Timothy Hill, Hykes has developed five types of Harmonic Chant. These include drones based on subharmonic pitches (higher fundamental), fundamentals as drones over which singers produce melodies based on the overtone series, and contrapuntal harmonic movements of both fundamentals and derived melodies from various related harmonic series.

Keyboard

The early experiments and compositions for piano by Henry Cowell (e.g., *The Banshee* [1925], which involves plucking and stroking the strings inside the instrument), John Cage (e.g., *Bacchanale* [1938] and *Sonatas and Interludes* [1946–48] for prepared piano), and Christian Wolff (whose *For Prepared Piano* appeared in *New Music Quarterly* in April, 1951) aroused great interest. The prepared piano (a technique first explored by John Cage in the mid-1930s) involves the placement of objects such as nuts, bolts, and nails on, around, and between the strings, converting the piano into an instrument sounding like the *gamelan* of Southeast Asia (Bunger 1981). Figure 4.11 shows a number of typical preparations. Resulting timbres change depending on the location of preparations in regard to string length (e.g., placing the object at harmonic

nodes creates a very different sound than placing it between these nodes); the striking techniques used (i.e., initiating the sound via the keyboard creates a sound distinctly different from striking the preparation directly); and the elasticity and density of the material used for preparation. Most preparations will not damage instruments if proper precautions are used—see Figure 4.12, which shows the use of a screwdriver covered with masking tape to insert preparations, thus avoiding any harm to the strings.

Aside from preparation, the following new techniques for piano are currently being explored:

(1) Muting by placing one hand on the string inside the piano between the pin and the dampers and playing the notes on the keyboard with the other hand—usually notated with a + above the note, this technique appears particularly in the works of George Crumb and David Cope;

(2) Harmonics produced by touching a node of the string inside the piano with one hand and striking the corresponding key with the other—used in works by George Crumb, Larry Barnes, and many others;

(3) Bowing the strings with bows created from fishing line. These bows are threaded around and between the strings and then drawn back and forth as one would on a string instrument. Bowing appears particularly in the works of Curtis Curtis-Smith;

(4) Stroking, rapping, tapping, striking, or plucking the strings directly for a variety of different timbres—primarily in the works of Henry Cowell, George Crumb, David Cope, Donald Erb, and others;

(5) Using other parts of the instrument by knocking, tapping, rapping, and so on, particularly on the wood of the lid and body, the metal of the internal crossbars and soundboard, and so on with mallets, hands, and various other objects—notable in works like *Knocking Piece* by Ben Johnston, and music by John Cage, George Crumb, Donald Erb, and many others.

Stephen Scott has developed a bowed piano, influenced by Curtis-Smith's invention, using sets of miniature piano bows similar in design to regular violin bows. Constructed of popsicle sticks with horsehair glued to both ends, these bows create vibrant and continuous sounds. Unlike Curtis-Smith's design, however, Scott's bows also can perform quite rapid pitch changes.

Pianists who actively use these new techniques in the performance of new avant-garde works include David Tudor, David Burge, Richard Bunger, and Aloys Kontarsky. "Blue" Gene Tyranny is known for his inventive compositions for piano and electronics and for his inspired, theatrical performances of other composers' keyboard works (e.g., as "Buddy, the world's greatest piano player" in Robert Ashley's *Perfect Lives*).

David Tudor, William Albright, and Martha Folts have been active in the performance of new music for the organ, as has Antoinette Vischer on the harpsichord. At present these experiments have been more theatrical (organ) and formal (harpsichord) than real in terms of sonic exploration (Steinberg 1961). Works by Mauricio Kagel, Gordon Mumma, Christian Wolff, and William Albright for organ and György Ligeti for harpsichord contain examples of these new techniques.

Conlon Nancarrow (b. 1912) has created unique music for the player piano. His *Studies for Player Piano* utilize punched piano rolls inserted in two Marshall and Wendell player pianos, both with modified hammers; one set covered with leather and the other with steel straps. Nancarrow's complex works vary from jazz-influenced shorter studies (especially his early music) to mathematically proportioned canons. Nancarrow speaks about his work and its relation to traditional instruments in an interview:

> I'm so tied up now with the player piano. I'd have to start thinking again: "Does the hand reach there?" "Can it go here?" The whole thing.
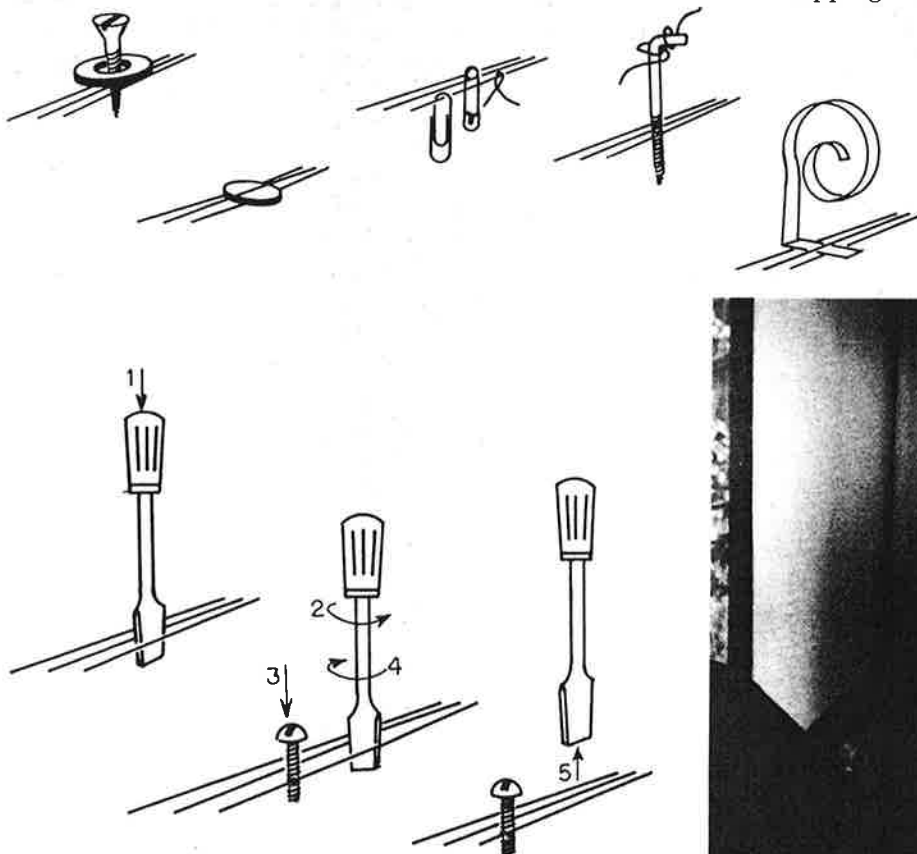
No, no. You know, when I do these things for player piano, I just write music; and the notes go here, there, wherever. I don't have to think about anything else. I used to, when I was writing for instruments. It's a real luxury not to have to think about all that. (Cagne and Caras 1982, p. 285)

Harp

Carlos Salzedo (1885–1961) developed a wide range of effects for harp, as well as highly original notations and names for these techniques ("gushing aeolian chords," etc.). Salzedo himself composed works utilizing the effects he created. Most of Salzedo's innovations have become standard for the harpist. Other composers utilizing these effects include Luciano Berio and George Crumb, in particular (see also Salzedo 1921, 1929, and 1961).

Ensembles

The previously discussed effects also have been used in combination or in conjunction with extracurricular performer activity, from finger-snapping and music-stand-tapping to the use of costumes, theatrical stag-

Figure 4.11. Examples of piano preparations from Richard Bunger's *The Well-Prepared Piano*. Second edition. Litoral Arts Press, 35 Firefly Lane, Sebastopol, CA (1981).

Figure 4.12. From Richard Bunger's *The Well-Prepared Piano*. Second edition. Litoral Arts Press, 35 Firefly Lane, Sebastopol, CA (1981).

Figure 4.13. Conlon Nancarrow. Photo by Gordon Mumma.

82

ing, and use of lighting effects (Anhalt 1984). Often composers use whispers, speaking, and shouting (as in the Crumb example in Figure 4.14) along with the inclusion of ancillary instruments such as triangles hung from music stands, maracas, and a variety of other percussion instruments.

George Crumb's *Songs, Drones, and Refrains of Death* (1969) for baritone, electric guitar, electric contrabass, electric piano, harpsichord, and two percussionists, combines many of the effects discussed here as shown in Figure 4.14. This duet for electric guitar and electric contrabass consists of seven events. Each performer sings or whispers while playing harmonics, glissandi, tremolo, metal rod, and so on. Crumb's *Black Angels* (1970) for amplified string quartet uses both contact and acoustic microphones for balance and for the unique timbre alteration that electronics add to live performances.

Iannis Xenakis, long interested in the creation of new techniques, proves convincingly in *Metastasis* (1953–54) that sixty-one traditional instruments can compete successfully with electronic sound sources. Roman Haubenstock-Ramati, in his *Interpolation* (1958), utilizes an unmanipulated prerecorded tape made by the performer. This enables a single instrumentalist to achieve ensemble effects using only one instrument as source. His 1961 *Liaisons* for vibraphone includes provisions for a performer-prepared tape begun six to ten seconds after the performance begins. The tape thus serves not as an electronic device, but as a tool to elicit combinations of instrumental tones and effects.

David Cope's *Margins* (1972) for cello, trumpet, percussion, and two pianos emphasizes the marginal aspects of each instrument. The composer explores equally the contrast and developmental possibilities of articulation and timbre. The tempo remains very slow throughout with the beat dividing into multifold groupings of often very quick and pointillistic imitations. Elsa Justel (b. 1944 in Mar del Plata, Argentina), in her work *Fy Mor* (1991), uses only the sounds of kitchen utensils and vocal sounds for unique effects.

Heinz Holliger's *Atembogen* contains many orchestral effects, most of which involve subtle nuances or shadings of breath or bow technique. Examples for winds include exhaling, inhaling, using voice, embouchure without tone, and whistle-tone. For strings, Holliger requires bow with over and under pressure, bowing the tailpiece, and *col legno*. *Atembogen* forms a series of large dramatic gestures based on a through-composed form. For example,

Figure 4.14. From George Crumb's *Songs, Drones, and Refrains of Death*. Copyright © 1968 by C.F. Peters Corporation. Used by permission.

Atembogen's opening four seconds consists of bowing and blowing without producing sound. The work ends similarly with the orchestra slowly releasing bows and breaths from their instruments (Becker 1950; Pooler and Pierce 1973).

Ensembles devoted to performance of contemporary music have contributed significantly to the development of instrument exploration. Such groups commission, perform, and record new music and include the Contemporary Chamber Ensemble, Aeolian Chamber Players, Die Reihe Ensemble, Philadelphia Composers Forum, Kronos String Quartet, Cologne New Music Ensemble, MW 2 Ensemble, the Melos Ensemble, and the ISKRA ensemble, to name but a few. A large number of university-affiliated new music ensembles, consisting of faculty as well as students, also contribute to the growing repertoire of avant-garde music.

Since its 1992 debut at Carnegie Hall with a tribute to John Cage, the Orchestra of the S.E.M. Ensemble has become recognized as one of the foremost large scale ensembles dedicated to new music. Conducted by Petr Kotik, this ensemble has toured Europe performing works by composers such as John Cage, Morton Feldman, Christian Wolff, Alvin Lucier, Earle Brown, Edgard Varèse, Pauline Oliveros, and Maria de Alvear, among others.

Zeitgeist, a chamber ensemble committed to performing contemporary music and founded in 1977, has explored a wide variety of musical idioms, developing close ties with such avant-garde composers as John Cage, Terry Riley, La Monte Young, Frederic Rzewski, and Harold Budd, and pays special attention to nurturing younger composers. Zeitgeist has attempted to reforge links between contemporary composers and their audience—links that, in America at least, had been fractured by the academism of the postwar decades. Zeitgeist's distinctive instrumentation creates an extraordinary range of timbres and textures. Zeitgeist consists of artistic co-directors Heather Barringer and Jay Johnson (percussion), Thomas Linker (keyboards), Robert Samarotto (woodwinds), and executive co-director Lawrence Fuchsberg.

The First Avenue Ensemble, formed in 1982, is dedicated to expanding their art through improvisation, theater, extended instrument techniques, performance art, and the integration of advanced technologies with acoustic instruments. First Avenue has evolved a diverse sonic world characterized by the interplay of tonal, timbral, and textural elements and consists of William Kannar (double bass, computer), C. Bryan Rulon (synthesizers), and Matt Sullivan (oboe, English horn, and wind controller).

The Machine for Making Sense is a cooperative venture between five Australian sound artists. The "machine's" synthesis of the academic and indeterminate has achieved acclaim in Europe, the USA, and Australia as one of the most original groups devoted to contemporary performance. Machine for Making Sense explores distinctions between language, sound, and music, as well as code, sign, and meaning. Members of the ensemble include Jim Denley, saxophone and voice; Chris Mann, voice and text; Rik Rue, digital and analog samples and tape manipulation; Amanda Stewart, voice and text; and Stevie Wishart, violin, live electronics, hurdy-gurdy, and voice.

NEW INSTRUMENTS

Transformations of traditional instruments represent only a part of the new sound sources for composers. Harry Partch, unlike Cage and Cowell, created new instruments rather than altering existing ones (though his first such instrument was an adapted viola). Partch's division of the octave into forty-three instead of twelve tones brought the need to create instruments capable of realizing his theoretical concepts (see his *Genesis of A New Music*, 1977). Except for his use of voice, almost all of his works employ original instruments (see Figure 4.16). Partch's *U.S. Highball: Account of Hobo Trip* (1943) and *Account of the Normandy Invasion by an American Glider Pilot* (1945, both early works) reflect his fascination with instruments (Johnston 1974; Partch 1968, 1977; Smith 1982). In *Revelation in the Courthouse Square* (1961), the visual—theatrical—elements become an integral (in his words: corporeal) part of the work. *And on the Seventh Day Petals Fell in*

Figure 4.15. Harry Partch.

Petaluma, a 1964 work comprising studies in the form of twenty-three duets for *Delusion of the Fury* (1967), explores the harmonic and melodic possibilities of microtones based on his microtonal theories (his word for major is *Otonality*, for minor *Utonality*).

Many recent compositions have extended instrumental possibili-
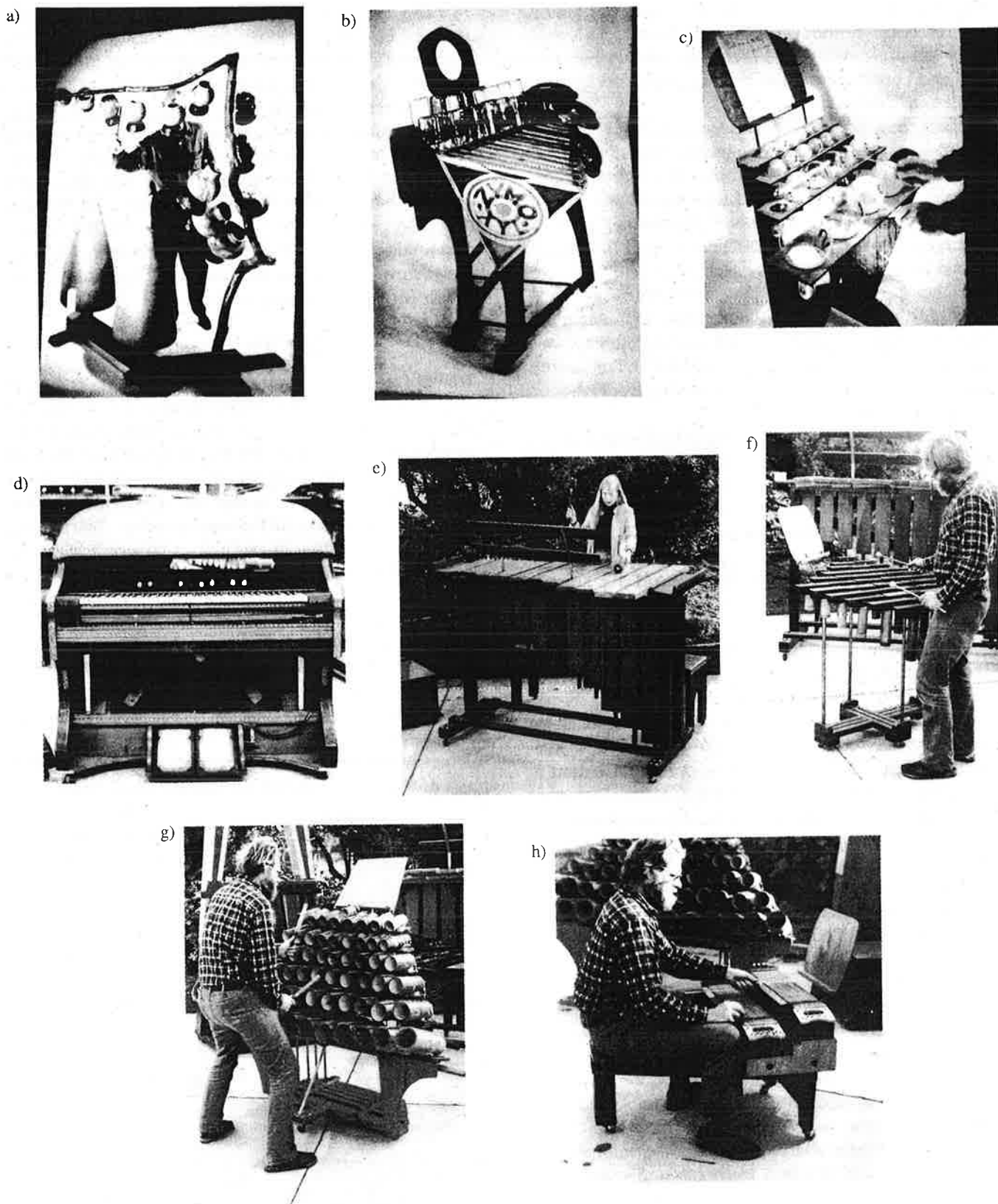
Figure 4.16. Various Partch instruments: a) Gourd Tree (1964) and Cone Tree (1965); b) Zymo-Xyl (1963); c) Mazda Marimba (1963); d) Chromelodeon I (1945–49); e) Bass Marimba (1951); f) Diamond Marimba (1946); g) Boo (1955–57); h) Surrogate Kithara (1953).

ties to anything that can be beaten, blown, or bowed, with each work demanding a new instrument for realization—even a jet engine, for example. Few of these instruments have achieved standardization, as their intrinsic theatrical value lies in their having a direct link to one work or composer.

Yoshima Wada has created a number of successful new wind instruments (see Figures 4.17 and 4.18) that, due to their large size, produce low sounds of soft dynamics often needing amplification. The KIVA Ensemble of the University of California at San Diego explores new instrumental resources (see Figure 4.19), often coupled with electronic amplification or modification. Arthur Frick has created a wide variety of new instruments (see Figure 4.20), many of which are mobile and often have comic effect.
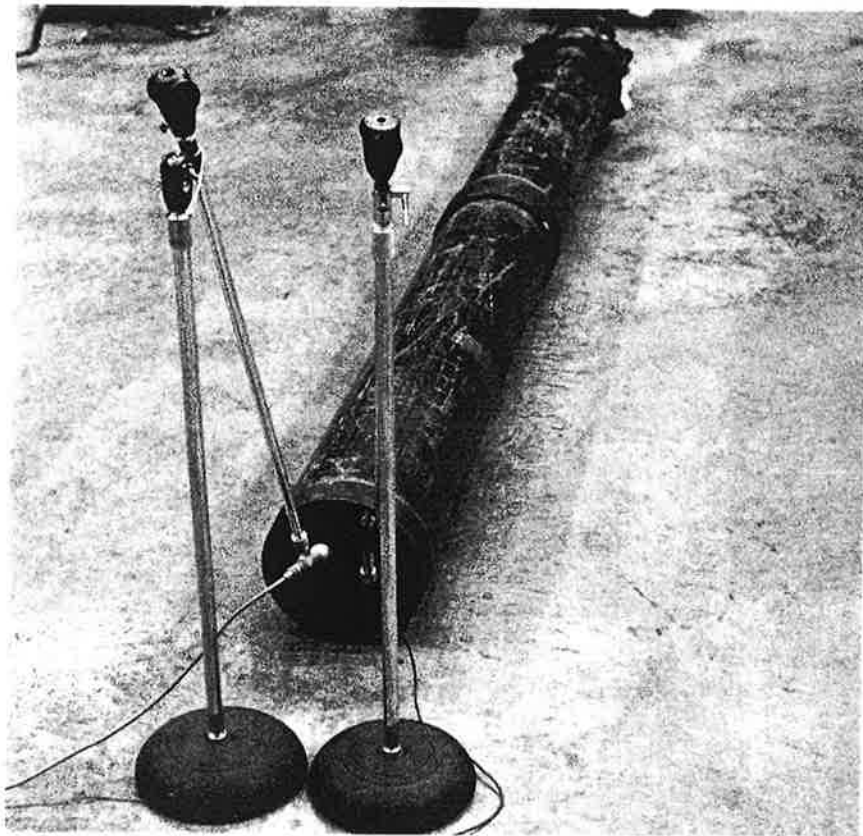
Figure 4.17. Instrument by Yoshima Wada. Photo by Seiji Kakizaki.
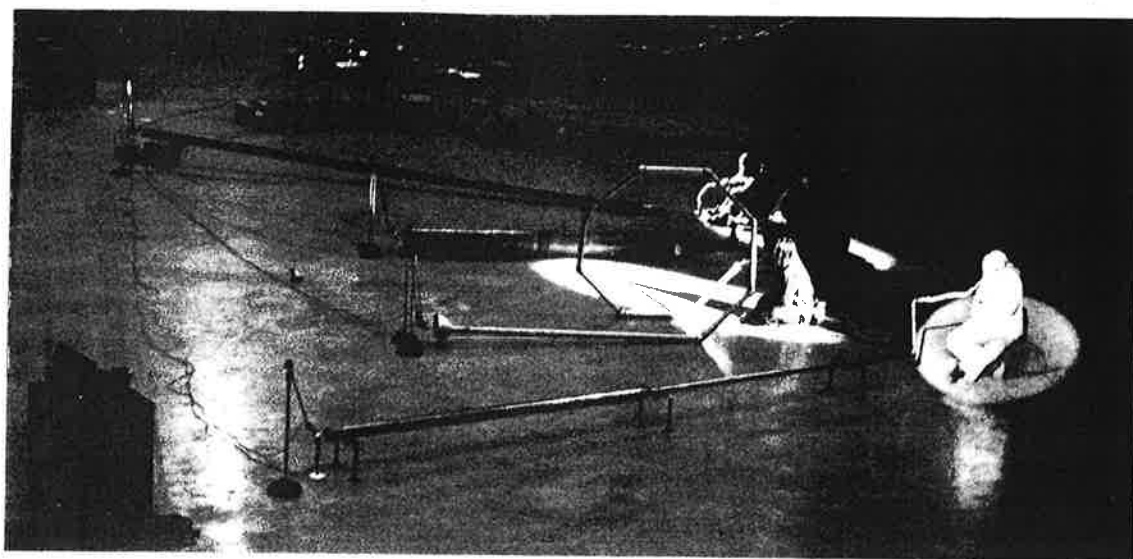
Figure 4.18. Instruments by Yoshima Wada. Photo by Seiji Kakizaki.
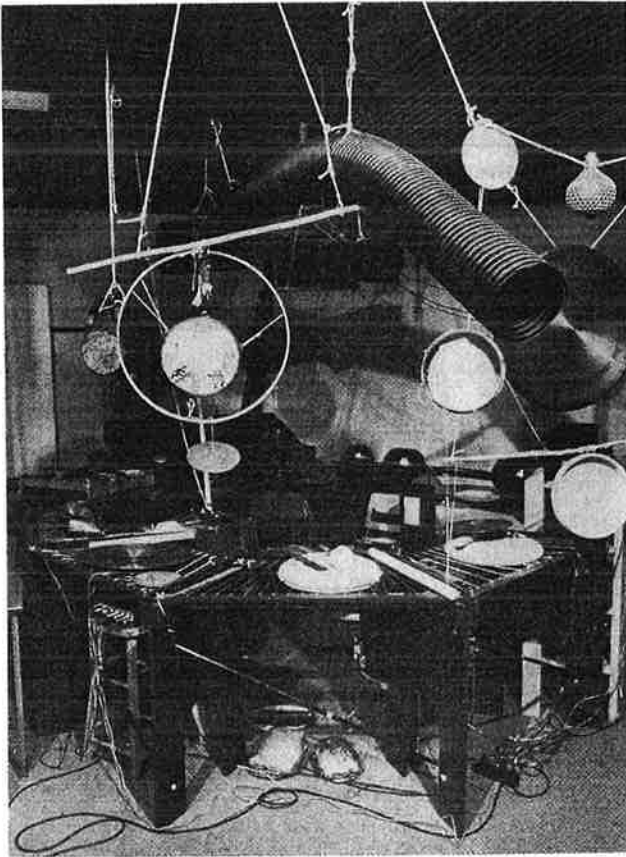
Figure 4.19. KIVA performance instruments. Photo by Solomon (UCSD).

Figure 4.20. Instrument by Arthur Frick.

George Gonzalez and Peter Richards have built a *Wave Organ* on the bay in San Francisco that amplifies the sound of ocean waves entering into and retreating from large cement pipes. The audience places their ears near to one of several orifices through which both sound and air propagate. Different wave and weather conditions affect the types and dynamics of the sounds produced.

Robert Rutman creates giant instruments, often out of industrial scrap metals. His *steel cello*, for example, consists of a large sheet of steel twisted into a "C" shape with a single string strung from top to bottom. His *bow chimes* have a similar shape but are held in place by a bar.

New instruments require performers with open minds and virtuosity (Hopkin 1996). One could hardly expect as practiced and polished a performance on a new instrument as from an experienced violinist after intense study of a Beethoven concerto. One of two alternatives seems likely: a simple but fully notated score or a more freely improvised score whereby per-

formers substitute their own creativity for familiarity with the instrument. Douglas Leedy chooses the latter in *Usable Music I* (1968) for very small instruments with holes. This work depends almost exclusively on the use of graphic symbols to indicate performance instructions such as "blow" or "draw." This graphic representation requires less attention to exact rhythms and pitches. Robert Moran, in *Titus* (1968), has the score projected on an automobile, pictorially showing the performers' areas and amounts of activity (see Figure 4.21). Each of from five to fifteen performers, using contact microphones, files, hammers, and the like, move around and within the car, visually guided by the score.

Such works require increasing need for performer creativity (Banek and Scoville 1980). Once composers have granted shared responsibilities, it is not difficult to understand the motivation behind graphic or less exact notational systems. New instruments and techniques have evolved simultaneously with unique sounds, creating new and significant composer-performer relationships.
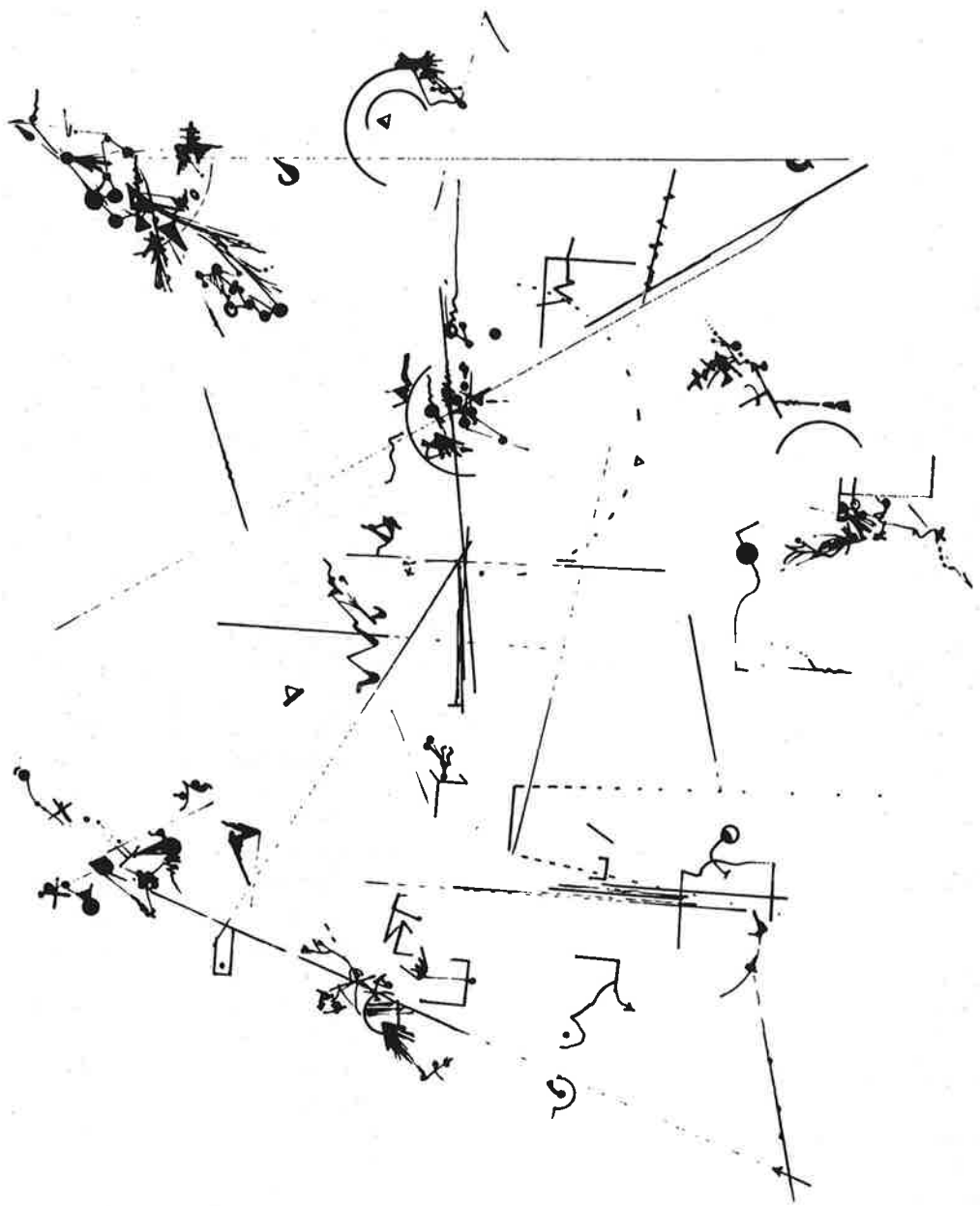
Other composers and artists involved in creating new musical instruments include Laurie Anderson (electronic tape-bow on violins); Christopher Charles Banta (large marimbas); Bob Bates (mechanical instruments and music machines); Harry Bertoia (sound sculptures); Jim Burton (sound installations); Ivor Darreg (large numbers of microtonal string, wind, and electronic instruments similar in scope to those of Harry Partch); Paul De Marinis (electronic modules); Richard Dunlap (nonconventional instruments for improvisation and theater presentation); Stephen Scott (large sound sculptures); Bruce Fier (architectural sound designs); Cris Forster (notably Chrysalis); Ron George (original percussion instruments and ensembles); Jonathan Glasier (notably his Harmonic Canon); Stephen Goodman (automatic music instruments); Jim Gordon (percussion synthesizers); Jim Hobart (percussion and steel-stringed instruments); Alzek Misheff (hot-air balloons containing portable electronic instruments); Max Neuhaus (sound installations); Jim Pomeroy (music boxes); Susan Rawcliffe (wind instruments); Tom Recchion (folk instruments from found objects); Prent Rodgers (electroacoustical instruments); Stephen von Huene (self-performing sound sculptures); Robert Wilhite (environments); and Richard Waters (notably the metal "waterphone"). More

often than not, these composers/instrument builders also perform their instruments (Baschet and Baschet 1987; Boulanger 1986).

Picc.
ppp — mf

Tri.
fff

Ob.
(St. Mute)
pp — mf

Tpt.
mf — pp

Piano
mp

B. Dr.
fff
Hand stop!

Figure 4.22. Timbre modulations.

TIMBRE AND SPATIAL MODULATION

With an increasing awareness of the subtle timbres available from various instruments—muting, dynamics, attacks, and decays—comes the realization that many timbres overlap between those instruments. Figure 4.22 shows three such overlaps with new timbres resulting from the combinations. In the first example, a triangle initially masks a piccolo. The piccolo's slow crescendo then gradually modulates from the sound of the triangle. In the second example, a trumpet with straight mute slowly decays as the like-timbred oboe crescendos and so takes over. The effect is indicated by the intersecting vertical dotted line. At the beginning, only the trumpet is heard. At the vertical line, a subtle combination of the two instruments begins. Finally one hears only the oboe. Terms like *obet* or *trumboe* emphasize the significance of the truly "new" sound created by the modulation (Cope 1977). In the third example, a

bass drum masks the piano attack completely. However, as the piano rings out of the bass drum a unique effect occurs: the piano chord slowly decays after the hand-stopped percussion attack disappears.

Works effectively employing timbre modulation include *Sinfonia* (1968) by Luciano Berio, *Lontano* (1967) by György Ligeti, *Ancient Voices of Children* (1970) by George Crumb, and *Apotheosis of This Earth* (1971) by Karel Husa.

Physical spacing and placement of instruments can play important roles in creating antiphonal and directional timbre modulations (Brant 1967; Forsyth 1985; Junger and Feit 1986; Schwartz 1970). Gabrieli's eight- and twelve-part canzonas in the sixteenth century; Mozart's *Don Giovanni* in the eighteenth century; Berlioz's *Requiem* in the nineteenth century; and Berg's *Wozzeck*, Mahler's *Das Klagende Lied*, and Ives's *Symphony 4* in the twentieth century provide historical examples. Henry Brant's experiments with vertical, horizontal, and circular instrumental arrangements have created unique spatial music. In his "Space as an Essential Aspect of Musical Composition," Brant describes many of his experiments in performer arrangements for optimum directional, acoustical, and balance effectiveness (Childs and Schwartz 1967, pp. 223–42). The spatial composing technique of one of his works (*Voyage Four*, 1964) involves percussion and brass on stage, violins on one side balcony, violas and cellos on the other balcony, basses on floor level at the rear of the auditorium, with various woodwind instruments and a few string instruments on the two rear balconies. Three conductors combine to direct the performers, which include tuba, timpani, and chimes in the audience. Brant contends that, if composers realistically understand performance, each composed work should contain specific instructions for performer placement.

Brant discusses his views regarding spatial performance in an interview:

> The competition, from both living and dead composers, is too great for a solo piece; it's also too great for an ensemble that doesn't use spatial separation. What would I write? A string quartet? Besides, I think that particular combination is lopsided. For thirty years I've been trying to devise a rational string quartet; it should be one violin, one viola, one instrument that doesn't exist—a tenor violin, which I'm trying to develop—and cello. (Cagne and Caras 1982, p. 61)

Brant's *An American Requiem* utilizes spatial location of six widely separated instrumental groups and four separated single players including an optional voice. The principal ensemble, a group of sixteen woodwinds, performs on stage in a semicircle with

INDETERMINACY

from <u>New Directions in Music</u> by David Cope

IMPROVISATION

Baroque figured bass and the classical concerto cadenza represent two examples of improvisation in traditional music. The figured bass typically provides only bass notes and short-hand numbers for intervals occurring above the bass. The figured bass allows performers the creative possibility of improvising and developing rhythmic and melodic fragments and motives. Performances, therefore, are predictable only within certain limits. Cadenzas, up to the late eighteenth century, were rarely written out in detail, giving performers the opportunity to improvise in a manner best suited to their own particular talents. Donald Erb refers to the latter in remarks about his own *Concerto for Percussion and Orchestra* (1966):

> The work is cast in the traditional concerto format of three movements. The solo part is in the eighteenth and nineteenth century virtuoso tradition. The cadenzas in the second and, especially, the third movements harken back to the eighteenth century tradition of having the performer improvise much or all of the cadenza. A variation on this idea was used in the first movement, where instead of having the soloist improvise a cadenza I had the entire orchestra, other than the soloist, improvise it. (Erb 1966, p. 1)

It seems logical for composers, rather than refusing to admit the improvisational aspects of music, to use improvisation to their advantage.

Allan Bryant states that improvisation is "Similar to free jazz, oriental and African music, things which are impossible to write out" (Bryant 1968, p. 26) and "Free, wild music and ideas that wouldn't come about with single composers working alone" (Bryant 1968, p. 24). Foss adds: "Cardew is right to worry about ethics of improvisation. It needs it. Improvisation: one plays what one already knows" (Foss 1968, p. 17).

Contemporary improvisation has its roots in jazz with such artists as Miles Davis (e.g., *Bitch's Brew*), the Modern Jazz Quartet, John Coltrane, Albert Ayler, Denny Zeitlin, Pharoah Sanders, Coleman Hawkins, Django Rheinhardt, Lenny Tristano, Ornette Coleman, Don Cherry, Eric Dolphy, Freddie Hubbard, Scott LaFaro, Charlie Haden, Billy Higgins, and Ed Blackwell (Logon 1975; Schuller 1968). Cecil Taylor (first with Steve Lacy and Buell Neidlinger, later with Bill Barron and Ted Curson) was also an important pioneer. Taylor's keyboard skills and intense energy produced imaginative improvisations. More recently George Lewis, Anthony Braxton, Sun Ra, and the Art Ensemble of Chicago have created richly improvised performances and albums.

A number of contemporary composers associated with improvisation have been actively involved in jazz, particularly third-stream composers such as Gunther Schuller. Much contemporary improvisation in the avant-garde, however, originated from the performers' inability to accurately realize the complexities of recent music. Composers, perhaps out of frustration, perhaps because the result was the same or better, chose to allow certain freedom in performance. Luciano Berio, for example, in his *Tempi Concertati*, requires the percussionist to hit every available instrument as fast as possible. Exact notation of this passage would be impractical or even impossible. Performances of such passages are generally predictable and effective without a single notated pitch or rhythm.

Some composers disagree that improvisation and indeterminacy share common roots. Speaking to this point William Hellermann defines the distinction:

> It seems to me that there is a fundamental difference between aleatoric and improvisational music. Improvisation is concerned with the realization in real time of defined artistic goals. Aleatory, by its very nature, does not recognize the existence of goals. Both differ from the traditional "classic music" by leaving open to the

performer the choice of the specific materials to be used in the piece. They are often lumped together for this reason and, also, because they are both thought to be "free." Actually, freedom is not really the issue. Improvisation, at its highest, seeks meaning through spontaneity. Aleatory declares meaning to be spontaneity. Both of these are very restrictive states. I find that in my own works, I am increasingly concerned with improvisation, and never with anything I would call aleatory. (Hellermann 1971, p. 82)

The reasons that most composers use improvisation include:

(1) Performing from notation often produces relatively predictable results. Improvisation, on the other hand, often creates unique performances.

(2) Improvisation often produces rhythms and patterns that would otherwise paralyze performers if completely notated. As an example, the subtle and refined improvisatory character of syncopations before and after the beat in jazz makes exact notation a near impossibility. Even if these syncopations were notable, they would not retain the same kind of musical freshness that they do when improvised.

(3) Many contemporary composers feel that improvisation exists in all music to one degree or another and allowing explicit improvisatory freedom creates rewards that far exceed risks.

Groups since the 1960s dedicated to improvisation include the New Music Ensemble (Austin, Lunetta, Mizelle, Woodbury, Alexander, and Johnson); Sonic Arts Group (Mumma, Ashley, Behrman, and Lucier); the Musica Elettronica Viva (Allan Bryant, Alvin Curran, Jon Phetteplace, Carol Plantamura, Frederic Rzewski, Richard Teitelbaum, and Ivan Vandor); and the University of Illinois Chamber Players, directed by Jack McKenzie. Whatever the means of producing sound (electronic or instrumental), the music performed results from the interaction of the performers, most of whom are composers. Lukas Foss remarks: "I thought I had invented a new kind of improvisation. I now know that I was merely the first not to sign my name" (Foss 1968, p. 17). The 1957 U.C.L.A.-based Improvisation Chamber Ensemble under the direction of Foss consisted of piano, clarinet, cello, and percussion (Foss 1963, 1964). The Improvisation Chamber Ensemble performed primarily from jazz-like charts indicating only the initial ideas needed to create a work. Many rehearsals yielded polished results in performances which, while varying somewhat, were more formal than free improvisation. This group also performed improvised interludes between the movements of Foss's *Time Cycle* (1960) for soprano and

Figure 5.1. Lukas Foss.

orchestra. Foss enjoys equal reputations as a composer, conductor, pianist, educator, and spokesman for his art. As Music Director of the Brooklyn Philharmonic, the Buffalo Philharmonic, and the Milwaukee Symphony, Foss has been an effective champion of living composers.

Foss's compositions of the last twenty-five years prove that a love for the past can be reconciled with innovation. The essential feature in his music is the tension, so typical of the twentieth century, between tradition and new modes of musical expression. This tension is most explicit in such works as *Baroque Variations* for orchestra (1967), which deconstructs works by Handel, Scarlatti, and Bach. The work has received frequent international performances and has had a strong influence on younger composers. On the other hand, traditionalism is not absent in such experimental works as *Echoi* (1961–63), which, along with Foss's *Paradigm* and *Solo Observed*, is considered one of the major contemporary works for chamber ensemble.

Etudes for Organ by Lukas Foss requires four different improvisational techniques, one for each movement. In the first movement, the performer varies an exactly-notated single-line melody by freely repeating note groups. In the second movement, performers may choose the order, rhythm, octave, and/or number of notes desired from groups of notes. Forearm clusters dominate the third movement, with spontaneous choice of rhythm and white or black key clusters. The form of

this movement falls into four sections: ABA-Coda. The fourth movement includes performer choice of a four-part "religious or patriotic" hymn around which two secondary performers play four-note clusters at either end of the keyboard. These auxiliary performers interfere, *poco a poco*, with the hymn performance. Foss has used pitches (in I, II, and IV), rhythms (in I), timbre (in III), and dynamics (in II, III, and IV), each in a somewhat traditional manner, while freeing other aspects of composition and performance for improvisation.

Cornelius Cardew of AMM, which also included Lou Gare, Eddie Prevost, and Keith Rowe, adds: "The past always seems intentional, but at the time it appears to be accidental" (Cardew 1968, p. 18). The MW 2 Ensemble of Poland uses traditional instruments with two dancers and an actor, tapes, projection, and scenery (see Figure 5.2) in improvisation. Performer interaction therefore involves theatrical as well as musical improvisation (Brinkman 1979).

Figure 5.2. MW 2 Ensemble of Poland.

Morton Feldman expressed his ideas as to how music exists as time, not of, in, or about time:

> . . . This was not how to make an object . . . but how this object exists as Time. Time regained, as Proust referred to his work. Time as an Image, as Aristotle suggested. This is the area that the visual arts later began to explore. This is the area which music, deluded that it was counting out the seconds, has neglected.
>
> I once had a conversation with Karlheinz Stockhausen, where he . . . began beating on the table and said: "A sound exists either here—or here—or here." He was convinced that he was demonstrating reality to me. That the beat, and the possible placement of sounds in relation to it, was the only thing the composer could realistically hold on to. The fact that he had reduced it to so much a square foot made him think Time

was something he could handle and even parcel out, pretty much as he pleased.

> Frankly, this approach to Time bores me. I am not a clockmaker. I am interested in getting Time in its unstructured existence. That is, I am interested in how this wild beast lives in the jungle—not in the zoo. I am interested in how Time exists before we put our paws on it—our minds, our imaginations, into it. One would think that music more than any other art would be exploratory about Time. But is it? Timing—not Time—has been passed off as the real thing in music. (Feldman 1969, p. 75)

William Duckworth's *Walden Variations* (see Figure 5.3) demonstrates improvisational graphic notation. The page shown (the third and final in the score) represents a free improvisation. The events and movements to and from events are ambiguous and can be freely interpreted. Dancers, readers, slides, movies, and/or lights may be employed in keeping within the general spirit of the piece as performers understand it. Completed in 1971, *Walden Variations* represents a non-structured improvisation-based work with open instrumentation.

In the above-discussed works, the composer still claims credit for one or more of the compositional aspects of the resultant work. Giuseppi Chiari's *Quel Che Volete* brings to mind Morton Feldman's statement: "Down with the Masterpiece; up with art . . ." (Feldman 1967, p. 43). This piece consists entirely of verbal instructions ranging from indications suggesting materials not be played in a virtuosic manner to exchanging instruments among performers. However vague the score may appear, close reading reveals composer intention: "you must try and play in a traditional manner," "play as if playing was a gift," and "We must never overdo." Likewise, in *Sonant*, Mauricio Kagel uses verbal descriptions of the framework within which performers should improvise. These often intricate instructions may more appropriately produce desired results than traditional notation.

Luciano Berio's *Circles* (1960) for female voice, harp, and two percussionists includes a variety of "improvisation boxes." Figure 5.4 shows the two percussion parts (top and bottom groups of staves) with the voice in the middle. The improvisation boxes should not be confused with the small boxes that graphically represent the mallets required: i.e., the first small box in the two top lines from the left. The percussion parts here would be either impossible or highly constrained if written out. Berio notates pitches and instrumentation in specific detail. Rhythm is left to the performer. Often Berio stacks
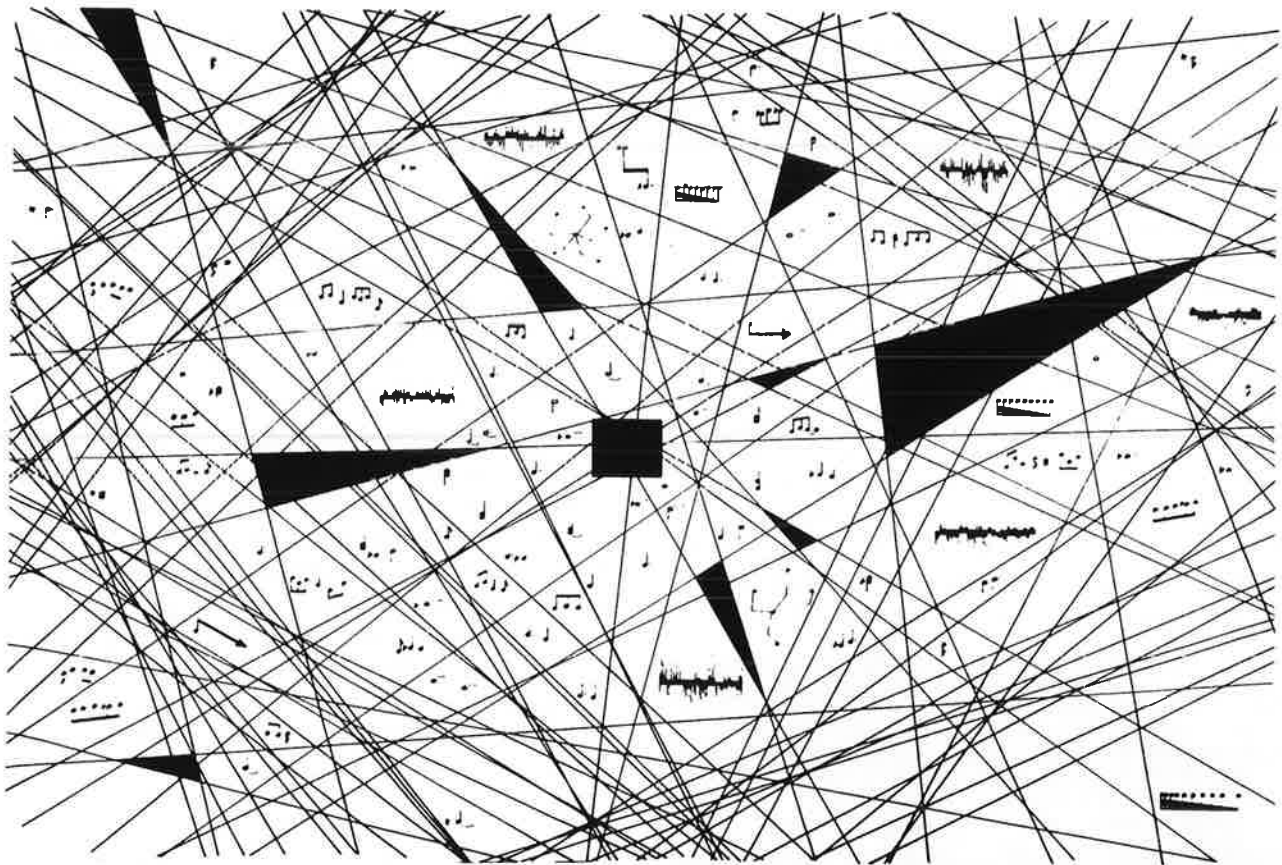
Figure 5.3. William Duckworth's *Walden Variations*.

Figure 5.4. From Luciano Berio's *Circles*. © Copyright 1961 by Universal Edition.

notes vertically in such a way that performers can proceed in any order desired. Occasionally pitches are proportionally distributed within boxes to indicate their approximate rhythmic placement or to introduce new groupings of notes. Dynamics, on the other hand, often appear as limits (i.e., *mf~pp*) with smooth crescendi and diminuendi indicated by dovetailing notations. This score contains no performance directions except the placement of instruments. Berio, it seems, feels that his notations are obvious. With the boxes occurring in only one or two parts at a time, Berio maintains control over the direction and flow of the work, allowing the improvisations to give life to each successive performance.

Robert Erickson's *Ricercar à 5* (1966) for five trombones uses many improvisational techniques. This work may be performed with five trombonists or one trombonist and four prerecorded trombones on tape. The score varies from exact notation to control of only one or two elements—most often dynamics and pitch. The interplay between parts requires sensitive and interpretative performance. The work was written for trombonist Stuart Dempster who speaks of these points in an interview.

> Question (Frank McCarty): So you began to compile a body of new sounds and techniques through research, practice, and mimicry. I assume you incorporated some of these in the improvisational music that was popular among the San Francisco composers of that era.

> Answer (Stu Dempster): Yes, those pieces gave me the first opportunity to couple my "funny sounds" with other "funny sounds" made by tapes and by other musical instruments such as Pauline's (Oliveros) accordion and Mort's (Subotnick) clarinet. I also became interested in working with composers. I did a demo for Berio in the early 1960s and asked him for a piece, never thinking he'd really do it. Later (1966), when I was working with Bob Erickson on a commission, I decided to resurrect the Berio idea. I wrote him a letter . . . and learned he was already right in the middle of the piece. The *Sequenza* (also involving improvisation techniques) was written in a way for two of us, myself and (Vinko) Globokar, who had played sketches of what became the B section. But as Berio and I worked together on the final version it became more and more my piece since he saw in me—in my performance—more and more the character of Grock, the famous European clown, about whom the piece is actually written. In the meantime, Erickson and I were spending many a Tuesday morning developing a vocabulary of sounds and sound-mixes which resulted in his composition of the *Ricercar à 5* . . . (McCarty 1974, p. 33–4)

The score to Phil Winsor's *Orgel* includes a sheet of twelve basic improvisatory boxes for organ and organ recorded on tape. The verbal indications above each box (see Figure 5.5) plus the timing and directions in the score (not shown) help to create this free improvisation.
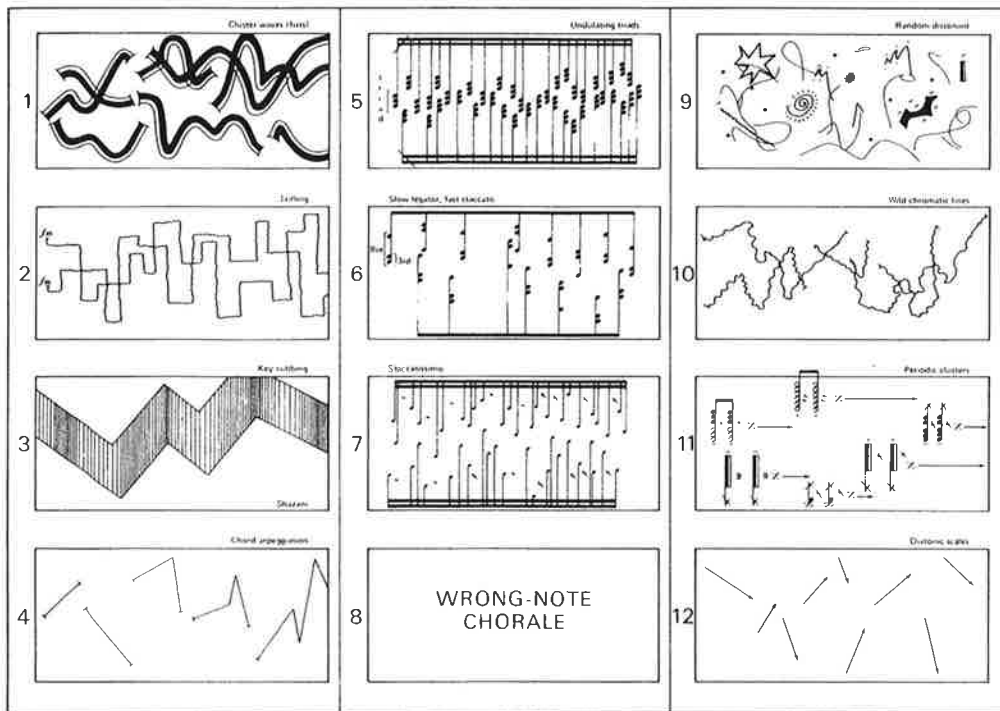
Figure 5.5. From Phil Winsor's *ORGEL I* (page X). Copyright © 1975 by Pembroke Music Co., Inc. International Copyright secured. 62 Cooper Square, NY 10003. Copying or reproducing this publication in while or in part violates the Federal Copyright Law. All rights reserved including public performance for profit.

In the last few years, improvisational techniques have helped produce a renaissance of new performance situations. Whether as a result of, or a reaction to, the restrictions of traditional notation, the creative collaborations between composers and performers help to enrich the continuum and significance of new music.

INDETERMINACY

William Hayes's *The Art of Composing Music by a Method Entirely New, Suited to the Meanest Capacity* (1751) describes a technique of composition using notes indeterminately spattered onto staff paper by running a finger over a stiff brush dipped in ink. Mozart used dice-throwing to create music (Musical Dice Game, K. 294d). Other indeterminate techniques have been attempted, even as early as the eleventh and twelfth centuries, but none with the vigor and philosophical implications of the composers of indeterminacy since the middle of the twentieth century.

Beginning in the early 1950s, John Cage developed an affinity for chance techniques using the *I Ching*. Christian Wolff had brought the English translation of this important book to Cage's attention at that time, Wolff's father Kurt Wolff being founder of the publishing house, Pantheon Press, that published it. The *I Ching*, the first written book of wisdom, philosophy, and oracle (attributed to Fu Hsi, 2953–2838 B.C.) indicates action as a result of six tosses of three coins (originally, the tossing of yarrow sticks). The example in Figure 5.6 shows all combinations of ▬ and ▬ ▬ with six tosses (heads giving ▬ and tails giving ▬ ▬). Having asked the question, "Should I use an example of the *I Ching* in this book?" and performing the required tosses, I received the following answer as a result: "Kun (indicates that in the case which it presupposes) there will be great progress and success, and the advantage will come from being correct and firm. (But) any movement in advance should not be (lightly) undertaken."

Experimental music, that is, actions the outcome of which are not foreseen, is more a philosophical than an audible phenomenon (Cage 1966). Form, intended or not, is inherent in all music, and therefore subject to analysis. It is impossible, without prior knowledge of the composer or work, to distinguish the intention or nonintention of the composer. Audiences can be presented with highly organized experimental compositions of the same general genre, instrumentation, and techniques, without reacting adversely (Corbett 1994; Higgins 1964; Kayn 1966; Young and Zazeela 1969). However, when prior knowledge of indeterminacy exists, or when a work such as John Cage's 4'33" (a

THE HEXAGRAMS, in the order in which they appear in the Yî, and were arranged by king Wăn.
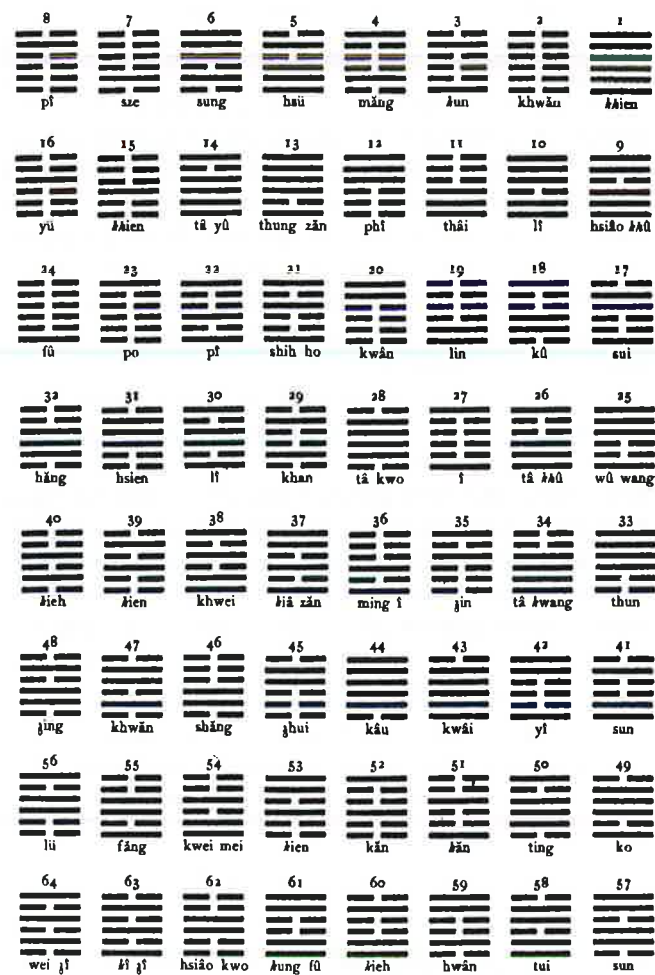
Figure 5.6. The Hexagrams from the *I Ching*. Permission for reprint granted by University Books, Inc. New Hyde Park, NY, NY 11040. Copyright 1964.

work where performers do not make sound) is performed and the audience realizes the unintention involved, reactions can be much more hostile. The audience's struggle occurs with the concept, not the sounds. "Therefore my purpose is to remove purpose," spoke John Cage in a 1962 interview with Roger Reynolds (Schwartz and Childs 1967). The idea is to let sounds happen, to free them from the composer's control (Shattuck 1968; Young and Mac Low 1963).

Figure 5.7 shows the full score to Paul Ignace's *It Is* (1946). There are no performance instructions for interpretation of this score as a musical composition. Obviously two performances of *It Is* could vary to extreme degrees in both instrumentation and content. However, without prior knowledge of the composer's procedure or visual access to the score, audiences can make few

Figure 5.7. Paul Ignace: *It Is.*
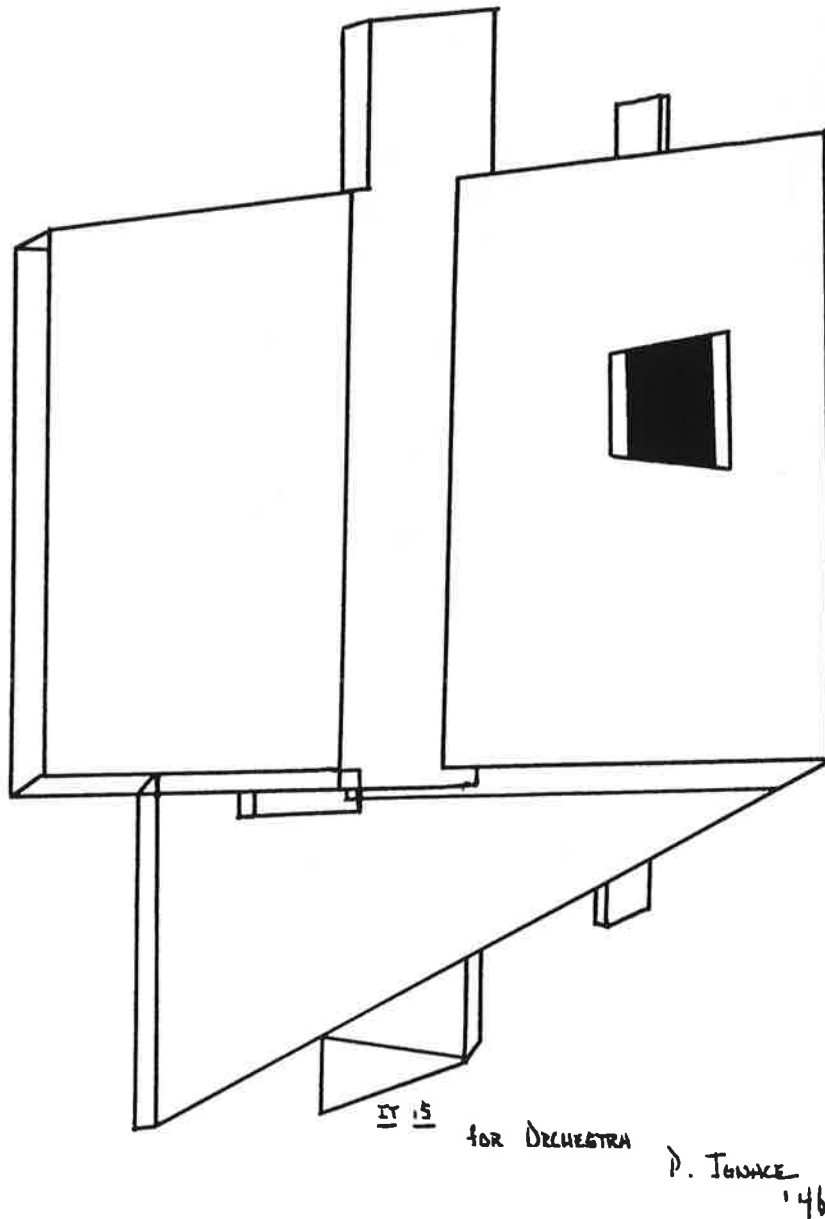
decisions concerning determinacy or indeterminacy. Earle Brown's *December 1952* is similar in nature, but more visually musical in that its short vertical and horizontal lines of varying thicknesses more easily convert to rhythmic, dynamic, and pitch realization.

Hindemith refers to chance as "one of the ugliest modern musical diseases" (Schwartz and Childs 1967, p. 89). However, most critics deal with the forms and individuals involved rather than the *concept* of indeterminacy (Copland 1968; O'Grady 1981; Satie 1977). As Cage has said, "If one is making an object and then proceeds in an indeterminate fashion, to let happen what will, outside of one's control, then one is simply being careless about the making of that object"

(Schwartz and Childs 1967, p. 341). However, if one is making an indeterminate object then proceeding *determinately* seems just as reckless.

Some critics point out that indeterminacy is not actually possible and hence argue against the rationale for attempting to approach it. Cage refers to his disappointment and the compromises that arise from the knowledge that he hasn't really done it, but merely has been ". . . going along in that general direction" (Schwartz and Childs 1967).

The terminology of indeterminacy involves certain basic American/European divisions (Childs 1969; Xenakis 1971; Yates 1967). The European term *aleatoric*, derived by Boulez from *alea*, French for risk, and origi-

Figure 5.8. John Cage. Photo by Dorothy Norman.

Figure 5.9. Morton Feldman. BMI Archives. Used by permission.

nally from the Latin word meaning dice, employs chance techniques within a controlled framework, more related to improvisation than indeterminacy (Boulez 1964). Morton Feldman has remarked, "This is true of Boulez. This is true of Stockhausen. You can see this in the way they have approached American 'chance' music. They began by finding rationalizations for how they could incorporate chance and still keep their precious integrity" (Schwartz and Childs 1967, p. 365). Boulez has expanded on the basic differences between aleatoric and chance techniques (see interview in chapter 2).

The division between American and European indeterminacy grew deeper during the 1960s and 1970s (Gagne and Caras 1982; Landy 1991; MacKenzie 1971; Sutherland 1994). Boulez remarks: "Do you see what we are getting back to? Constantly to a refusal of choice. The first conception was purely mechanistic, automatic, fetishistic; the second is still fetishistic but one is freed from choice not by numbers but by the interpreter" (Boulez 1964, p. 42). England's David Bedford and Brian Tilbury, however, championed the American cause of indeterminacy, mirroring much the same discoveries and excitement engendered by Cage and Feldman in the early fifties (Sutherland 1994).

COMPOSER INDETERMINACY

Many works are indeterminate with respect to composition but determinate with respect to performance (Cage 1966, 1973, 1979a, 1979b). Typically this music is

predictable before performance but composed using of some type of chance operation (Behrman 1964). Often such works appear in traditional notation and almost always imply determinate performance. In his *Music of Changes* (1951), Cage followed the *I Ching* to indeterminately create twenty-six large charts indicating aspects of composition (durations, tempos, dynamics). It took nine months to create *Music of Changes*, every aspect of which was based on coin tosses. Possibly no other work in the history of music has required such exacting standards in its creation, its composer having purposely attempted to withdraw his own control (Cope 1980; Reynolds 1965, 1968, 1976).

R. Murray Schafer's *The Tuning of the World*, while possibly less all-encompassing than Cage's *Music of Changes*, is modeled after the proportions of what Schafer terms the world's "soundscape" (Schafer 1977). His work involves the recording of post-industrial soundscapes and the design of soundscapes. His process of listening, called *ear cleaning*, has significant consequence in his view: "... take a sheet of paper and give it a sound ... By giving the paper a voice we have exposed its sound-soul. Every object on the earth has a sound-soul."

Magic squares (and cubes) have also been used as raw material for formal compositional techniques. These matrices of numbers add, subtract, divide, and/ or multiply to the same number regardless of the direction taken. Figure 5.10 shows a simple magic square and one possible interpretation in music. Note

that the addition of every line, including the two diagonal lines, equals 15, and no line contains more than one each of the numbers used.

Many wonder why such formalisms could not be achieved by using more musical and less mathematical means. Writings by and about Xenakis often contribute, for example, to confusion about this and other indeterminate techniques (Olson and Herbert 1961). The following discussion between Lukas Foss and Iannis Xenakis may provide some clarification:

> Foss: Iannis, all the music of yours that I know is built on mathematical premise, mostly probability. Is there any aspect to chance that is not mathematical, that is, not probability theory?
>
> Xenakis: All my music is not based on mathematics—there are parts of it which use mathematics. As to chance, it is not like dice or tossing a coin, this is ignorance, as if there were impossibility of predicting. What does chance mean to you?
>
> Foss: Anything I cannot control. (Cage, Foss, and Xenakis 1970, p. 40)

Dick Higgins's *Thousand Symphonies* involved the machine-gunning of one thousand pages of blank orchestral manuscript. Performances, though necessarily constituting some performer interpretation of the resultant holes, are basically determinate. "My machine-gunning of scores actually represents the concretization of a fantasy I had of setting the police (or armies) to composing music with their most familiar instruments—guns, machine guns. In fact . . . we actually organized an orchestral performance of the gunshot notations according to a system I worked out, and it sounded quite lovely" (letter to the author).

Mauricio Kagel's *1898* (1973), for eleven to seventeen instrumentalists and twenty to twenty-five children's voices, is freely orchestrated so that even non-pitched instruments can participate. The performance instructions provide further insight:

> The purpose of these tape recordings, among others, is to demonstrate that what is needed is not "reliable" musical education but the very opposite: an unorthodox system of changeable, ambivalent invitations to express oneself acoustically—rather than "musically." (Kagel 1979, p. 89)

This is later followed by:

> What is the difference between proper and artificial laughter? One can almost be certain that the responses to the ambiguities inherent in this unambiguous question will produce complex aural situations. (Kagel 1979, p. 89)

PERFORMER INDETERMINACY

Music that is determinate with respect to composition but indeterminate with respect to performance often appears as musical mobiles (Gagne and Caras 1982). The performance process resembles mobiles in art, where the shape, color, and design of each part are fixed, with the order and angle constantly changing.

Karlheinz Stockhausen's *Klavierstück XI, No. 7* (1957), printed on a long roll (37 by 21 inches), opens onto a special wooden stand supplied with the score. This work contains nineteen fragments, which may be played in any order. Performer instructions require glancing at the score and then playing whichever fragment may catch the eye.

> At the end of the first group, he reads the tempo, dynamic and attack indications that follow, and looks at random to any other group, which he then plays in accordance with the latter indications. "Looking at random to any other group" implies that the performer will never link up expressly chosen groups or intentionally leave out others. Each group can be joined to any of the other 18: each can thus be played at any of the six tempi and dynamic levels and with any of the six types of attack. (Stockhausen 1957)

1	4	2	3	5
2	3	5	1	4
5	1	4	2	3
4	2	3	5	1
3	5	1	4	2

Pitch: (Using 0–11 ordination—beginning on C)
Line 1—Lines 2 and 1—Lines 2, 1, and 3—etc.
(Reducing numbers over 11 by 12—e.g.
C♯ E D D♯ F D♯ G G E A G♯ G♯ B etc.)
Rhythm: 1 = ♪ 2 = ♩ 3 = ♩. 4 = 𝅗𝅥 5 = 𝅝
Timbre: 1 = horn   2 = flute   3 = piano   4 = violin   5 = cello

Figure 5.10. A magic square and possible musical interpretation.

The work concludes when a fragment occurs for a third time. Thus, performances may involve anywhere from three (the first one randomly observed three times in succession) to thirty-eight factorial (that is 38!—or 38 times 37 times 36 times 35 totaling over 3.5 million) fragments. Figure 5.11 shows the score from measures 27 to 32 of Stockhausen's *Stop* (1965). This "Pariser Version" (there is another version for full orchestra) requires eighteen performers in six groups of like timbres. This "recipe" work has determinate form (note the durations at the top of each measure) yet lacks determinate directions for performance ("noises," for example, has vague meanings). Stockhausen has a sense of the outcome in terms of form, contrast, balance, and direction—note the occasional exactly notated overlapping events—but little sense of rhythm, entrance order, and pitch. This type of work, though very different from the mobile structure of his *Klavierstück XI, No. 7*, still reflects music that is relatively determinate with respect to composition but indeterminate with respect to performance.

Henri Pousseur's piano solo *Caracteres* (1961) includes cutout windows and randomly placed score pages so that the order of the fragments cannot be predicted. Henry Cowell's *Mosaic Quartet* (1934) provides blocks of music from which performers construct performances.

Referring to his *Available Forms I* and *II* (1961–62), Earle Brown writes: "The title of the work refers to the availability of many possible forms which these composed elements may assume, spontaneously directed by the conductors in the process of performing the work. The individual musical events are rehearsed but the performances are not" (Brown 1964). In Brown's *Available Forms I* for orchestra, the score is projected at the back of the stage for the performers to read (Brown 1967). The conductor then indicates a number, which represents one of the large numerals indicated in the score. The performers read and improvise within the context of the information given in the indicated block.

In *Indeterminacy*, Cage describes Bach's *Art of the Fugue* as an example of composition which is indeterminate with respect to its performance, based on the lack of directions in regard to timbre, dynamics, sequence of notes, and durations, making available a wide range of possible realizations (Cage 1966, p. 35).

Barney Child's *Nonet* includes an *event machine* (a numbered acetate overlay and two rotating color-coded discs), which provides the order, timing, and selection of events. In Morton Feldman's *Intersection 3*, the duration, number, and timbre of sounds are determined by the composer while the dynamics and range (high, middle, and low) remain indeterminate during performance (Feldman 1966, 1969, 1985; DeLio 1996).

John Cage's *Atlas Eclipticalis* (see Figure 5.12) includes the use of contact microphones placed in various locations on the instruments. Though somewhat

Figure 5.11. From Karlheinz Stockhausen's *Stop.* © Copyright Universal Edition.
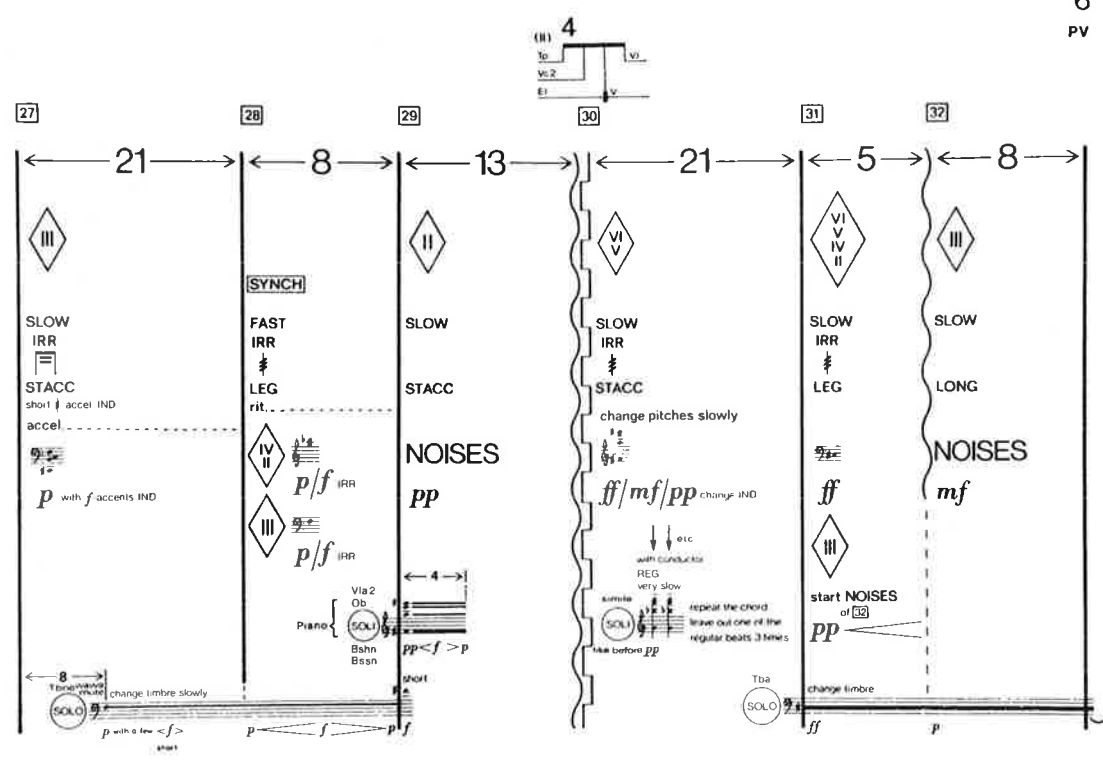
graphic in notation, this work provides pitches and directions of movement. As seen in Figure 5.13, the notation of *34′45.776″ for a Pianist* (1954) has graphic and explicit elements.

Iannis Xenakis defines music without in-performance conflict as *autonomous* (inclusive of most music to the present day) and the music of games (inclusive of music with conflict between groups or individuals during performance) as *heteronomous* (Xenakis 1971). Xenakis's *Duel* (1958–59) comprises materials like that of mobiles: a set of six events, each precisely written. Unlike mobiles, however, Xenakis's strategic games

use tactics determining which events permit interruption, with choice of events decided by performers.

Strategie (1962), for two forty-four-member orchestras, employs Xenakis's *strategie musicale*, the application of the mathematical theory of games to music. Xenakis uses seven basic sounds whose structure follows a stochastic base calculated with an IBM 70690 computer. Four hundred possible combinations exist between the two orchestras seated on opposite sides of the stage. An electric scoreboard set at the back of the stage lists the points gained and lost according to the composer's rules. "At the end of a certain number of

Figure 5.13. From John Cage's *34′ 46.776″ for a Pianist*. Copyright © 1954 by Henmar Press, Inc. Reprinted by permission of C. F. Peters Corporation.
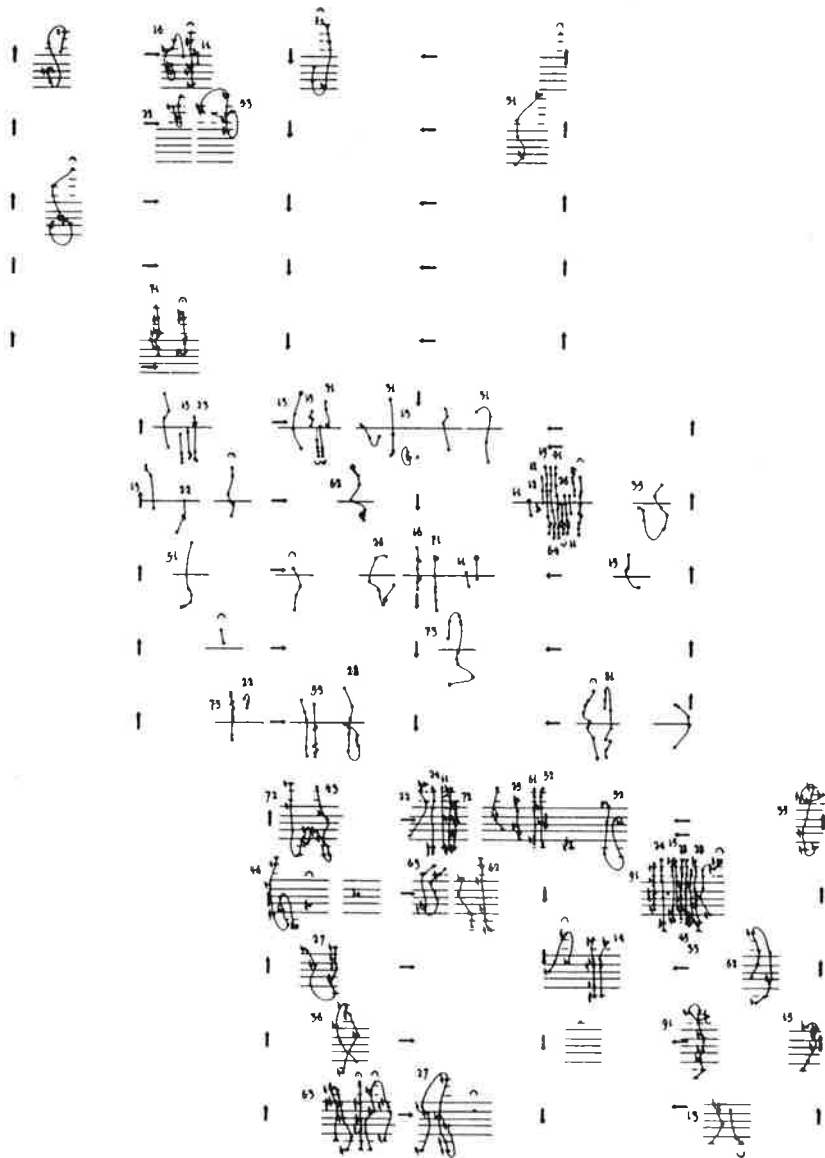
Atlas Eclipticalis, French Horn 5, Percussion 4, Cello 7, pages 245, 309, and 157

Figure 5.12. From John Cage's *Atlas Eclipticalis*. French Horn 5, Percussion 4, Cello 7, pages 157, 245, and 309. Copyright © 1962 by Henmar Press, Inc. Reprinted by permission of C. F. Peters Corporation.

100

exchanges or minutes, as agreed upon by the conductors, one of the two is declared a winner and is awarded a prize" (Xenakis 1971, p. 122).

Roman Haubenstock-Ramati's *Mobile for Shakespeare* for voice, piano, celeste, vibraphone, and three percussionists represents a good example of mobile indeterminacy (see Figure 5.14). Each box in the mobile gives a fairly straightforward, mostly traditionally-notated fragment. Haubenstock-Ramati has composed every note here. Performances will differ significantly, however, depending on the different routes taken between boxes.

Figure 5.14. From Roman Haubenstock-Ramati's *Mobile for Shakespeare.* © Copyright by Universal Edition. 1968. Used by permission.
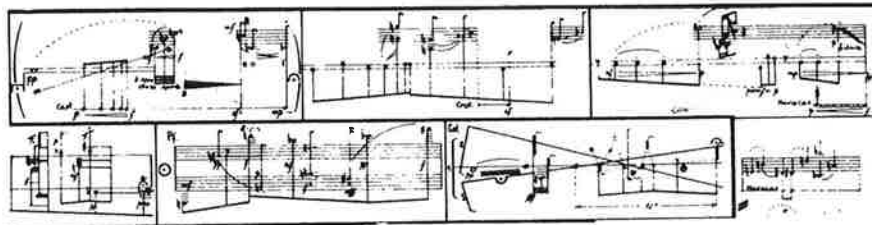
COMPOSER AND PERFORMER INDETERMINACY

Music can be indeterminate with respect to both composition and performance (Cage 1967, 1969, 1976). Christian Wolff's *Duo II for Pianists* (1958), for example, involves no score and all materials are indeterminate, except for the use of pianos indicated by the title. *Duo II* has no designated beginning or ending, these being determined entirely by the performance situation. Nam June Paik's *In Homage to John Cage* (1959) is likewise indeterminate in respect to both composition and performance. In its first performance Paik leaped offstage to Cage's seat, removed Cage's jacket and, as Calvin Tomkins puts it: "slashed his (Cage's) shirt with a wickedly long pair of scissors, cut off his necktie at the knot, poured a bottle of shampoo over his head, and then rushed out of the room" (Tomkins 1965). Paik later telephoned members of the audience to inform them that the work was completed.

Cage has also explored *contingency*-type indeterminacy:

> I have been writing pieces that I call "music of contingency," in which there is a rupture between cause and effect, so that the causes that are introduced don't necessarily produce effects. That's what contingency is. One piece, *Inlets*, uses conch shells, for example; if instead of blowing a conch shell, you fill it with water and tip it, it will sometimes gurgle and sometimes not. You have no control over it. Even if you try very hard to control it, it gurgles when it wishes to . . . when it's ready to. Sometimes if you rehearse with it and think that you've got it down pat,

you'll discover as I do, I'm sure, that it foxes you and gurgles when it chooses. (Cope 1980)

John Mizelle's *Radial Energy I* (see Figure 5.15) allows extensive freedom in choice of sound sources, number of participants, location of performance, and interpretation. In the explanation accompanying the score, Mizelle describes in detail the periods of silence between performances before the first opportunity for the piece to be concluded: one hundred fifty years. Other complete performances may last over 382 years, depending on initial performance time, with duration of the performances (between the periods of silence) computed by addition, squaring, cubing, and so on of the initial performance duration. Likewise the area of performance could be expanded, as the composer states, "to other planets, galaxies, etc. When all of time and space are transformed into sound, the piece (and the universe) ends."

Barney Childs's *The Roachville Project*, a sound sculpture for four to ten performers, verbally describes a situation in which performers and audience create an instrument out of available materials and improvise during and after its construction. Emphasis in *The Roachville Project* moves toward situation, theater, and full participation (see Figure 5.16).

Sylvano Bussotti's *Five Piano Pieces for David Tudor* (1959), a graphic score, was performed in Los Angeles three times in one concert, by three different performers. More conservative members of the audience, obviously appalled by the lack of recognizable similarities between performances, reacted antagonistically to both the performers and the work. In reference to these performances Halsey Stevens has pointed out that:

> . . . if Mr. Bussotti had wandered into the hall and didn't know what was going on, he would not have had the remotest idea that those three performances, or any one of them, might have been his own piece. They were so totally different in every respect that the only thing he could lay claim to was having designed the score, not to having composed the piece. Aleatoric music, it seems to me, as it is frequently pursued, is an amusing parlor game . . . (Cope 1973, p. 30)
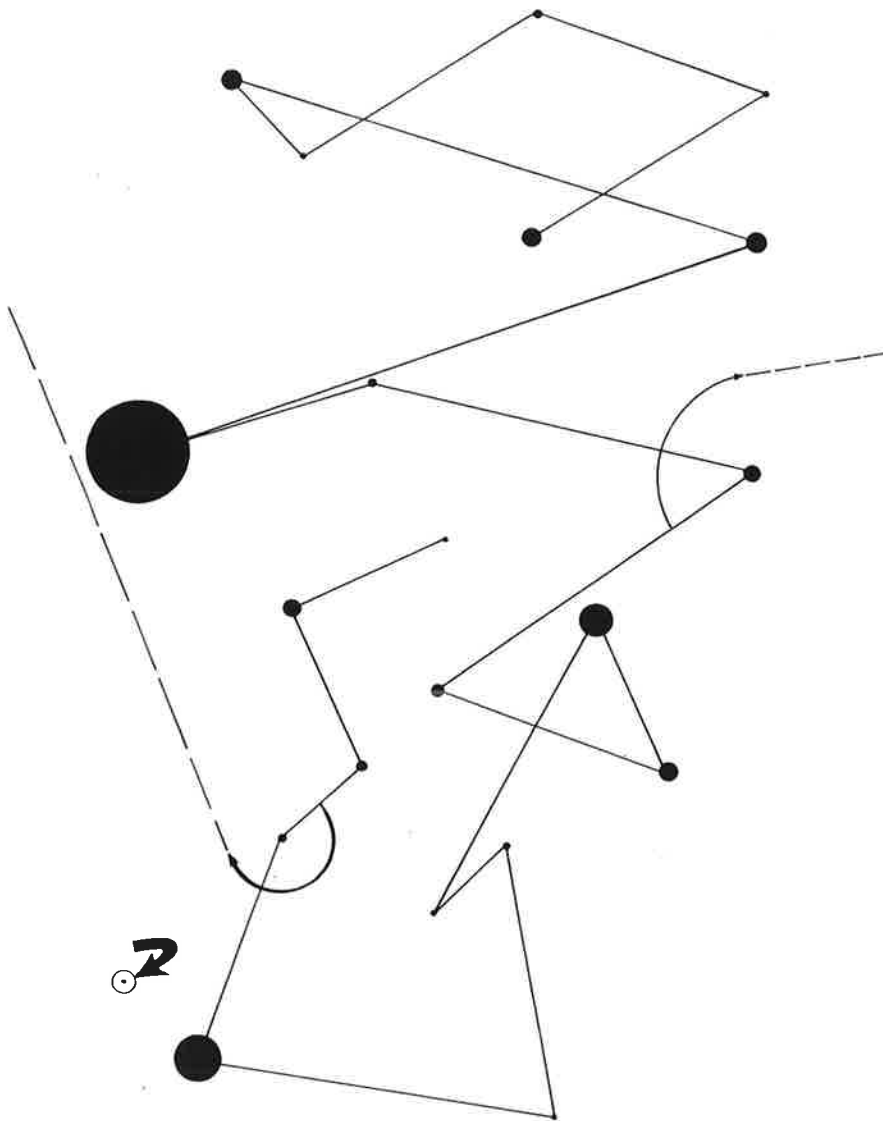
101

Had these performances been recorded and subsequently transferred into traditional notation for performer interpretation, the resultant works could have avoided the controversy. Had the piece then been performed three times, repetition would have replaced the creativity inherent in the original work (Layton 1964).

Figures 5.17 to 5.21 show the variety of notations John Cage has used, and a general cross section of types of his works. *Concert for Piano and Orchestra* (Figure 5.17, *Solo for Piano*) was written for and first performed at the 1958 Cage *Retrospective Concert* in New York City's Town Hall, with the composer conducting. The staging included a large battery of electronic equipment with Cage slowly bringing his hands together over his head in clocklike fashion. This gesture controlled the duration of this work of otherwise indeterminate notes and rhythms.

Cage's *26′1.1499″ for a String Player* (1955, see Figure 5.18) has been realized by Harold Budd for Bertram Turetzky's Nonesuch recording. Both *Variations I* (1958, see Figure 5.19) and *Fontana Mix* (1958, see Figure 5.20) graphically plot areas and physical locations for performance. The score to *Fontana Mix* indicates the contact areas on the instruments and their striking points. Since Cage has not restricted instrumentation, it is not possible to predict the outcome of a performance. Moreover, since the score results from randomly overlaying various translucent sheets, the score itself looks different in each performance. Once created, however, performers should conform to the score in very determined ways so that improvisation or reliance on past experience does not occur.

Variations IV (1963) requires performers to lay score transparencies over a map of the performance

4 to 10 performers, minimum duration 30 minutes.

Provide a great deal of material, most of which should be capable of sound production, either immediately (wires, pipes, blocks, tubes, containers, bits and pieces of musical instruments, junk, etc.) or potentially (material which when assembled or altered or worked with can be made; maybe, to produce sound in some fashion).

The piece begins with the arrival of the performers at the material. They begin to assemble the material, as they please, any way they wish, into a "musical instrument" of sorts. The complete construction is to be a unit—that is, separate people may work for a while on separate sub-units, but these must eventually be built into the complete construction. All that is necessary for assembling, finally, is ingenuity: the means of assembly (nails, staples, glue, string, sticky tape, leather straps, bailing wire, rivets, etc.) are up to the performers. Performers may converse together concerning problems of assembly and sound potential, but this must be done very quietly, and other conversation is to be avoided; performers may test parts they are working on for sound as they are assembling (i.e. test string tension by plucking, test resonances by tapping, etc.) but this must also be done very quietly. At a stipulated time, or when all agree that the instrument is completed, the performers improvise music on it, for any length of time. The composition is finished with the completion, at a pre-arranged time or by agreement among the performers, of this "piece-within-a-piece." All material provided need not, or perhaps will not, be used. If passing members of the audience wish to become performers they may, as long as the total working number of participants never exceeds 10.

Deep Springs
April 1967

*Roachville and White Mountain City were "settlements just over the White Mountain summit from Owens Valley. . . . A writer visiting there in 1864 tells all that we know of those would-be mining centers. The 'city' from which he wrote was on Wyman Creek, on the Deep Spring slope; its rival, Roachville, was on Cottonwood Creek, and was named by its proprietor, William Roach. . . ."

W. A. Chalfant, The Story of Inyo

Figure 5.17. From John Cage's *Solo for Piano (Concert for Piano and Orchestra).* Copyright © 1958 by Henmar Press, Inc. Reprinted by permission of C. F. Peters Corporation.

area that then determines the source and direction of sounds. A recording made in a Los Angeles art gallery includes Cage performing electronic equipment along with the candid conversations of the audience. Cage created a final realization of this work by selecting, evaluating, splicing, and manipulating the resultant tapes. *Theatre Piece* (1960, Figure 5.21) uses number charts to graphically represent actions.

Paintings (1965) by Louis Andriessen (Figure 5.22), for recorder and piano, has a graphic score. Even with the instructions, one cannot predict the results in performance. William Bland's *Speed* (1968) for organ (see Figure 5.23) uses traditional left-to-right reading, up/down pitch representation, and block-cluster chord notation, encouraging indeterminate performance.

Other composers employ varying degrees of graphic notations to achieve equally varied results (Sumner 1986; Young and MacLow 1963). Anestis Logothetis's scores appear at first glance as works of visual art. If one reads the instructions for his works carefully, however, clues appear that indicate aspects of composer intention (e.g., *Clusters, Odyssee*, 1963, or *Ichnologia*, 1964). Robert Moran often utilizes graphic notations, but unlike Logothetis, gives clear indication of instrumentation and possible interpretation of visual symbols (see *Four Visions*, 1963, in Karkoschka's *Notation in New Music*, or *Bombardments No. 2*, 1964). Boguslaw Schaffer has pointed out the advantages of graphic music, at least for its usefulness to mainstream musicians. In Schaffer's 1963 *Violin Concerto*, the
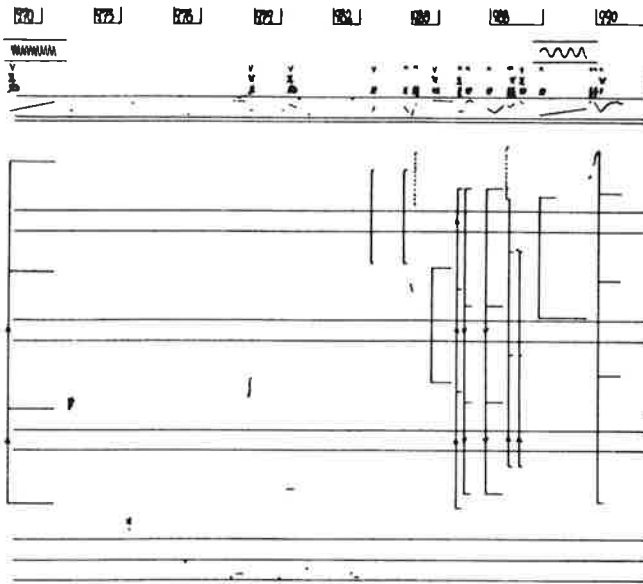
26'1.1499" for a String Player, pages 59 and 84
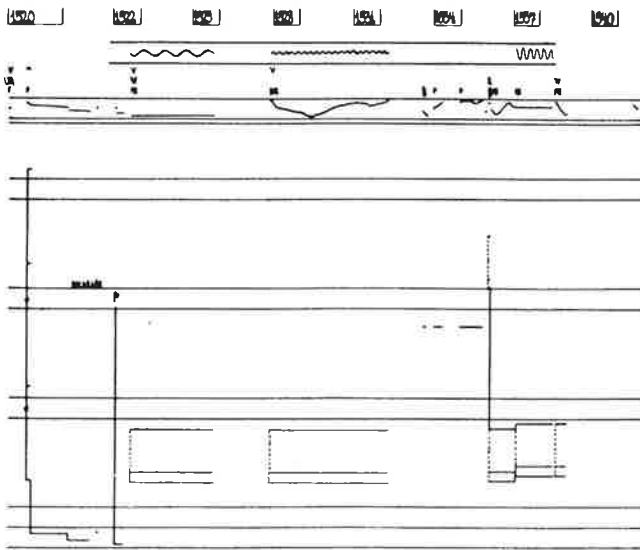
Figure 5.18. From John Cage's *26' 1.1499" for a String Player*. Copyright © 1955 by Henmar Press, Inc. Reprinted by permission of C. F. Peters Corporation.

Figure 5.19. From John Cage's *Variations I*. Copyright © 1958 by Henmar Press, Inc. Reprinted by permission of C. F. Peters Corporation.

Variations I

Variations I. Extra Materials
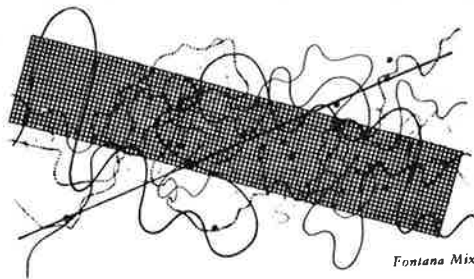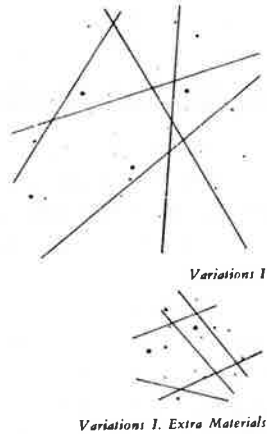
Figure 5.20. From John Cage's *Fontana Mix*. Copyright © 1958 by Henmar Press, Inc. Reprinted by permission of C. F. Peters Corporation.

Fontana Mix

Figure 5.21. From John Cage's *Theatre Piece Part VI* (one of eighteen unnumbered pages). Copyright © 1960 by Henmar Press, Inc. Reprinted by permission of C. F. Peters Corporation.
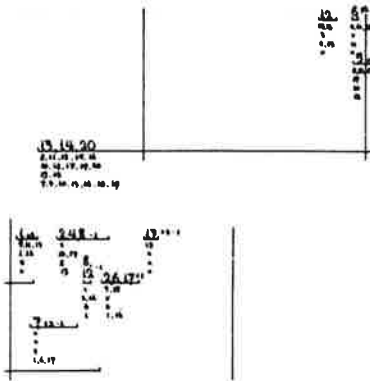
Figure 5.22. Flute part of Louis Andriessen's *Paintings*. Copyright © by Herman Moeck Verlag. Used with permission. All rights reserved.
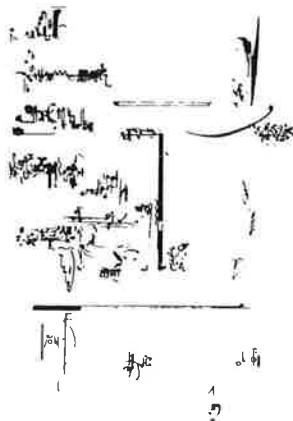
cadenza, consisting primarily of thick black waves of twisting lines, is transcribed into one possible traditionally notated version. The result, based on a rather literal translation, derives time in terms of left-to-right proportionality, pitch in terms of up-and-down relativity, and flow in terms of visual motion. This traditional version is incredibly complex, nearly unplayable, and, to some, totally foreign to the work as a whole. The plasticity of the graphic notation allows for creation of music as complex as the traditionally notated version, yet without the studied end result.

Figure 5.24 shows a portion of the score to Roman Haubenstock-Ramati's *Jeux 2* (1968) for two percussionists. Though mobile in structure, the graphic nature of the fragments themselves makes determinacy on the part of the composer or performer an impossibility. Note the difference here between *Jeux 2* and *Mobile for Shakespeare* (1959, Figure 5.14), the latter having composer control over the fragments, thus indicating performer indeterminacy. Possibly Europe's most experimental protagonist of the varieties of indeterminacy, Haubenstock-Ramati continues to explore the areas founded by John Cage, Earle Brown, and Barney Childs.

Figure 5.25 shows Robert Moran's *Sketch for a Tragic One-Act Opera*. The graphic nature of the score (even though instrumentation is traditional as shown in the left margin) contributes to composer-performer indeterminacy. This graphic sketch defines texture and dynamics more than pitches or rhythms. Other composers involved with indeterminate techniques include Folke Rabe, Bo Nilsson, Cornelius Cardew (Cardew later disowned this style to compose *political-reformation* music), Roland Kayn, Allan Bryant, Joseph Byrd, Richard Maxfield, Philip Corner, Douglas Leedy, Robert Ashley, and James Fulkerson (Brecht 1991).

105

Composers

Styles and Works

John Adams   (1947 -   )

John Adams is one of the best known and most often performed of America's composers. As Andrew Porter wrote in *The New Yorker*, Adams is the creator of a "flexible new language capable of producing large-scale works that are both attractive and strongly fashioned. His is a music whose highly polished resonant sound is wonderful." *Le Monde* says that his music "...gives the impression of a rediscovered liberty, of an open door which lets in the fresh air in great gusts."

Adams was born in Worcester, Massachusetts on 15 February 1947. During his youth, growing up in Vermont and New Hampshire, he was strongly influenced by the intellectual and cultural institutions of New England. He received both his BA and MA degrees from Harvard University, where he was active as a conductor, clarinetist, and composer. His principal teachers included Leon Kirchner, David Del Tredici, and Roger Sessions.

In 1971 Adams began an active career in the San Francisco area, teaching at the San Francisco Conservatory of Music (1972-83) and serving as new music adviser and composer-in-residence for the San Francisco Symphony (1978-85). His creative output spans a wide range of media: works for orchestra, opera, video, film, and dance, as well as electronic and instrumental music. Such pieces as *Harmonium*, *Harmonielehre*, *Shaker Loops*, and *The Chairman Dances* are among the best known and most frequently performed of contemporary American music. In these works he has taken minimalism into a new and fresh terrain characterized by luminous sonorities and apowerful and dramatic approach to form.

Adams's works have been programmed by every major orchestra in the United States as well as orchestras throughout Europe, Asia, and Australia. His music has also been choreographed by numerous dance companies including Dance Theater of Harlem (Garth Fagan) and the New York City Ballet (Peter Martins). Adams's two operas, *Nixon in China* (1987) and *The Death of Klinghoffer* (1991) have been among the more controversial and widely seen stage events in recent history.

John Adams has become increasingly active as a conductor of his own and other 20th-century music. From 1987 to 1990 Adams served as creative chair of the St. Paul Chamber Orchestra, conducting four weeks of concerts and overseeing their new music activities. In 1993, he served as music director of the Ojai Festival. With the Ensemble Modern he led a European tour in 1993 and an American tour in 1996. He has also conducted the Cleveland Orchestra, San Francisco Symphony, the Los Angeles Philharmonic, the Orchestra of St. Luke's, the Concertgebouw, and the London Sinfonietta. In February 1997 he led the San Francisco Symphony in performances and a recording of *Harmonium*. He was also the focus of the New York Philharmonic's Composer Week in the spring of 1997.

The music of John Adams has been recorded in multiple versions on the Nonesuch, EMI/Angel, Philips, ECM, Chandos, New Albion, and 1750 Arch labels. Among recent recordings are his *Grand Pianola Music* with the Netherlands Wind Ensemble conducted by Stephen Mosko, a new release of *Harmonielehre* and *The Chairman Dances* conducted by Simon Rattle, and *Harmonium* conducted by Leonard Slatkin. In 1985, *Harmonielehre* was honored as "Best Classical Album" by both *Time* and *USA Today*. *Harmonium*, *Grand Pianola Music*, *Shaker Loops*, *Harmonielehre*, *Phrygian Gates*, and *China Gates* are available in published form from Associated Music Publishers.

Belá Bartók (1881-1945)

(born Sînnicolau Mare, 25 March 1881; died New York, 26 September 1945).

He began lessons with his mother, who brought up the family after his father's death in 1888. In 1894 they settled in Bratislava, where he attended the Gymnasium (Dohnányi was an elder schoolfellow), studied the piano with Laszlo Erkel and Anton Hyrtl, and composed sonatas and quartets. In 1898 he was accepted by the Vienna Conservatory, but following Dohnányi he went to the Budapest Academy (1899-1903), where he studied the piano with Liszt's pupil Istvan Thoman and composition with Janos Koessler. There he deepened his acquaintance with Wagner, though it was the music of Strauss, which he met at the Budapest premiere of *Also sprach Zarathustra* in 1902, that had most influence. He wrote a symphonic poem, *Kossuth* (1903), using Strauss's methods with Hungarian elements in Liszt's manner.

In 1904 *Kossuth* was performed in Budapest and Manchester; at the same time Bartók began to make a career as a pianist, writing a Piano Quintet and two Lisztian virtuoso showpieces (Rhapsody op.1, Scherzo op.2). Also in 1904 he made his first Hungarian folksong transcription. In 1905 he collected more songs and began his collaboration with Kodály: their first arrangements were published in 1906. The next year he was appointed Thoman's successor at the Budapest Academy, which enabled him to settle in Hungary and continue his folksong collecting, notably in Transylvania. Meanwhile his music was beginning to be influenced by this activity and by the music of Debussy that Kodály had brought back from Paris: both opened the way to new, modal kinds of harmony and irregular metre. The 1908 Violin Concerto is still within the symphonic tradition, but the many small piano pieces of this period show a new, authentically Hungarian Bartók emerging, with the 4ths of Magyar folksong, the rhythms of peasant dance and the scales he had discovered among Hungarian, Romanian and Slovak peoples. The arrival of this new voice is documented in his String Quartet no.1 (1908), introduced at a Budapest concert of his music in 1910.

There followed orchestral pieces and a one-act opera, *Bluebeard's Castle*, dedicated to his young wife. Influenced by Mussorgsky and Debussy but most directly by Hungarian peasant music (and Strauss, still, in its orchestral pictures), the work, a grim fable of human isolation, failed to win the competition in which it was entered. For two years (1912-14) Bartok practically gave up composition and devoted himself to the collection, arrangement and study of folk music, until World War I put an end to his expeditions. He returned to creative activity with the String Quartet no.2 (1917) and the fairytale ballet *The Wooden Prince*, whose production in Budapest in 1917 restored him to public favour. The next year *Bluebeard's Castle* was staged and he began a second ballet, *The Miraculous Mandarin*, which was not performed until 1926 (there were problems over the subject, the thwarting and consummation of sexual passion). Rich and graphic in invention, the score is practically an opera without words.

While composing *The Mandarin* Bartók came under the influence of Stravinsky and Schönberg, and produced some of his most complex music in the two violin sonatas of 1921-2. At the same time he was gaining international esteem: his works were published by Universal Edition and he was invited to play them all over Europe. He was now well established, too, at home. He wrote the confident Dance Suite (1923) for a concert marking the 50th anniversary of Budapest, though there was then another lull in his composing activity until the sudden rush of works in 1926 designed for himself to play, including the Piano Concerto no.1, the Piano Sonata and the suite *Out of Doors*. These exploit the piano as a percussion instrument, using its resonances as well as its xylophonic hardness. The search for new sonorities and driving rhythms was continued in the next two string quartets (1927-8), of which no.4, like the concerto, is in a five-section palindromic pattem (ABCBA).

Similar formal schemes, with intensively worked counterpoint, were used in the Piano Concerto no.2 (1931) and String Quartet no.5 (1934), though now Bartók's harmony was becoming more diatonic. The move from inward chromaticism to a glowing major (though modally tinged) tonality is basic to the

Music for Strings, Percussion and Celesta (1936) and the Sonata for Two Pianos and Percussion (1937), both written for performance in Switzerland at a time when the political situation in Hungary was growing unsympathetic.

In 1940 Bartók and his second wife (he had divorced and remarried in 1923) sadly left war-torn Europe to live in New York, which he found alien. They gave concerts and for a while he had a research grant to work on a collection of Yugoslav folksong, but their finances were precarious, as increasingly was his health. It seemed that his last European work the String Quartet no.6 (1939), might be his pessimistic swansong, but then came the exuberant Concerto for Orchestra (1943) and the involuted Sonata for solo violin (1944). Piano Concerto no.3, written to provide his widow with an income, was almost finished when he died, a Viola Concerto left in sketch.

Béla Bartók's Musical Style

Background / Influences

Bartók set out from the influence of Wagner, Liszt, Brahms, and Richard Strauss. Through his development, he mastered and outgrew the devices of French Impressionism. He drew some inspiration from Stravinsky and Schoenberg but was bound to the classical heritage because of his ties to the beauty and logic of form. (See Neoclassicism)

Taking Liszt as his first model, he explored the musical traditions of his homeland and ultimately achieved a remarkable personal synthesis of elements drawn in approximately equal measure from Hungarian folk and Western art sources, thereby charting one of the most characteristic lines of 20th-century musical development.

He studied piano and composition at the Budapest Academy, at first distinguishing himself primarily as a pianist. A performance of Strauss's "Also sprach Zarathustra" in 1902, however, reignited the spark of composition, the result being the symphonic poem "Kossuth" (see below).

Liszt had been exclusively concerned with the music of the Gypsies, whom he considered the founders of an indigenous Hungarian national style. The music of the Hungarian peasants, on the other hand, he considered to be not only inferior in quality but entirely derived from -- and thus a perversion of -- Gypsy music. In 1904, however, when Bartók began to go out in the countryside to hear and write down folk melodies, he found that the opposite was the case: the music of the farmers and peasants was the true folk music of Hungary, of which Gypsy music was an urban and largely commercial adaptation, incorporating numerous Western influences.

Style

Bartók, upon studying the Hungarian folklore, felt freed from the restraints of traditional major/minor tonality. The peasant tunes, based on old modes and pentatonic scales, were very liberating for him. His characteristic melodies seemed to circle around a given note and move within a narrow range. He was fond of repeating fragments on different beats of the measure, producing primitive effects like a melody turning in on itself. The influence of folk songs was also manifest in his use of the intervals of seconds, fourths, and sevenths.

He loosened the old modes through chromatic ornamentation. He also experimented with polymodality. His fondness for the simultaneous use of major and minor sonorities was a result of his experimentation. Characteristic is his technique of superimposing independent streams of chords, as well as quartal harmony, cluster chords, and parallel seconds, sevenths and ninths.

From the folk dances of southeastern Europe, he incorporated numerous asymmetrical formations. He had a fondness for repeated notes and passages based on alternating patterns. He, along with Stravinsky, played a major role in the revitalization of western rhythm. His orchestration exemplifies the contemporary tendency to use color for the projection of ideas rather than an end in itself.

Bartók was preoccupied with formal unity and coherence, which he attained through the cumulative development and continuous variation of themes and motives.

The compositions of the late 1920s and the 1930s incorporate a wealth of different

scalar resources -- including diatonic, whole-tone, octatonic, and chromatic types -- into a remarkably flexible new stylistic amalgam.   By arriving at complex pitch configurations through the addition of simpler and more basic building blocks, Bartók was able to integrate a remarkable varied fund of pitch material, ranging from the simplest diatonicism to full twelve-tone chromaticism. (See "Mikrokosmos" below)

Musical Works

Significantly, the program for the symphonic poem, "Kossuth" (1903), concerns the life of a Hungarian national hero; and the music, despite affinities to Strauss, also reflects the influence of Liszt. The Lisztian strain becomes yet more pronounced in the "Rhapsody," Op. 1, originally for piano solo, later arranged for piano and orchestra (1904). Its form is based on the traditional structure of Hungarian Gypsy music -- a slow introductory section followed by a fast, dancelike one -- which Liszt had employed in his Hungarian Rhapsodies.

Bartók's preoccupation for classical form is evident in his "First String Quartet" (1908). It represents his first mature and fully successful realization of an extended developmental form. It inaugurates a series of six quartets that, taken as a group, form one of the major musical achievements of the first half of the century.

"Allegro barbaro" (1911) is a keyboard piece of elemental rhythmic force whose character and title suggest a strong kinship with "The Rite of Spring," which Stravinsky began composing in the same year.

The first completely convincing synthesis of the full range of Bartók's compositional influences was achieved in the one-act opera "Bluebeard's Castle" (1911). Although it contains no actual folk material, the score is pervaded with the character of the native music Bartók had been intensively studying.

Bartók, incorporating his native folk tunes, tended to devise more and more elaborate accompaniments for the melodies, shifting the emphasis from the original tune to the total effect of its presentation. In "For Children" (a set of 85 folk tune settings - 1909), the accompaniments are still relatively simple in texture, but in the "Fifteen Hungarian Peasant Songs" (1917) one finds a wealth of pianistic variety, including doubling and elaborate registral layouts. In the "Sonatina for Piano" (1915) the accompaniment represents a completely integrated component of a complex compositional conception, each movement of which far transcends the formal scope and expressive intent of the folk material on which it is based.

After the temporary retreat from public life brought on by the rejection of "Bluebeard's Castle," Bartók achieved a resounding success in 1917 with the premiere of his ballet "The Wooden Prince." This in turn stimulated the production of the opera the following year. His next work, another ballet, "The Miraculous Mandarin" (1919), was banned because of the eroticism of it scenario. The ballet's heated aggressiveness and morbid tone may well reflect the emotional stress attendant upon life in Hungary at the time.

Passages from "Mikrokosmos," a graded six-volume series of short pieces for piano students, illustrate different solutions to the integrations of opposing scalar configurations, such as octatonic and diatonic. In the opening phrase of the piece "Diminished Fifth" the entirely octatonic scale is generated by a combination of two diatonic tetrachords a diminished fifth apart, each assigned to one of the pianist's hands in a quasi-imitative texture. At the beginning of "From the Island of Bali" the octatonic material is again generated by combining two four-note units in an imitative texture, but here the individual units are essentially chromatic rather than diatonic.

Alban Berg (1885-1935)

(born Vienna, 9 February 1885; died there, 24 December 1935).

He wrote songs as a youth but had no serious musical education before his lessons with Schönberg, which began in 1904. Webern was a pupil at the same time, a crucial period in Schönberg's creative life, when he was moving rapidly towards and into atonality. Berg's Piano Sonata op.1 (1908) is still tonal, but the Four Songs op.2 (1910) move away from key and the op.3 String Quartet (1910) is wholly atonal; it is also remarkable in sustaining, through motivic development, a larger span when the instrumental works of Schönberg and Webern were comparatively momentary. Berg dedicated it to his wife Helene, whom he married in 1911.

Then came the Five Songs for soprano op.4 (1912), miniatures setting poetic instants by Peter Altenberg. This was Berg's first orchestral score, and though it shows an awareness of Schönberg, Mahler and Debussy, it is brilliantly conceived and points towards *Wozzeck* - and towards 12-note serialism, notably in its final passacaglia. More immediately Berg produced another set of compact statements, the Four Pieces for clarinet and piano op.5 (1913), then returned to large form with the Three Orchestral Pieces op.6 (1915), a thematically linked sequence of prelude, dance movement and funeral march. The prelude begins and ends in the quiet noise of percussion; the other two movements show Berg's discovery of how traditional forms and stylistic elements (including tonal harmony) might support big structures.

In May 1914 Berg saw the Vienna premiere of Büchner's *Woyzeck* and formed the plan of setting it. He started the opera in 1917, while he was in the Austrian army (1915-18), and finished it in 1922. He made his own selection from the play's fragmentary scenes to furnish a three-act libretto for formal musical setting: the first act is a suite of five character pieces (five scenes showing the simple soldier Wozzeck in different relationships), the second a five-movement symphony (for the disintegration of his liaison with Marie), the third a set of five inventions on different ostinato ideas (for the tragedy's brutally nihilist climax). The close musical structuring, extending to small details of timing, may be seen as an analogue for the mechanical alienness of the universe around Büchner's central characters, though Berg's music crosses all boundaries, from atonal to tonal (there is a Mahlerian interlude in d Minor), from speech to song, from café music to sophisticated textures of dissonant counterpoint. *Wozzeck* had its premiere in Berlin in 1925 and thereafter was widely produced, bringing Berg financial security.

His next work, the Chamber Concerto for violin, piano and 13 wind (1925), moves decisively towards a more classical style: its three formally complex movements are still more clearly shaped than those of the op.6 set and the scoring suggests a response to Stravinskian objectivity. The work is also threaded through with ciphers and numerical conceits, making it a celebration of the triune partnership of Schönberg, Berg and Webern. Then came the Lyric Suite for string quartet (1926), whose long-secret programme connects it with Berg's intimate feelings for Hanna Fuchs-Robettin - feelings also important to him in the composition of his second opera, *Lulu* (1929-35). The suite, in six movements of increasingly extreme tempo, uses 12-note serial along with other material in projecting a quasi-operatic development towards catastrophe and annulment. The development of *Lulu* was twice interrupted by commissioned works, the concert aria *Der Wein* on poems by Baudelaire (1929) and the Violin Concerto (1935), and it remained unfinished at Berg's death: his widow placed an embargo on the incomplete third act which could not be published or performed until 1979. As with *Wozzeck*, he made his own libretto out of stage material, this time choosing two plays by Wedekind, whom he had long admired for his treatment of sexuality. Dramatically and musically the opera is a huge palindrome, showing Lulu's rise through society in her successive relationships and then her descent into prostitution and eventual death at the hands of Jack the Ripper. Again the score is filled with elaborate formal schemes, around a lyricism unloosed by Berg's individual understanding of 12-note serialism. Something of its threnodic sensuality is continued in the Violin Concerto, designed as a memorial to the teenage daughter of Mahler's widow.

John Cage (1912-1992)

(born Los Angeles, 5 September 1912; died New York, 12 August 1992).

He left Pomona College early to travel in Europe (1930-31), then studied with Cowell in New York (1933-4) and Schönberg in Los Angeles (1934): his first published compositions, in a rigorous atonal system of his own, date from this period. In 1937 he moved to Seattle to work as a dance accompanist, and there in 1938 he founded a percussion orchestra; his music now concerned with filling units of time with ostinatos (**First Construction (in Metal)**, 1939). He also began to use electronic devices (variable-speed turntables in **Imaginary Landscape no.1**, 1939) and invented the 'prepared piano', placing diverse objects between the strings of a grand piano in order to create an effective percussion orchestra under the control of two hands. He moved to San Francisco in 1939, to Chicago in 1941 and back to New York in 1942, all the time writing music for dance companies (notably for Merce Cunningham), nearly always for prepared piano or percussion ensemble. There were also major concert works for the new instrument: **A Book of Music** (1944) and **Three Dances** (1945) for two prepared pianos, and the **Sonatas and Interludes** (1948) for one.
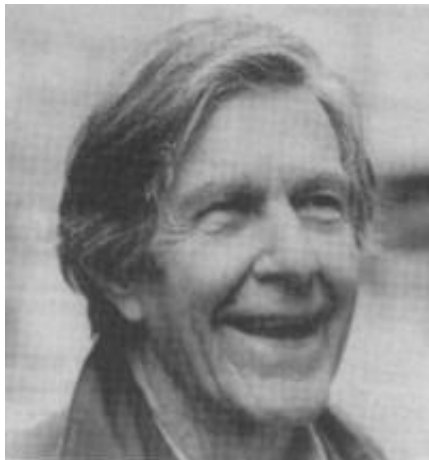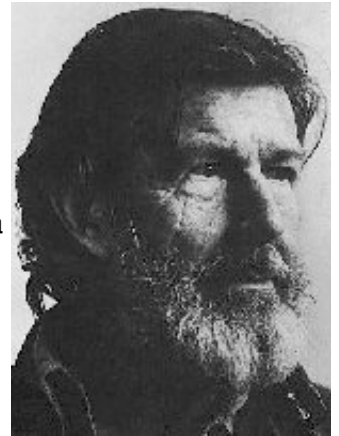
During this period Cage became interested in Eastern philosophies, especially in Zen, from which he gained a treasuring of non-intention. Working to remove creative choice from composition, he used coin tosses to determine events (**Music of Changes** for piano, 1951), wrote for 12 radios (**Imaginary Landscape no.4**, also 1951) and introduced other indeterminate techniques. His **4'33"** (1952) has no sound added to that of the environment in which it is performed; the **Concert for Piano and Orchestra** (1958) is an encyclopedia of indeterminate notations. Yet other works show his growing interest in the theatre of musical performance (**Water Music**, 1952, for pianist with a variety of non-standard equipment) and in electronics (**Imaginary Landscape no.5** for randomly mixed recordings, 1952; **Cartridge Music** for small sounds amplified in live performance, 1960), culminating in various large-scale events staged as jamborees of haphazardness (**HPSCHD** for harpsichords, tapes etc, 1969).

The later output is various, including indeterminate works, others fully notated within a very limited range of material, and pieces for natural resources (plants, shells). Cage also appeared widely in Europe and the USA as a lecturer and performer, having an enormous influence on younger musicians and artists; he wrote several books.

Claude Debussy (1862-1918)

(born St. Germain-en-Laye, 22 August 1862; died Paris, 25 March 1918).

He studied with Guiraud and others at the Paris Conservatoire (1872-84) and as prizewinner went to Rome (1885-7), though more important Impressions came from his visits to Bayreuth (1888, 1889) and from hearing Javanese music in Paris (1889). Wagner's influence is evident in the cantata "La damoiselle élue" (1888) and the "Cinq poèmes de Baudelaire" (1889) but other songs of the period, notably the settings of Verlaine ("Ariettes oubliées", "Trois mélodies", "Fêtes galantes", set 1) are in a more capricious style, as are parts of the still somewhat Franckian "G Minor String Quartet" (1893); in that work he used not only the Phrygian mode but also less standard modes, notably the whole-tone mode, to create the floating harmony he discovered through the work of contemporary writers: Mallarmé in the orchestral "Prélude à 'L'après-midi d'un faune'" (1894) and Maeterlinck in the opera "Pelléas et Mélisande", dating in large part from 1893-5 but not completed until 1902. These works also brought forward a fluidity of rhythm and color quite new to Western music.

"Pelléas," with its rule of understatement and deceptively simple declamation, also brought an entirely new tone to opera - but an unrepeatable one. Debussy worked on other opera projects and left substantial sketches for two pieces after tales by Poe ("Le diable dans le beffroi" and "La chûte de la maison Usher"), but nothing was completed. Instead the main works were orchestral pieces, piano sets and songs.

The orchestral works include the three "Nocturnes" (1899), characteristic studies of veiled harmony and texture ('Nuages'), exuberant cross-cutting ('Fêtes') and seductive whole-tone drift ('Sirènes'). "La mer" (1905) essays a more symphonic form, with a finale that works themes from the first movement, though the centerpiece ('Jeux de vagues') proceeds much less directly and with more variety of color. The three "Images" (1912) are more loosely linked, and the biggest, 'Ibéria', is itself a triptych, a medley of Spanish allusions. Finally the ballet "Jeux" (1913) contains some of Debussy's strangest harmony and texture in a form that moves freely over its own field of motivic connection. Other late stage works, including the ballets *Khamma* (1912) and *La boîte à joujoux* (1913) and the mystery play *Le martyre de St.* "Sébastien" (1911), were not completely orchestrated by Debussy, though "St. Sébastien" is remarkable in sustaining an antique modal atmosphere that otherwise was touched only in relatively short piano pieces (e.g.'La cathédrale engloutie').

The important piano music begins with works which, Verlaine fashion, look back at rococo decorousness with a modern cynicism and puzzlement ("Suite bergamasque," 1890; "Pour le piano," 1901). But then, as in the orchestral pieces, Debussy began to associate his music with visual impressions of the East, Spain, landscapes etc., in a sequence of sets of short pieces. His last volume of "Etudes" (1915) interprets similar varieties of style and texture purely as pianistic exercises and includes pieces that develop irregular form to an extreme as well as others influenced by the young Stravinsky (a presence too in the suite "En blanc et noir" for two pianos, 1915). The rarefaction of these works is a feature of the last set of songs, the "Trois poèmes de Mallarmé" (1913), and of the "Sonata for flute, viola and harp" (1915), though the sonata and its companions also recapture the inquisitive Verlainian classicism. The planned set of six sonatas was cut short by the composer's death from rectal cancer.

Claude Debussy's Musical Style

Background

Debussy provided the first real alternative to the music and style of the German Romantic Wagnerians. He established France as a musical power and opened up Western music to non-Western influences. He drew from many sources, including:

- French opera composers such as Gounod
- Mussorgsky (Coronation scene in "Boris Godunov" and "Pictures at an Exhibition")
- Gregorian chant
- Renaissance polyphony
- ragtime
- Eastern sources

He is the last composer to decisively change the whole world of music. His musical career can be divided into three basic periods.

First Style Period

This period is marked by his move away from salon music to a more serious/artistic approach. Two examples are:

- Suite Bergamesque (1893) - not Impressionistic
- String Quartet (1893)
  - clear melodies
  - long lyrical lines
  - harmony fairly tonal
  - modality creeping in

Second Style Period (Impressionistic)

The work that ushers Debussy into his second (Impressionistic) period is "**Prelude to the Afternoon of a Faun**" (1894). It is probably his best known work. Many Impressionistic techniques can be seen in "Prelude." They are:

- **Orchestration**
  - Impressionistic use of tone color
  - new orchestral combinations
  - lyrical wind writing
  - preference for muted string sounds and "nonheroic" brass
  - delicate percussive sounds
  - extensive use of harp
  - soloistic writing
- **Melody and Harmony**
  - importance of melody over harmonic progression and rhythm
  - harmony as a dimension of melody instead of as accompaniment
  - use of modes and scales such as the whole-tone and pentatonic
  - free chromaticism
  - ambiguous harmonies and tonal centers
  - mixture of functional and non-functional progressions
  - rich chords
  - nonfunctional use of 7th and 9th chords
  - chord planing

- fragmentary melodies
- **Rhythm**
  - complex and non-metrical rhythms
- **Texture**
  - subtle polyphony
  - chord planing
  - harmony as a dimension of melody instead of as accompaniment
- **General**
  - allusion and understatement
  - overall concern for private communication

Other exemplary works in this period are:

- the opera "**Pelleas et Melisande**" (1893-1902)
  - ranks as one of the finest operas of the 20th century
  - filled with gloom and internal action
  - voices engage in recitative-like singing style that is conversational and fragmentary and well suited to the French language
- the orchestral work "**La Mer**"
  - filled with advanced and colorful orchestration techniques
- Impressionistic piano works include:
  - "**Estampes**" (1903)
  - 2 books of "**Images**" (1905)
  - "**Children's Corner**" (1908) - includes "Golliwog's Cake Walk," which incorporates a satirical quotation from Wagner's "Tristan"
  - 2 books of "**Preludes**" (1909, 1913)

Third Style Period

Debussy's third period begins around 1912-13. He shows a move away from Impressionism and toward a more textural and formal economy. Poetic titles of the middle period disappear in favor of the classical titles he used as a youth.

- ballet "**Jeux**" (1912)
- **Sonatas** for
  - cello and piano
  - violin and piano
  - flute, viola and harp (uses polyrhythms and bitonality)
- 12 "**Etudes**" for piano
  - influenced by Chopin
  - each explores a different technical problem
- "**Study for Chords**" (uses the piano as a percussion instrument, similar to Bartok and others)

Overview of Compositional Style

Debussy's **innovations** were based to some extent on:

- the special and subtle inflections of the French language and poetry;
- on the character and length of sound (as opposed to strong metrical and rhythmic accent);
- on the fluid and asymmetrical organization of French meter, rhythm, accent, and phrase.

He extended this kind of rhythmical and phrase organization into every aspect of music: thus melodic, harmonic, rhythmic, and timbral concepts are organized

around qualities of sound patterns and relationships.

- Debussy's **vocabulary** of sound is chosen for its sensual qualities,
- and the motion from one sound pattern to the next is built on intervallic relationships and on parallelisms of structure.

It has often been suggested that the whole-tone scale, and its ambiguities, forms the basis of Debussy's music. However, whole-tone relationships are used by him in conjunction with, or as part of, a much more complex group of melodic and harmonic usages -- interlocking pentatonic structures, for example, based on a fundamental principle of symmetry.

Characteristics of his style are

- chains of thirds, of seventh, ninth, or eleventh chords,
- or of related structures built on fourths or major seconds,
- arranged in pentatonic, whole-tone, diatonic, or chromatic patterns.
- Rhythmic and phrase structure are also built on parallelism and symmetry.

Debussy was the first to use an **alternative musical concept**

- based on symmetrical patterns and structures
- with a highly weakened directional motion
- and thus a very ambiguous sense of tonal organization.
- He often consciously exploits this ambiguity, setting it by contrast against clear tonal, cadential statements.

Rhythm, **phrase**, **dynamics**, **accent,** and **tone color** are largely freed from direct dependence on tonal motion because of Debussy's ambiguities. Thus, they tend to gain an importance in the musical process almost equal to that of melody and harmony. One may find individual sound patterns and even isolated sounds which seem to create their own context.

An analogy might be drawn from one of Debussy's own musical "subjects", the sea. Like his music, the waves of the sea form a powerful surge of undulating motion in varying crests and troughs without necessarily any real movement underneath.

Philip Glass (1937-)

Born in Baltimore on January 31, 1937, Philip Glass discovered music in his father's radio repair shop. In addition to servicing radios, Ben Glass carried a line of records and, when certain ones sold poorly, he would take them home and play them for his three children, trying to discover why they didn't appeal to customers. These happened to be recordings of the great chamber works, and the future composer rapidly became familiar with Beethoven quartets, Schubert sonatas, Shostakovich symphonies and other music then considered "off-beat". It was not until he was in his upper teens that Glass began to encounter more "standard" classics.

Glass began the violin at six and became serious about music when he took up the flute at eight. But by the time he was 15, he had become frustrated with the limited flute repertory as well as with the musical life in post-war Baltimore. During his second year in high school, he applied for admission to the University of Chicago, was accepted, and, with his parent's encouragement, moved to Chicago where he partly supported him-self with part-time jobs waiting tables and loading air-planes at airports. He majored in mathematics and philosophy, and in off hours practiced piano and concentrated on such composers as Ives and Webern.

At nineteen, Glass graduated from the University of Chicago and, determined to become a composer, moves to New York and the Julliard School. By then he had abandoned the 12-tone techniques he had been using in Chicago and preferred American composers like Aaron Copland and William Schuman.

By the time he was twenty-three, Glass had studied with Vincent Persichetti, Darius Milhaud and William Bergsma. He had rejected serialism and preferred such maverick composers as Harry Partch, Ives, Moondog, Henry Cowell, Virgil Thomson, but he still had not found his own voice. Still searching, he moved to Paris for two years of intensive study under Nadia Boulanger.

In Paris, he was hired by a film-maker to transcribe the Indian music of Ravi Shankar in notation readable by French musicians and, in the process, discovered the techniques of Indian music. Glass promptly renounced his previous music and, after researching music in North Africa, India and the Himalayas, returned to New York and began applying Eastern techniques to his own work.

By 1976, he has composed a large collection of new music, much of it for use by theater companies and his own performing group, the Philip Glass Ensemble. This period included Music in 12 Parts, a four hour summation of Glass' new music, and the Robert Wilson/Philip Glass opera *Einstein on the Beach*, now seen as a landmark in 20th century music theater.

Glass' output since *Einstein* has ranged from opera *(Satyagraha, Akhnaten, The Making of the Representative for Planet 8, The Fall of the House of Usher, The Juniper Tree)* to film *(Koyaanisqatsi, Mishima, The Thin Blue Line, Powaqqatsi)* to dance *(A Descent into the Maelstrom* and *In the Upper Room)*, and such unclassifiable theater pieces as *The Photographer and 1000 Airplanes on the Roof,* and numerous recordings. Among his recently completed work are *Itapú*, a large-scale work for chorus and orchestra based on South American Indian legends, and *Hydrogen Juke-box*, with libretto by Allen Ginsberg. Among his works in progress are *Orphée*, a chamber opera based on a film by Jean Cocteau, and *The Voyage*, commissioned by the Metropolitan Opera for its 1992 season, and *Through the Eye of the Raven*, a collaboration with Robert Wilson.

Although he loathes the term, Glass if often classified as a "minimalist" composer, along with such composers as Steve Reich, Terry Riley and John Adams. His music is based on the extended repetition of a brief, elegant melodic fragments that weave in and out an aural tapestry. Listening to this music is

something like watching a challenging painting that initially appeared static, but seems to metamorphose slowly as one concentrates. Compositional material is usually limited to a few elements, which are the subjected to a transformation processes. One shouldn't expect Westernized musical *events* - sforzandos, sudden diminuendos - in this music; rather, the listener is immersed in a sonic weather that surrounds, twists, turns, develops.

Glass prefers to speak of his work as "music with repetitive structures". His busy, tonal, aggressively rhythmic compositions would seem to mark a spiritual break with the spare, atonal and largely arhythmic world of the 50s and 60s *avant-guardists*. One thing is certain: Philip Glass has brought a new and enthusiastic audience to contemporary music.

Paul Hindemith (1895-1963)

(born Hanau, near Frankfurt, 16 November 1895; died Frankfurt, 28 December 1963).

He studied as a violinist and composer (with Mendelssohn and Sekles) at the Hoch Conservatory in Frankfurt (1908-17) and made an early reputation through his chamber music and expressionist operas. But then he turned to neo-classicism in his "**Kammermusik**" no.l, the first of seven such works imitating the Baroque concerto while using an expanded tonal harmony and distinctively modern elements, notably jazz. Each uses a different mixed chamber orchestra, suited to music of linear counterpoint and, in the fast movements, strongly pulsed rhythm.

During this early period Hindemith lived as a performer: he was leader of the Frankfurt Opera orchestra (1915-23, with a break for army service), and he played the viola in the Amar-Hindemith Quartet (1921-9) as well as in the first performance of Walton's Viola Concerto (1929). Much of his chamber music was written in 1917-24, including four of his six quartets and numerous sonatas, and he was also involved in promoting chamber music through his administrative work for the Donaueschingen Festival (1923-30). However, he also found time to compose abundantly in other genres; including lieder ("**Das Marienleben**", to Rilke poems), music for newly invented mechanical instruments, music for schoolchildren and amateurs, and opera ("**Cardillac**", a fantasy melodrama in neo-classical forms). In addition, from 1927 he taught at the Berlin Musikhochschule.

His concern with so many branches of music sprang from a sense of ethical responsibility that inevitably became more acute with the rise of the Nazis. With the beginning of the 1930s he moved from chamber ensembles to the more public domain of the symphony orchestra, and at the same time his music became harmonically smoother and less intensively contrapuntal. Then in the opera "**Mathis der Maler**" (preceded by a symphony of orchestral excerpts) he dramatized the dilemma of the artist in society, eventually opposing Brechtian engagement and insisting on a greater responsibility to art. Nevertheless, his music fell under official disapproval, and in 1938 he left for Switzerland, where "Mathis" had its first performance. He moved on to the USA and taught at Yale (1940-53), but spent his last decade back in Switzerland.

His later music is in the style that he had established in the early 1930s and that he had theoretically expounded in his "Craft of Musical Composition" (1937-9), where he ranks scale degrees and harmonic intervals in order from most consonant (tonic, octave) to most dissonant (augmented 4th, tritone), providing a justification for the primacy of the triad. His large output of the later 1930s and 1940s includes concertos (for violin, cello, piano, clarinet and horn) and other orchestral works, as well as sonatas for most of the standard instruments. His search for an all-encompassing, all-explaining harmony also found expression in his Kepler opera "**Die Harmonie der Welt**".

Hindemith always interested himself in the **teaching** of music. From 1940 to 1949 he held the post of professor of the theory of music at Yale University in the United States. Among a large number of books that he wrote, two stand out as particularly pertinent to 20th-century theory and composition -- "The Craft of Musical Composition" (mentioned above), and "A Composer's World: Horizons and Limitations". They state the individual theory of Hindemith's composing technique as well as his aesthetic concepts concerning music of the 20th century.

Charles Ives (1874-1954)

(born Danbury, CT, 20 October 1874; died New York, 19 May 1954).

He was influenced first by his father, a bandmaster who had libertarian ideas about what music might be. When he was perhaps 19 (the dating of his music is nearly always problematic) he produced psalm settings that exploit polytonality and other unusual procedures. He then studied with Parker at Yale (1894-8) and showed some sign of becoming a relatively conventional composer in his First Symphony (1898) and songs of this period. He worked, however, not in music but in the insurance business, and composition became a weekend activity - but one practiced assiduously: during the two decades after his graduation he produced three more symphonies and numerous other orchestral works, four violin sonatas, two monumental piano sonatas and numerous songs.
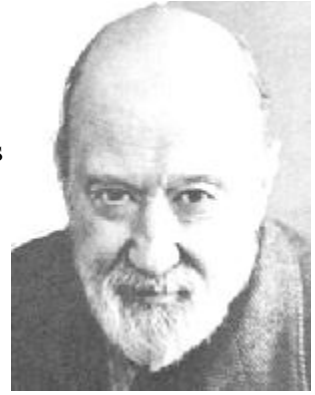
The only consistent characteristic of this music is liberation from rule. There are entirely atonal pieces, while others are in the simple harmonic style of a hymn or folksong. Some are highly systematic and abstract in construction; others are filled with quotations from the music of Ives's youth: hymns, popular songs, ragtime dances, marches etc. Some, like the "**Three Places in New England**", are explicitly nostalgic; others, like the "**Fourth Symphony**", are fueled by the vision of an idealist democracy. He published his **'Concord' Sonata** in 1920 and a volume of 114 songs in 1922, but composed little thereafter. Most of his music had been written without prospect of performance, and it was only towards the end of his life that it began to be played frequently and appreciated.

Charles Ives' Musical Style

Charles Ives, both as a man and an artist, had his roots in the New England heritage. His tone imagery resounds from the music of his childhood:

- hymn tunes,
- popular songs,
- town parade bands,
- fiddlers at a Saturday night dance,
- patriotic songs,
- parlor ballads,
- and medleys heard at county fairs.

His keen ear heard:

- untrained voices singing both above and below the pitch, which manifested itself in his compositional use of tone clusters
- some singers a bit ahead of the beat and others lagged behind, which translated into his music as polyrhythms
- the overlapping clash of parade bands playing different tunes in different keys (polyrhythms, polytonality)
- fiddlers play a "mite off pitch" in their excitement at a country dance which initiated the idea of microtones in his mind

From these personal experiences, he found his way to the use of polytonality, atonality, polyharmony, cluster chords, and polyrhythms.

Ives was:

- fond of quoting hymn tunes and popular tunes
- partial to the contrapuntal procedures of inversion, retrograde, rhythmic augmentation and diminution
- addicted to dissonance, but his music has an underlying tonality
- one of the first to write without barlines, only inserting them to indicate an accented beat

He would:

- set two distinct lines of harmony in motion against each other and would treat them like counterpoint
- pit rhythmic patterns of three, four, five, or six notes in a measure against units of seven, eleven, thirteen, and seventeen.
- use repeating dissonant chords for percussive effect (anticipating Stravinsky)
- create jazz-like rhythms and syncopation (long before it became standard in jazz practice)
- He also moved away from symmetrical repetition to a fresh off-balance arrangement of material.

He was influenced first by his father, a bandmaster who had libertarian ideas about what music might be. When he was perhaps 19 (the dating of his music is nearly always problematic) he produced psalm settings that exploit polytonality and other unusual procedures. He then studied with Horatio Parker at Yale (1894-8) and showed some sign of becoming a relatively conventional composer in his **First Symphony (1898)** and songs of this period. He worked, however, not in music but in the insurance business, and composition became a weekend activity - but one practiced assiduously: during the two decades after his graduation he produced:

- four more symphonies
- numerous other orchestral works,

- five violin sonatas,
- two monumental piano sonatas
- and numerous songs.

The only consistent characteristic of this music is liberation from rule. There are

- entirely atonal pieces,
- while others are in the simple harmonic style of a hymn or folksong.
- Some are highly systematic and abstract in construction;
- others are filled with quotations from the music of Ives's youth:
    - hymns,
    - popular songs,
    - ragtime dances,
    - marches, etc.
- Some, like the "**Three Places in New England**", are explicitly nostalgic;
- others, like the "**Fourth Symphony**", are fuelled by the vision of an idealist democracy.
- He published his '**Concord' Sonata** in 1920
- and a volume of 114 songs in 1922, but composed little thereafter.

Most of his music had been written without prospect of performance, and it was only towards the end of his life that it began to be played frequently and appreciated.

Charles Ives stands as the first truly American composer of the 20th century and one of the most original of his time.

Steve Reich (1936 -   )

Steve Reich, as an early pioneer in tape music and American minimalism, has established himself as one of the foremost composers of our time. Following studies in philosophy at Cornell University (1953-7), Reich turned to composition, first with Persichetti at Julliard (1958-61), then with Luciano Berio and Darius Milhaud at Mills College (1962-3).

His music is characterized by a strong, steady pulse and strictly diatonic and tonal harmonies. He is typically grouped together with other "first generation" minimalist composers such as Phillip Glass and La Monte Young, and more recently with younger composers such as John Adams. The music is deeply "American" in its roots, with an unrelenting pulse and short, repeating melodic figures often compared to rock-and-roll and be-bop. However, like other minimalist composers, Reich's music is also largely influenced by extra-European forms and techniques, generally viewed as a response to the largely academic, elitist climate of new music in the 1950's and 60's.

Reich's early works were created in the early 1960's at the San Francisco Tape Music Center. These tape pieces, such as "It's Gonna Rain" (1965) and "Come Out" (1966), are the earliest examples of "phasing," one of Reich's most used and most well known techniques. In this process, two tape loops are set into motion at two slightly different speeds, so that the tapes begin in unison and slowly shift "out of phase," creating a new set of harmonies and rhythms. This process was later incorporated into several pieces for traditional acoustic instruments (or instruments and tape), such as in "Piano Phase" (1967) and "Violin Phase" (1967). In addition to the initial process of phasing, Reich also introduces into "Violin Phase" the notion of "found" or "resulting" patterns (new melodic figures created from the overlapping voices of the original "theme").

This technique was further explored in the largely popular and influential "Drumming" of 1971. In 1970, Reich set out on an intensive study of Ghanaian drumming that, either directly or indirectly, led to many of the procedures used not only in "Drumming" but also throughout the remainder of his career. This piece is an enormous, hour-long elaboration of a single rhythmic cell, developed and re-orchestrated through four distinct sections. The piece begins with a slow, additive process of introducing the initial rhythmic pattern. Through phasing procedures and further "build-up and reduction," new melodic and harmonic patterns are created—these are brought to the fore by doublings, first by female voice, then by whistling, and finally by piccolo.

Reich's later music is characterized by a considerably faster harmonic rate of change, and by a more diverse (though still strictly diatonic) harmonic language. In the mid to late 1970's, a series of commissions from ensembles other than his own (up until this point, Reich's ensemble was the sole performing group for his music) led to several non-percussion works; "Music for 18 Musicians" (1976), "Music for a Large Ensemble" (1978) and "Octet" (1979) all came in this period.

Recently, Reich has returned to the ideas first seen in "Violin Phase" in a series of pieces for solo instruments and tape. "Vermont Counterpoint," for flute, "New York Counterpoint," for clarinet, and "Electric Counterpoint" for electric guitar, build upon the original processes of the early phasing music. The complexity, however, is far deeper than the early phasing pieces: In Vermont Counterpoint, for example, a total of 10 layers are prerecorded, with the final 11th flute layer played live.

Reich has also recently returned to the voice, as in "Tehillim" (1981), a setting of Psalm texts in Hebrew, "Different Trains" (1988) for string quartet and tape, and in Reich's hugely successful venture into the theater, "The Cave" (1990-3). Each of these works explores the pitch of taped and sequenced voices, and then uses those pitches as melodic material in the accompanying instrumental ensemble.

Reich's combination of repetition and process creates a music full of vitality and energy. His strict, tonal melodic style has brought Reich much critical acclaim, even in a general public that often is distrustful of "new music." As such, Reich has, in many ways, led a charge toward establishing the accessible and almost "anti-academic" diatribe of the newest developments in contemporary music.

Arnold Schönberg (1874-1951)

(born Vienna, 13 September 1874; died Los Angeles, 13 July 1951). Austro-Hungarian composer, an American citizen from 1941.

He began violin lessons when he was eight and almost immediately started composing, though he had no formal training until he was in his late teens, when Zemlinsky became his teacher and friend (in 1910 he married Zemlinsky's sister). His first acknowledged works date from the turn of the century and include the string sextet "Verklärte Nacht" as well as some songs, all showing influences from Brahms, Wagner and Wolf. In 1901-3 he was in Berlin as a cabaret musician and teacher, and there he wrote the symphonic poem "Pelleas und Melisande", pressing the Straussian model towards denser thematic argument and contrapuntal richness. He then returned to Vienna and began taking private pupils, Berg and Webern being among the first. He also moved rapidly forwards in his musical style.

The large orchestra of "Pelleas" and the "Gurrelieder" (a huge symphonic cantata), was replaced by an ensemble of 15 in "Chamber Symphony no.1" (1907), but with an intensification of harmonic strangeness, formal complexity and contrapuntal density: like the "String Quartet no.1" (1905), the work is cast as a single movement encompassing the characters of the traditional four and using every effort to join unconventional ideas (a sequence of 4ths in the Chamber Symphony, for instance) into a conventional discourse. When atonality arrived, therefore, as it did in 1908, it came as the inevitable outcome of a doomed attempt to accommodate ever more disruptive material. However, Schönberg found it possible a quarter-century later to return to something like his tonal style in such works as the "Suite in G" for strings, the completion of the "Chamber Symphony no.2" and the "Theme and Variations" for band.

That, however, was not possible immediately. The sense of key was left behind as Schönberg set poems by Stefan George in the last two movements of "String Quartet no.2 (1908)" and in the song cycle "Das Buch der hängenden Gärten" (often referred to as the first piece written in the new style), and for the next few years he lived in the new, rarefied musical air. With tonality had gone thematicism and rhythmic constraint; works tended to be short statements of a single extreme musical state, justifying the term 'expressionist' ("Five Orchestral Pieces"; "Three Piano Pieces").

The larger pieces of this period have some appropriate dramatic content: the rage and despair of a woman seaching for her lover ("Erwartung"), the bizarre stories, melancholia and jokes of a distintegrating personality -- ("Pierrot lunaire" (1912), for reciter in Sprechgesang with mixed quintet), or the progress of the soul towards union with God ("Die Jakobsleiter" -- unfinished oratorio). "Die glückliche Hand" (1913), the one-act "drama with music," is from this same period as well. Historically, "Pierrot" is of particular interest as it gives the first indication of a change in Schönberg's thinking that was to become more evident in later years. Several of the songs feature elaborate contrapuntal structures of a relatively strict kind, marking a turn from the freer approach of the preceding works.

Gradually Schönberg came to find the means for writing longer instrumental structures, in the 12-tone serial method, and in the 1920s he returned to standard forms and genres, notably in the "Suite for piano" (1924) -- his first completely 12-tone work, "String Quartet no.3" (1927), "Variations for Orchestra"(1928) -- in which we see the technique of combinatoriality in an extended setting, and several choral pieces. He also founded the Society for Private Musical Performances (1919-21), involving his pupils in the presentation of new music under favorable conditions. In 1923 his wife died (he remarried the next year), and in 1925 he moved to Berlin to take a master class at the Prussian Academy of Arts. While there he wrote much of his unfinished opera "Moses und Aron" which is concerned with the impossibility of communicating truth without some distortion in the telling: it was a vehement confrontation with despair on the part of a composer who insisted on the highest standards of artistic honesty.

In 1933 he was obliged as a Jew to leave Berlin: he went to Paris, and formally returned to the faith which he had deserted for Lutheranism in 1898. Later the same year he arrived in the USA, and he settled in Los Angeles in 1934. It was there that he returned to tonal composition, while developing serialism to make possible the more complex structures of the "**Violin Concerto**" and the "**String Quartet no.4**". In 1936 he began teaching at UCLA and his output dwindled. After a heart attack in 1945, however, he gave up teaching and made some return to expressionism ("**A Survivor from Warsaw**", "**String Trio**"), as well as writing religious choruses.

An Overview of Schoenberg's Music

"**Verklärte Nacht**" (Transfigured Night) (1899) - string sextet

"**Pelleas und Melisande**" (1903) - symphonic poem (pressing the Straussian model towards denser thematic argument and contrapuntal richness)

"**Gurrelieder**" (Songs of Gurre) (1901-03) - a huge symphonic cantata

String Quartet no.1 (1905)

Chamber Symphony no.1 (1907) - an ensemble of 15

- intensification of harmonic strangeness
- formal complexity
- contrapuntal density
- cast as a single movement
- the absolute limits of traditional chromatic tonality

String Quartet no.2, op.10 (1908) - (sense of key was left behind)

"**Das Buch der hängenden Gärten**" op.15 (1907-09) - the song cycle (often referred to as the first piece written in the new style)

"**Five Orchestral Pieces**" op. 16, (1907-09) and "**Three Piano Pieces**" op. 11, (1907-09) - (justifying the term 'expressionist')

Works with dramatic content:

"**Erwartung**" (1909) - (the rage and despair of a woman searching for her lover)

"**Pierrot lunaire**" (1912) - for reciter in Sprechgesang with mixed quintet (the bizarre stories, melancholia and jokes of a disintegrating personality)

"**Die Jakobsleiter**" - unfinished oratorio (the progress of the soul towards union with God)

"**Die glückliche Hand**" (1913) - one-act "drama with music"

Suite for piano (1924) - (returned to standard forms and genres)

String Quartet no.3 (1927) - (first completely 12-tone work)

Variations for Orchestra (1928) (the technique of combinatoriality in an extended setting)

"**Moses und Aron**" - unfinished opera (concerned with the impossibility of communicating truth without some distortion in the telling)

Return to something like his tonal style:

- "**Suite in G**" (1934) - for strings (written in the form of a Baroque suite)

- "**Chamber Symphony no.2**" - (1939)

- integrates the warm, rich harmonies of late Romanticism with
- transparent textures
- and a rhythmically lively, almost neo-classic spirit

- **"Theme and Variations"** (for band)

"**A Survivor from Warsaw**" and "**String Trio**" - (After a heart attack in 1945, he gave up teaching at UCLA and made some return to expressionism.)

(See also **The Second Viennese School**)

Karlheinz Stockhausen (1928-2007)

(born Burg Mödrath, 22 August 1928).

German composer of modern music, electronic music and operas. He was initially influenced by the music of [Anton Webern](), and by [serialism]() (a method of composing non-tonal music). He studied under [Olivier Messiaen]() in 1952, and his early works, like "Spiel" and "Kreuzspiel", show the influence of both these masters. He was one of the first composers to write [electronic music](), having first studied phonetics and information/communication theory at Bonn University.

"Kontakte" is a compostion which includes a tape playback of electronic sounds which zip and swirl about via loudspeakers placed around the audience. The "Klavierstücke" (Piano pieces) start out using strict serial principles (Klavierstücke I - IV), but later become expansive (VI), exquisite (VII), and even dramatic (IX and X). "Zyklus", for solo percussion, is written so that the performance can start on any page, and it may be read upside down, or from right to left, or not, as the performer chooses. "Refrain" is somewhat meditative with its rarefied, ringing chords of bell-like sonorities, and occasional tutti vocalizations by the three instrumentalists.

The piece "Mantra" is written for two pianos, the sounds from which are modulated in real time by ring modulators. If you are not accustomed to dissonance, "Stimmung" might be a good place to begin. It is for 6 unaccompanied singers, with texts based on the names of gods and deities throughout world history, as well as erotic poems by the composer. The basic musical material for the entire 70 min. piece is a B-natural 9th chord. "Stimmung" means "attuning", but also "mood", "disposition", as in "good mood" (guter Stimmung).

Stockhausen has written over 200 individual works for a variety of musical media. Since 1977, he has been in the process of writing "LICHT", a massive series of seven operas, each named after a day of the week. Five of them are completed as of this date (Feb. 1996).

> "Donnerstag" (Thursday), completed in 1980,
> "Samstag" (Saturday), completed in 1984,
> "Montag" (Monday), completed in 1988,
> "Dienstag" (Tuesday), completed in 1991, and
> "Freitag" (Friday), completed in 1995.

Only the first two operas have been released as recordings. The series is expected to be completed by the year 2005.

Stockhausen is a conceptual composer - his texts and his musical designs reflect occidental and oriental musical concepts, as well as eastern and western spiritual truths. Every composition is a complete rethinking of the term "music", incorporating European and non-European tradition, the latest musical technolgy, and a wide range of musical cultures.

A young Karlheinz Stockhausen can be spotted on the Beatles' famous Sgt. Peppers Lonely Hearts Club Band album cover.
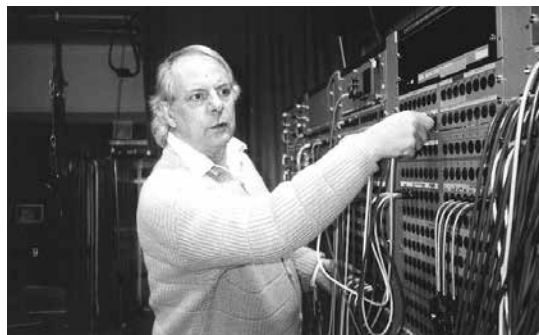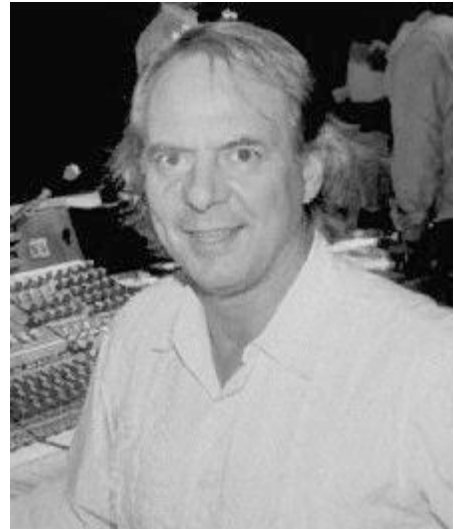
Igor Stravinsky (1882-1971)

(born Lomonosov, 17 June 1882; died New York, 6 April 1971).
Russian composer, later of French (1934) and American (1945) nationality.

The son of a leading bass at the Mariinsky Theatre in St. Petersburg, he studied with Rimsky-Korsakov (1902-8), who was an influence on his early music, though so were Tchaikovsky, Borodin, Glazunov and (from 1907-8) Debussy and Dukas. This colourful mixture of sources lies behind "The Firebird" (1910), commissioned by Dyagilev for his Ballets Russes. Stravinsky went with the company to Paris in 1910 and spent much of his time in France from then onwards, continuing his association with Dyagilev in "Petrushka" (1911) and "The Rite of Spring" (1913).

These scores show an extraordinary development. Both use folktunes, but not in any symphonic manner: Stravinsky's forms are additive rather than symphonic, created from placing blocks of material together without disguising the joints. The binding energy is much more rhythmic than harmonic, and the driving pulsations of "The Rite" marked a crucial change in the nature of Western music. Stravinsky, however, left it to others to use that change in the most obvious manner. He himself, after completing his Chinese opera "The Nightingale", turned aside from large resources to concentrate on chamber forces and the piano.

Partly this was a result of World War I, which disrupted the activities of the Ballets Russes and caused Stravinsky to seek refuge in Switzerland. He was not to return to Russia until 1962, though his works of 1914-18 are almost exclusively concerned with Russian folk tales and songs: they include the choral ballet "Les noces" (The Wedding), the smaller sung and danced fable "Renard", a short play doubly formalized with spoken narration and instrumental music ("The Soldier's Tale") and several groups of songs. In "The Wedding", where block form is geared to highly mechanical rhythm to give an objective ceremonial effect, it took him some while to find an appropriately objective instrumentation; he eventually set it with pianos and percussion. Meanwhile, for the revived Ballets Russes, he produced a startling transformation of 18th-century Italian music (ascribed to Pergolesi) in "Pulcinella" (1920), which opened the way to a long period of 'neo-classicism', or re-exploring past forms, styles and gestures with the irony of nondevelopmental material being placed in developmental molds. The "Symphonies of Wind Instruments", an apotheosis of the wartime 'Russian' style, was thus followed by the short number-opera "Mavra", the "Octet" for winds, and three works he wrote to help him earn his living as a pianist: the "Piano Concerto", the "Sonata" and the "Serenade in A".

During this period of the early 1920s he avoided string instruments because of their expressive nuances, preferring the clear articulation of wind, percussion, piano and even pianola. But he returned to the full orchestra to achieve the starkly presented Handel-Verdi imagery of the opera-oratorio "Oedipus rex", and then wrote for strings alone in "Apollon musagete" (1928), the last of his works to be presented by Dyagilev. All this while he was living in France, and "Apollon", with its Lullian echoes, suggests an identification with French classicism which also marks the "Duo concertant" for violin and piano and the stage work on which he collaborated with Gide: "Perséphone", a classical rite of spring. However, his Russianness remained deep. He orchestrated pieces by Tchaikovsky, now established as his chosen ancestor, to make the ballet "Le baiser de la fée," and in 1926 he rejoined the Orthodox Church. The "Symphony of Psalms" was the first major work in which his ritual music engaged with the Christian tradition.

The other important works of the 1930s, apart from "Persephone", are all instrumental, and include the Violin Concerto, the Concerto for two pianos, the post-Brandenburg 'Dumbarton Oaks' Concerto and the Symphony in C, which disrupts diatonic normality on its home ground. It was during the composition of this work, in 1939, that Stravinsky moved to the USA, followed by Vera Sudeikina, whom he had loved since 1921 and who was to be his second wife (his first wife and his mother had both died earlier the same year). In 1940 they settled in Hollywood, which was henceforth their home. Various film projects ensued, though all

foundered, perhaps inevitably: the Hollywood cinema of the period demanded grand continuity; Stravinsky's patterned discontinuities were much better suited to dancing. He had a more suitable collaborator in Balanchine, with whom he had worked since "Apollon," and for whom in America he composed "**Orpheus**" and "**Agon**". Meanwhile music intended for films went into orchestral pieces, including the **Symphony in Three Movements** (1945).

The later 1940s were devoted to "**The Rake's Progress**", a parable using the conventions of Mozart's mature comedies and composed to a libretto by Auden and Kallman. Early in its composition, in 1948, Stravinsky met Robert Craft, who soon became a member of his household and whose enthusiasm for Schönberg and Webern (as well as Stravinsky) probably helped make possible the gradual achievement of a highly personal serial style after "The Rake". The process was initiated in 1953 while composing the brilliant, tightly patterned ballet "**Agon** (1957)," which was interrupted by work on "**Canticum Sacrum**." The boundaries of this critical period in Stravinsky's evolution can be traced within this single work. "Agon" projects a remarkably unified compositional outlook: the tonal sections reveal distinct serial characteristics, while the serial ones, reflect a definite tonal bias.

Most of the serial works are religious or commemorative, being sacred cantatas ["**Canticum sacrum**"(1955), "**Threni**" (1958) (entirely twelve-tone), "**Requiem Canticles**" (1965)] or elegies ["**In Memoriam Dylan Thomas**" (1954), "**Elegy for J.F.K.**"]. "In Memoriam...", a setting of a Thomas poem for tenor, string quartet, and four trombones, was the composer's first wholly serial composition, derived entirely from a five-note row and its strict serial permutations. All these were written after Stravinsky's 70th birthday, and he continued to compose into his mid-80s, also conducting concerts and making many gramophone records of his music. During this period, too, he and Craft published several volumes of conversations.

Stravinsky's music, even in his late period, is flavored with abrupt formal juxtapositions and polarized texture. His style was characterized by its harmonic innovations and perhaps even more by its primitive and brutal rhythmic patterns. The resulting complexities included the consecutive use of widely varying metric patterns and polyphony of widely differing rhythmic strata. The syncopations of jazz rhythms were often imitated. In many instances, rhythm constituted the single most important element in Stravinsky's musical fabric.

Stravinsky, following the model of his mentor Rimsky-Korsakov, exploited tone color to its utmost in both large and small instrumental combinations. Typical examples of his unusual scoring include the elimination of all the violins, violas, and clarinets in the orchestra for the "Symphony of Psalms", or the accompaniment of four pianos and percussion in "Les Noces" (The Wedding).

The Music of Stravinsky: An Overview

Early Works

Scherzo fantastique (1909) - orchestra
Fireworks (1909) - orchestra
The Fire Bird (1910) - ballet
Petrushka (1911) - ballet
Le Sacre du printemps (1913) - ballet

1913 - 1923

A change of style; most noticeable feature -- replacement of large orchestra with small combinations

L'Histoire du Soldat (The Soldier's Tale; 1918) - ballet
Les Noces (The Wedding; 1917-23) - ballet
Pulcinella (1919) - ballet
Octet for Wind Instruments (1923)

Neo-Classicism

Octet for Wind Instruments (1923)
Sonata (1924) - piano
Serenade in A (1925) - piano
Oedipus Rex (Oedipus the King; 1927) - opera-oratorio
Le Baiser de la Fée (The Fairy's Kiss; 1928) - ballet
Apollon musagète (Apollo, Leader of the Muses; 1928) - ballet
Capriccio for piano and orchestra (1929)
Symphony of Psalms (1930) -choir / orchestra
Violin Concerto (1931)
Duo Concertant (for violin and piano; 1932)
Perséphone (1934) - ballet-melodrama
Concerto for Two Pianos (1935)
Dumbarton Oaks Concerto in E-flat (1938)
Symphony in C (1940)
Symphony in Three Movements (1945)
Basle Concerto in D (1946)
Mass (1948)
The Rake's Progress (1951) - opera

Late Works (Serialism)

Septet (1953)
In Memoriam Dylan Thomas (1954) - song
Canticum Sacrum (1955) - cantata
Agon (1954-57) - ballet
Threni (1958) - ballet
Movements (1959) - piano and orchestra
A Sermon, a Narrative, and a Prayer (1961) - voices and orchestra
The Flood (1962)
Abraham and Isaac (1963) - voices and orchestra
Orchestra Variations (1964)
Requiem Canticles (1965)

His style

Rhythm

- introduces an irregular pattern of rhythm after a regular one has been established
- the regular beat may be maintained in one part against an irregular one in another
- a rhythmic motive may be shifted from place to place in the measure
- use of silences

Harmony

- organized around tonal centers
- ambiguous chords
- bitonality
- simultaneous use of both major and minor thirds of a triad

Orchestration

- unusual groups of instruments
- each piece has a color of its own
- the particular color is part of the particular musical concept

Richard Wagner (1813-1883)

(born Leipzig, 22 May 1813; died Venice, 13 February 1883).

He was the son either of the police actuary Friedrich Wagner, who died soon after his birth, or of his mother's friend the painter, actor and poet Ludwig Geyer, whom she married in August 1814. He went to school in Dresden and then Leipzig; at 15 he wrote a play, at 16 his first compositions. In 1831 he went to Leipzig University, also studying music with the Thomaskantor, C.T. Weinlig; a symphony was written and successfully performed in 1832. In 1833 he became chorus master at the Würzburg theatre and wrote the text and music of his first opera, *Die Feen*; this remained unheard, but his next, *Das Liebesverbot*, written in 1833, was staged in 1836. By then he had made his début as an opera conductor with a small company which however went bankrupt soon after performing his opera. He married the singer Minna Planer in 1836 and went with her to Königsberg where he became musical director at the theatre, but he soon left and took a similar post in Riga where he began his next opera, *Rienzi*, and did much conducting, especially of [Beethoven](#).

In 1839 they slipped away from creditors in Riga, by ship to London and then to Paris, where he was befriended by Meyerbeer and did hack-work for publishers and theatres. He also worked on the text and music of an opera on the 'Flying Dutchman' legend; but in 1842 *Rienzi*, a large-scale opera with a political theme set in imperial Rome, was accepted for Dresden and Wagner went there for its highly successful premiere. Its theme reflects something of Wagner's own politics (he was involved in the semi-revolutionary, intellectual 'Young Germany' movement). *Die fliegende Holländer* ('The Flying Dutchman'), given the next year, was less well received, though a much tauter musical drama, beginning to move away from the 'number opera' tradition and strong in its evocation of atmosphere, especially the supernatural and the raging seas (inspired by the stormy trip from Riga). Wagner was now appointed joint Kapellmeister at the Dresden court.

The theme of redemption through a woman's love, in the Dutchman, recurs in Wagner's operas (and perhaps his life). In 1845 *Tannhäuser* was completed and performed and **[Lohengrin](#)** begun. In both Wagner moves towards a more continuous texture with semi-melodic narrative and a supporting orchestral fabric helping convey its sense. In 1848 he was caught up in the revolutionary fervour and the next year fled to Weimar (where Liszt helped him) and then Switzerland (there was also a spell in France); politically suspect, he was unable to enter Germany for 11 years. In Zürich, he wrote in 1850-51 his ferociously anti-semitic *Jewishness in Music* (some of it an attack on Meyerbeer) and his basic statement on musical theatre, *Opera and Drama*; he also began sketching the text and music of a series of operas on the Nordic and Germanic sagas. By 1853 the text for this four-night cycle (to be *The Nibelung's Ring*) was written, printed and read to friends - who included a generous patron, Otto Wesendonck, and his wife Mathilde, who loved him, wrote poems that he set, and inspired *Tristan und Isolde* - conceived in 1854 and completed five years later, by which time more than half of *The Ring* was written. In 1855 he conducted in London; tension with Minna led to his going to Paris in 1858-9. 1860 saw them both in Paris, where the next year he revived Tannhäuser in revised form for French taste. but it was literally shouted down, partly for political reasons. In 1862 he was allowed freely into Germany; that year he and the ill and childless Minna parted (she died in 1866). In 1863 he gave concerts in Vienna, Russia etc; the next year King Ludwig II invited him to settle in Bavaria, near Munich, discharging his debts and providing him with money.

Wagner did not stay long in Bavaria, because of opposition at Ludwig's court, especially when it was known that he was having an affair with Cosima, the wife of the conductor Hans von Bülow (she was [Liszt's](#) daughter); Bülow (who condoned it) directed the *Tristan* premiere in 1865. Here Wagner, in depicting every shade of sexual love, developed a style richer and more chromatic than anyone had previously attempted, using dissonance and its urge for resolution in a continuing pattem to build up tension and a sense of profound yearning; Act 2 is virtually a continuous love duet, touching every

emotion from the tenderest to the most passionately erotic. Before returning to the *Ring*, Wagner wrote, during the mid-1860s, *The Mastersingers of Nuremberg*: this is in a quite different vein, a comedy set in 16th-century Nuremberg, in which a noble poet-musician wins, through his victory in a music contest - a victory over pedants who stick to the foolish old rules - the hand of his beloved, fame and riches. (The analogy with Wagner's view of himself is obvious.) The music is less chromatic than that of *Tristan*, warm and good-humoured, often contrapuntal; unlike the mythological figures of his other operas the characters here have real humanity.

The opera was given, under Bülow, in 1868; Wagner had been living at Tribschen, near Lucerne, since 1866, and that year Cosima formally joined him, they had two children when in 1870 they married. The first two *Ring* operas, *Das Rheingold* and *Die Walküre*, were given in Munich, on Ludwig's insistence, in 1869 and 1870; Wagner however was anxious to have a special festival opera house for the complete cycle and spent much energy trying to raise money for it. Eventually, when he had almost despaired, Ludwig came to the rescue and in 1874 - the year the fourth opera, *Götterdämmerung*, was finished - provided the necessary support. The house was built at Bayreuth, designed by Wagner as the home for his concept of the Gesamtkunstwerk ('total art work'- an alliance of music, poetry, the visual arts, dance etc). The first festival, an artistic triumph but a financial disaster - was held there in 1876, when the complete *Ring* was given. The *Ring* is about 18 hours' music, held together by an immensely detailed network of themes, or leitmotifs, each of which has some allusive meaning: a character, a concept, an object etc. They change and develop as the ideas within the opera develop. They are heard in the orchestra, not merely as 'labels' but carrying the action, sometimes informing the listener of connections of ideas or the thoughts of those on the stage. There are no 'numbers' in the Ring; the musical texture is made up of narrative and dialogue, in which the orchestra partakes. The work is not merely a story about gods, humans and dwarfs but embodies reflections on every aspect of the human condition. It has been interpreted as socialist, fascist, Jungian, prophetic, as a parable about industrial society, and much more.

In 1877 Wagner conducted in London, hoping to recoup Bayreuth losses; later in the year he began a new opera, *Parsifal*. He continued his musical and polemic writings, concentrating on 'racial purity'. He spent most of 1880 in Italy. *Parsifal*, a sacred festival drama, again treating redemption but through the acts of communion and renunciation on the stage, was given at the Bayreuth Festival in 1882. He went to Venice for the winter, and died there in February of the heart trouble that had been with him for some years. His body was retumed by gondola and train for burial at Bayreuth. Wagner did more than any other composer to change music, and indeed to change art and thinking about it. His life and his music arouse passions like no other composer's. His works are hated as much as they are worshipped; but no-one denies their greatness.

Wagner was the most prolific **writer** on the aesthetics and criticism of music among the Romantic composers. In addition to being the author of libretti for his own operas, he wrote essays and pamphlets on a variety of musical subjects. Of special significance were his writing on the problems of opera. "Oper und Drama" (Leipzig, 1851) outlined his theories of the artwork of the future. His autobiography set forth his ideas on the union of the arts and his thought on almost everything from music to politics. He also wrote an important essay, "Religion und Kunst," that was related to his opera "Parsifal."

The Operas and Music Dramas of Wagner

TITLE OF WORK	DATE OF COMPOSITION	FIRST PERFORMANCE
Die Feen	1833	Munich, 1888
Das Liebesverbot	1835	Magdeburg, 1836
Rienzi	1838-40	Dresden, 1842
Der fliegende Holländer	1841	Dresden, 1843
Tannhäuser	1843-45	Dresden, 1845
Lohengrin	1846-48	Weimar, 1850
Der Ring des Nibelungen	1848-52	Bayreuth, 1876 (Complete)
I. Das Rheingold	1853-54	Munich, 1869
II. Die Walküre	1854-56	Munich, 1870
III. Siegfried	1856-71	Bayreuth, 1876
IV. Götterdämmerung	1869-74	Bayreuth, 1876
Tristan und Isolde	1857-59	Munich, 1865
Die Meistersinger von Nürnberg	1862-67	Munich, 1868
Parsifal	1877-82	Bayreith, 1882

Die Feen

"The Fairies," never performed in Wagner's lifetime, is a long work with the usual subdivision into recitatives, arias, and ensembles. It is apparently modeled after Beethoven and Weber.

Das Liebesverbot

"The Ban on Love" showed Wagner eagerly assimilating the Italian style. His libretto is full of comic scenes and has some spoken dialogue. The music is a blend of Rossini and Donizetti, with distinct traces of Meyerbeer in the finales, which often seem to strain terribly for effect. The melodies are florid, often with typical Italian cadenzas, and everything is repeated at great length.

Rienzi

This was a grand opera in the fashion of the time, with just enough novelty to make it extremely popular. The success of the work was immediate and overwhelming and led to a demand for his next opera.

Der fliegende Holländer

"The Flying Dutchman" is essentially a German romantic opera and is divided into the customary numbers. Some of these are quite successful, while others

seem mechanical and forced, monotonous in rhythm, and without marked originality of melody or harmony. The themes chosen are good examples of Wagner's characteristic procedure or representing basic dramatic ideas by specific musical formulae.

Tannhäuser

In this work, Wagner aimed to unite the two elements which he had developed separately in "Der fliegende Holländer" and "Rienzi" -- to clothe the dramatic idea of redemption in the garments of grand opera. The division into numbers is still clear, though with more sweep and less rigidity than in the earlier works. "Tannhäuser" does not sacrifice the drama for outward show. There are few operas in which form and content are so well balanced. The technique of Sprechgesang ("speech song") was used in this opera. It is a melody strictly molded to the text, a semirealistic declamation of the words combined with expression of their content by means of a flexible line supported by an equally important harmonic structure. It was not entirely new -- it had been used earlier by Weber. The overture to "Tannhäuser" is a complete composition in itself, and, like those of "Die fliegende Holländer" and "Die Meistersinger," a synopsis of the larger dramatic and musical form to follow.

Lohengrin

The musical setting of "Lohengrin" is altogether less spectacular than that of "Tannhäuser". There are no sensational contrasts, and an extraordinary unity of mood prevails throughout. The system of reminiscence motifs is still further developed, not only in extent but also in the changed function of the motifs themselves: they are no longer used simply to recall earlier scenes and actions but to symbolize situations or abstract ideas. From the formal point of view "Lohengrin" has shed many traces of the traditional division into numbers, as well as much of the distinction between aria and recitative. It carries this practice further than any previous work and clearly points the way to Wagner's later style. The harmony is remarkably diatonic; there is very little chromaticism of the sort found in the middle section of "Pilgrims' Chorus" or the "Evening Star" aria in "Tannhäuser." The orchestration likewise contrasts; Wagner, instead of treating them as a homogeneous group, divides them into antiphonal choirs, often with the violins subdivided and the woodwind section expanded so as to make possible a whole chord of three or four tones in a single color. "Lohengrin" is generally regarded as the last of the German Romantic operas.

Der Ring des Nibelungen

(see the Article **Wagner's Ring**)

Tristan und Isolde

"Tristan und Isolde" is all Wagner's. It is owing to him, and him alone, that this is now one of the great love stories, living in the imagination of millions along with the tales of Romeo and Juliet, Launcelot and Guinevere. The peculiar strength of the drama arises from the fact that external events are simplified to the utmost, so that the action is almost all inner, and consequently expressed almost wholly in music.

The words themselves often melt into music, losing their very character as intelligible language, nearly superfluous in many places where the plane of expression is purely that of the emotions. The three leading ideas of the drama -- love, night, and death -- are inseparable, but each one in turn is especially emphasized in each of the three acts. The power of the "Tristan" chromaticism comes from its being founded in tonality. The ambiguity of the chords could not exist without the underlying tonal foundation.

Die Meistersinger von Nürnburg

The story has for historical background the Mastersinger Guilds of 16th-century Nuremberg and their song contests, bound about with traditional rules and customs. Wagner not only incorporated many of these points but also borrowed several names and characters of real Mastersingers, notably Hans Sachs. Wagner even incorporated a historical Mastersinger melody. The focus of the work is the conflict between tradition, represented by the Guild, and artistic creativity. "Die Meistersinger" has every requirement of good comedy and is readily accessible to the public. With such a play as this, Wagner was led to compose a score that more nearly approaches the traditional outlines of opera. The principle of symphonic development of a set of leitmotifs is maintained, and there is no return to the old-fashioned recitative. There is an amount of formalization, but it fits naturally into the dramatic requirements. The harmonic vocabulary has a much stronger diatonic foundation than that of "Tristan" and the rhythmic structure is more square.

Parsifal

No doubt the complexity of the poem is responsible for the music of "Parsifal" being less clear in formal outlines than that of either "Tristan" or "Meistersinger." There is sufficient resemblance between the first and third acts to delineate a general A B A structure, but neither the key scheme nor other details of the various scenes are as amenable to analysis as in the case of the other two works. The music depicts different worlds of thought and feeling in sharpest possible contrast; but whereas in "Tannhäuser" there were two such worlds, in "Parsifal" there are three. The music of Amfortas, the agonizing penitent, is intense with rich orchestral color, and dissonant with harmonic complexity almost to the point of atonality. The Grail music, on the other hand, is diatonic and almost churchlike in style. The third realm is the least significant, acting merely as a foil for the other two. It is the realm of sensual pleasure exemplified in the second act. Wagner's distinguished choral writing in "Lohengrin," "Die Meistersinger," and above all in "Parsifal" is of interest; in particular, the closing scenes of Acts I and III of "Parsifal," with their fine choral effects and the device of separated choirs, with the high and low voices giving an impression in music of actual space and depth, recall the Venetian composers of the later 16th century.

Wagner's Mature Harmonic Style

Within the larger frameworks of order, take place the various harmonic procedures which have given rise to Wagner's reputation:

- modulations induced by enharmonic changes in chromatically altered chords and forwarded by modulating sequences

- the interchangeable use of major and minor modes and the frequency of the mediants and the flat supertonic as goals of modulation

- the determination of chord sequences by chromatic progression of individual voices

- the presence of "harmonic parentheses" within a section, related to the the tonality of the whole as auxiliary notes or appoggiaturas are related to the fundamental harmony of the chord with which the occur

- the systematic treatment of sevenths and even ninths as consonant chords

- the resolution of dominants to chords other than the tonic

- the combination of melodies in a contrapuntal tissue

- the frequent suspensions and appoggiaturas in the various melodic lines, which contribute as much as any single factor to the peculiar romantic, Wagnerian, "longing" quality of the harmony -- a quality heard in perfection in the prelude to "Tristan und Isolde."

Anton von Webern (1883-1945)

(born Vienna, 3 December 1883; died Mittersill, 15 September 1945).

He studied at Vienna University under Adler (1902-6), taking the doctorate for work on Heinrich Isaac; in composition he was one of Schönberg's first pupils (1904-8), along with Berg. Like Berg, he developed rapidly under Schönberg's guidance, achieving a fusion of Brahms, Reger and tonal Schönberg in his orchestral Passacaglia, already highly characteristic in its modest dynamic level and its brevity. But he was closer than Berg in following Schönberg into atonality, even choosing verses by the same poet, Stefan George, to take the step in songs of 1908-9. His other step was into a conducting career, which he began with modest provincial engagements before World War I. After the war he settled close to Schönberg in Mödling and took charge of the Vienna Workers' Symphony Concerts (1922-34). Meanwhile he had continued his atonal style, mostly in songs: the relatively few instrumental pieces of 1909-14 had grown ever shorter, ostensibly because of the lack of any means of formal extension in a language without key or theme. However, the songs of 1910-25 show a reintroduction of traditional formal patterns even before the arrival of serialism (especially canonic patterns, no doubt stimulated, as was the instrumentation of many of these songs, by *Pierrot lunaire*), to the extent that the eventual adoption of the 12-note method in the Three Traditional Rhymes (1925) seems almost incidental, making little change to a musical style that was already systematized by strict counterpoint.

However, Webern soon recognized that the 12-note principle sanctioned a severity and virtuosity of polyphony that he could compare with that of the Renaissance masters he had studied. Unlike Schönberg, he never again sought to compose in any other way. Rather, the highly controlled, pure style of his Symphony appears to have represented an ideal which later works could only repeat, showing different facets. His use of the series as a source of similar motifs, especially in instrumental works, merely emphasizes the almost geometrical perfection of this music, for which he found literary stimulus in Goethe and, more nearly, in the poetry of his friend and neighbour Hildegard Jone, whose words he set exclusively during his last dozen years. With Schönberg gone, Berg dead and himself deprived of his posts, Webern saw Jone as one of his few allies during World War II. He was shot in error by a soldier after the end of hostilities, leaving a total acknowledged output of about three hours' duration.

A PRACTICAL GLOSSARY
for Twentieth-Century Music

additive chords — harmonies, usually triadic, that contain one or more added tones (such as a ninth or a sixth above the root). This technique is common in the music of Debussy and Ravel.

aggregate — in music, generally refers to the collection of all twelve pitch classes. The idea may be applicable to both serial and non-serial compositions.

aleatoric — making use of chance or indeterminacy, either in the compositional process or during the performance. Examples include rolling dice to determine pitches or instructing a performer to play three melodic figures in any order. The term is closely associated with John Cage, but many composers have included a degree of aleatory in their music.

all-combinatorial row — a row that is combinatorial both with some transposition of itself and with some inversion of itself. The term usually refers to hexachordal combinatoriality.

all-interval row — a twelve-tone row containing all eleven intervals. (Note: refers to *intervals*, not *interval classes*.)

atonality — the absence of tonality (not the absence of tones). Sometimes people use "atonal" to refer specifically to non-serial music, such as that written by Schoenberg between 1909 and 1923.

axis of symmetry (also known as **axis of inversion**) — the pitch (or pitches) around which a composition (or part of a composition) is inversionally symmetrical.

bimodality — the use of two modes simultaneously in a composition (or some portion of a composition). The modes must be separated in some way (for instance, one instrument plays in one mode while another instrument plays in another mode) in order to be perceptible.

bitonality — the use of two keys simultaneously in a composition (or some portion of a composition). The keys must be separated in some way (for instance, one instrument plays in one key while another instrument plays in another key) in order to be perceptible. (Note: the individual keys are not just collections of notes; they should have the typical characteristics of tonality.)

canon — a composition (or some portion of a composition) in which one voice (called the *dux* or "leader") is strictly imitated by another voice (called the *comes* or "follower"). While the imitation is strict, it may be consistently altered (for instance, by inversion or rhythmic augmentation).

cluster — a harmonic structure composed of seconds (rather than thirds).

combinatorial row — a twelve-tone row whose first hexachord has no pitch classes in common with the first hexachord of either a transposition or an inversion of itself.
Example: P2 = < D C♯ A B♭ F E♭   E C A♭ G F♯ B >
                 I7 = < G A♭ C B E F♯   F A C♯ D E♭ B♭>
Tetrachordal combinatoriality involves three row forms that have no pitch classes in common in any of their corresponding tetrachords. Example:
                 P0 = < C D C♯ G   G♯ F♯ F E♭   E B B♭ A >
                 P4 = < E F♯ F B   C B♭ A G   A♭ E♭ D C♯>
                 P8 = < A♭ B♭ A E♭   E D C♯ B   C G F♯ F >
Trichordal combinatoriality involves four row forms that have no pitch classes in common in any of their corresponding trichords.

complement — all of the pitch classes that are not included in a particular set. For instance, the complement of {C D E F G A B} is {D♭ E♭ G♭ A♭ B♭}. Complements may be either literal or abstract.

degree of symmetry — the number of distinct ways in which a given set can be transposed and inverted onto itself. This is often expressed an ordered pair *<x, y>* where the first number reflects the number of distinct transposition levels that produce complete invariance and the second number reflects the number of distinct inversion levels that produce complete invariance. For instance, {C E G♯} is invariant under T_0, T_4, T_8, T_0I, T_4I, and T_8I, so its degree of symmetry is <3,3>.

derived row — a twelve-tone row whose segments are all members of the same set class (for instance, four successive [014] trichords). Example:

     B B♭ D   E♭ G F♯   A♭ E F   C C♯ A

dyad — any pair of pitches

expressionism — applies to music, the visual arts, and literature. The expressionists felt that art should reflect the inner consciousness of its creator. The emphasis is on the artist's feelings about something rather than an accurate portrayal of it, so distortion and exaggeration are important features. The term is closely associated with Schoenberg.

extended tertian chord — a chord built from major and minor thirds that go beyond the seventh (for instance, the ninth, eleventh, or thirteenth). Such chords may be found in the music of Debussy.

golden section — a proportion that occurs when one divides something in such a way that the ratio between the whole and its larger subsection is identical to the ratio between the larger subsection and the smaller subsection. The golden section is approximately 0.618 and is frequently found in nature.

Hauptstimme — literally "chief voice." Designates the voice in a musical texture that is intended to be most prominent.

hexachord — any collection of six distinct pitch classes

hexatonic scale — literally, a scale with six notes per octave. The name is used specifically to refer to a scale with alternating intervals 1 and 3. Example:

     C C♯ E F G♯ A

The hexatonic scale is a *mode of limited transposition*.

impressionism — in music, refers to the musical style cultivated by Debussy. Analogous to impressionism in the visual arts, in which details and sharply-drawn contours are undermined by haziness or blurriness. Impressionistic music tends to emphasize orchestration, nonclimactic melodies, and complex textures while suppressing functional harmony.

index number — generally, the specific transposition level applied to an operation (for instance, T_3 refers to transposition up three half-steps). In twelve-tone music, the number used to designate the transposition level of a row form (including inverted row forms) is sometimes called an index number. (For example, P4 refers to a prime row starting on E, while I2 refers to an inverted row starting on D.)

interval — the distance between two notes. Also see *pitch interval*, *pitch-class interval*, and *interval class*.

interval class — unordered pitch-class interval (i.e., the smallest possible distance between two pitch classes). Only integers 0-6 are possible. A major second and a minor seventh are said to be members of the same interval class (ic 2).

interval-class vector — an ordered six-digit tally of all the interval classes contained in some set or set class. The first digit represents the number of ic1s, the second digit represents the number of ic2s, etc. The set {B C D} (a member of set-class [013]) has an interval-class vector of <111000>.

invariance — in general, pitches or pitch classes that two musical events have in common. In twelve-tone music, refers to identical segments of different row forms. Invariance may be either ordered or unordered.

inversion — in atonal and serial music, refers to turning some musical event (for instance, a melodic fragment, a twelve-tone row, or a chord) "upside down" so that its contour is a mirror image of the original form. For instance, a descending half step becomes an ascending half step. See also *axis of symmetry.*

matrix — a convenient way of representing the 48 members of a given twelve-tone row class (all transposition levels of prime and inverted rows as well as their retrogrades).

modes of limited transposition — a group of scales so-named by Messiaen because of their limited number of distinct transpositions. (For instance, there are only two distinct transpositions of the whole-tone scale; the rest are duplications.)

Nebenstimme — designates the voice in a musical texture that is intended to be less prominent than the *Hauptstimme.* (Note that the *Nebenstimme* is still more important than voices with no marking at all.)

neoclassicism — in music, a style that emphasizes motivic clarity, textural transparency, formal balance, and reliance upon stylistic models (or even existing compositions from the Baroque and Classical eras). The term is commonly associated with Stravinsky's works composed between 1920 and 1951.

nonretrogradable rhythm — term used by Messiaen to describe rhythms that sound the same when played backwards.

octatonic scale — literally, a scale with eight notes per octave. The name is used specifically to refer to a scale with alternating whole and half steps. Example:

> B C♯ D E F G G♯ A♯

The octatonic scale is one of Messiaen's *modes of limited transposition.*

pandiatonicism — a twentieth-century technique involving the use of a particular diatonic scale without regard to the usual functional relationships or traditional treatment of dissonance.

pentachord — any collection of five distinct pitch classes.

pentatonic scale — literally, a scale with five notes per octave. The name is used specifically to refer to a scale composed exclusively of major seconds and minor thirds, as represented by the black keys of a piano.

phasing — technique in which two subgroups of an ensemble begin by playing the same pattern, but one group either gradually speeds up or suddenly drops a beat so that the two subgroups are playing the same pattern "out of phase." The term is most closely associated with Reich.

pitch — a note in a particular register, including enharmonic equivalents.

pitch-centric — having a tonic-like note, but lacking other important features of tonality.

pitch class — a note plus all of its octave duplications, including enharmonic equivalents. Middle C, the C two octaves above, and the lowest B♯ on a piano are different pitches, but they are all members of the same pitch class. To eliminate enharmonic confusion, pitch classes are often represented with the numbers 0-9, plus A and B (or T and E) to represent 10 and 11: 0 = C, 1 = C♯ or D♭, 2 = D, 3 = D♯ or E♭, etc.

pitch-class interval — the distance between two pitch classes, expressed as the number of half-steps separating them mod 12. Generally understood to be ordered (reflecting contour, in which case only integers 0-11 are possible). Also see *interval class.*

pitch interval — the distance between two pitches, expressed as the number of half-steps separating them. May be ordered (reflecting contour, in which case negative integers are possible) or unordered (ignoring contour, in which case only positive integers are possible).

planing — the parallel movement of harmonic structures (for instance, major triads or dominant seventh chords). Debussy and Satie frequently used this technique.

pointillism — a twentieth-century compositional technique in which long melodic lines are replaced by fragmented figures in different instruments and registers, producing a disjointed sound.

polychord — a harmonic structure consisting of two or more different chords (usually triads). The polychord should be spaced or orchestrated so that the identity of each chord is retained.

prime row — the original form of a twelve-tone row or any of its transpositions.

prime form — an abstract representation of a set's structure, often used to designate a set class. The prime form of any set is its most closely-packed arrangement that is transposed or inverted to begin on pitch class 0.

quartal harmony — harmonic structure built upon the interval of a perfect fourth instead of major and minor thirds. Often includes harmonic structures built upon both perfect fourths and perfect fifths.

quintal harmony — harmonic structure built upon the interval of a perfect fifth instead of major and minor thirds.

retrograde — the statement of a melodic figure, a twelve-tone row, or a rhythmic pattern in reverse order (that is, backwards).

rotation — in twelve-tone composition, a systematic reordering of the row by moving the first pitch class (or pitch classes) to the end of the row. Example:

< C   D   F♯ F   A♭ C♯ E   A   B   B♭ E♭ G >
< D   F♯ F   A♭ C♯ E   A   B   B♭ E♭ G   C >

row class — in twelve-tone composition, the family of all rows that are related by transposition, inversion, and/or retrograde.

row form — a specific member of a row class.

segmentation — generally, the way in which music is divided into smaller units. In twelve-tone music, this is sometimes understood as a technique in which the row is divided into fragments (which are often treated in a motivic fashion). This practice is closely associated with Webern.

serial — refers to music in which at least one parameter (such as pitch or rhythm) is subjected to an ordering principle.

set — an unordered collection of elements (usually pitch classes). This is distinct from a series or row, in which the elements are ordered.

set class — the family of all sets that are transpositions and/or inversions of one another. For instance, {C C♯ D}, {G F♯ F}, and {B A B♭} are all members of set class [012] — three adjacent notes from a chromatic scale.

Sprechstimme — a type of vocal recitation in which specifically notated pitches are approximated in performance. The result is half way between speech and song.

subset — a group of elements that forms part of some particular set. For instance, {D E} is a subset of {C D E F B♭}. Subsets may be either literal or abstract.

superset — a group of elements that includes some particular set. For instance, {D F♯ A C} is a superset of {D F♯ A}. Supersets may be either literal or abstract.

symmetry — the property of a set whose elements may entirely be mapped onto one another through a specific operation (in other words, some operation produces total invariance). Sets that can be transposed onto themselves (at some transposition level other than T_0) are described as transpositionally symmetrical (T-symmetrical); sets that can be inverted onto themselves are described as inversionally symmetrical (I-symmetrical). See *degree of symmetry*.

synthetic scale — any scale other than the major or minor scales and the church modes that is invented for use in a particular musical composition.

tetrachord — in non-tonal music, any collection of four distinct pitch classes.

trichord — any collection of three distinct pitch classes.

twelve-tone row — an ordered series of all twelve pitch classes (no duplications).

whole-tone scale — a scale consisting exclusively of whole tones. This is one of Messiaen's *modes of limited transposition.*

Z-related sets — a pair of sets that are not members of the same set class, yet have the same interval-class content (and therefore share the same *interval-class vector*).