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## Writings on Music 1965–2000

## STEVE REICH

Edited with an Introduction by Paul Hillier



#### EARLY WORKS 31



#### Pendulum Music (1968)

Five years after working together on Ubu Roi, Reich and Wiley collaborated again in the multimedia piece Over Evident Falls at the University of Colorado in August 1968. Pendulum Music originated there, Reich says, when he had soaked in the atmosphere to the point that he began to twirl a microphone cord like a lasso in Wiley's Boulder studio and discovered the effect of its feedback as it crossed the path of a speaker [see fig. 1-1]. It was incorporated into the performance accompanying a snowfall (of Ivory Snow flakes) in black light; the second part featured a tape piece called My Name Is, in which Reich played multiples of various taped voices providing that information, while Wiley passed cards with some of the resulting nonsense syllables or contextually interesting words across the black-lighted stage on a clothesline [see ex. 1-5]. From Strickland, 1963 (p. 191).

Pendulum Music—Anti-Illusion: Procedures/Materials, Marcia Tucker and James Monte, Whitney Museum of American Art, New York, 1969. See also "Second Interview with Michael Nyman" (no. 19), p. 95.

FOR MICROPHONES, AMPLIFIERS, SPEAKERS AND PERFORMERS 2, 3, 4 or more microphones are sospended from the ceiling by their cables so that they all hang the same distance from the floor and are all free to swing with a pendular notion. Each nicrophones cable is plugged into an amplifier which is connected to a speaker. Kade nicrophone hangs a few indus directly above on next to its speaker. The performance begins with performens taking each mike, pulling it back like a swing, and then in phison releasing all of them together. Performens then carefully turn up each amplifier just to the point where featback occurs when a mike swings directly over or helt to it's speaker. Thus, a series of seedback pulses are heard which will either be all in unson or not depending on the gradually changing phase relations of the different mike pendulous. Parformers then sit down to wortch and lister to the process along with the audience. The piece is ended sometime after all mikes have come to rest and are feeding back a continuous tone by performers pulling out the your conts of the amplifiers. Stave Reich \$/68

Example 1-5. Pendulum Music. Copyright © 1980 by Universal Edition (London) Ltd., London. Reproduced by Kind Permission.

See also both Michael Nyman interviews (nos. 6 and 19); in the first interview, Reich quotes from this essay, and in the second interview, he talks about the connection to artists such as Sol Lewitt and Richard Serra.

## 26 MUSIC AS A GRADUAL PROCESS (1968)

Music as a Gradual Process—first published in the catalogue to the exhibition Anti-Illusion: Procedures/Materiels, Marcia Tucker and James Monte, Whitney Museum of American Art, New York, 1969.

I do not mean the process of composition but rather pieces of music that are, literally, processes.

The distinctive thing about musical processes is that they determine all the noteto-note (sound-to-sound) details and the overall form simultaneously. (Think of a round or infinite canon.)

I am interested in perceptible processes. I want to be able to hear the process happening throughout the sounding music.

To facilitate closely detailed listening a musical process should happen extremely gradually.

Performing and listening to a gradual musical process resembles:

- pulling back a swing, releasing it, and observing it gradually come to rest; turning over an hour glass and watching the sand slowly run through to the bottom;
- placing your feet in the sand by the ocean's edge and watching, feeling, and listening to the waves gradually bury them.

Although I may have the pleasure of discovering musical processes and composing the musical material to run through them, once the process is set up and loaded it runs by itself.

Material may suggest what sort of process it should be run through (content suggests form), and processes may suggest what sort of material should be run through them (form suggests content). If the shoe fits, wear it.

As to whether a musical process is realized through live human performance or through some electromechanical means is not finally the main issue. One of the

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most beautiful concerts I ever heard consisted of four composers playing their tapes in a dark hall. (A tape is interesting when it's an interesting tape.)

It is quite natural to think about musical processes if one is frequently working with electromechanical sound equipment. All music turns out to be ethnic music.

Musical processes can give one a direct contact with the impersonal and also a kind of complete control, and one doesn't always think of the impersonal and complete control as going together. By "a kind" of complete control, I mean that by running this material through this process I completely control all that results, but also that I accept all that results without changes.

John Cage has used processes and has certainly accepted their results, but the processes he used were compositional ones that could not be heard when the piece was performed. The process of using the *I Ching* or imperfections in a sheet of paper to determine musical parameters can't be heard when listening to music composed that way. The compositional processes and the sounding music have no audible connection. Similarly, in serial music, the series itself is seldom audible. (This is a basic difference between serial—basically European—music, and serial—basically American—art, where the perceived series is usually the focal point of the work.)

What I'm interested in is a compositional process and a sounding music that are one and the same thing.

James Tenney said in conversation, "Then the composer isn't privy to anything." I don't know any secrets of structure that you can't hear. We all listen to the process together since it's quite audible, and one of the reasons it's quite audible is because it's happening extremely gradually.

The use of hidden structural devices in music never appealed to me. Even when all the cards are on the table and everyone hears what is gradually happening in a musical process, there are still enough mysteries to satisfy all. These mysteries are the impersonal, unintended, psychoacoustic by-products of the intended process. These might include submelodies heard within repeated melodic patterns, stereophonic effects due to listener location, slight irregularities in performance, harmonics, difference tones, and so on.

Listening to an extremely gradual musical process opens my ears to *it*, but *it* always extends farther than I can hear, and that makes it interesting to listen to that musical process again. That area of every gradual (completely controlled) musical process, where one hears the details of the sound moving out away from intentions, occuring for their own acoustic reasons, is *it*.

I begin to perceive these minute details when I can sustain close attention and a gradual process invites my sustained attention. By "gradual" I mean extremely gradual; a process happening so slowly and gradually that listening to it resembles watching a minute hand on a watch—you can perceive it moving after you stay with it a little while.

Several currently popular modal musics like Indian classical and drug-oriented rock and roll may make us aware of minute sound details because in being modal (constant key center, hypnotically droning and repetitious) they naturally focus on these details rather than on key modulation, counterpoint, and other peculiarly Western devices. Nevertheless, these modal musics remain more or less strict frameworks for improvisation. They are not processes.

The distinctive thing about musical processes is that they determine all the noteto-note details and the overall form simultaneously. One can't improvise in a musical process—the concepts are mutually exclusive.

While performing and listening to gradual musical processes, one can participate in a particular liberating and impersonal kind of ritual. Focusing in on the musical process makes possible that shift of attention away from *he* and *she* and *you* and *me* outward toward *it*.

### WAYELENGTH BY MICHAEL SNOW (1968)

3

Written in 1968 as a spontaneous reaction to the film and not published until it was included in the catalogue for a retrospective exhibition of Michael Snow's work: *Presence and Absence — Films of Michael Snow*, edited by Jim Shedden (Art Gallery of Ontario, Toronto, 1995). See also Snow, 1994.

#### Wavelength — as in Length of Sound or Light Wave; Wave as in the Sea

Begins with girl having bookcase moved into loft room. Sync sound. Documentary level. Sounds of the street and traffic. People leave—the room by itself. What does a room feel when no one is there? Does the tree fall in the forest of no one sees it? The camera (no one?) sees it. Two girls enter (one coming back? from where?). And turn on a transistor radio—*Strawberry Fields*—traffic and they turn it off before tune is over and they leave. And then we get a new sound (no sound?) of the 60-cycle hum of the amplifier slowly beating against an oscillator tone that then, slowly, very slowly, begins to rise creating faster and faster beats

## THE PHASE SHIFTING PULSE GATE - FOUR ORGANS - PHASE PATTERNS -AN END TO ELECTRONICS (1968-70)

"An End to Electronics—Pulse Music, the Phase Shifting Pulse Gate, and Four Organs, 1968–1970"—appeared originally in *Source Magazine*, no. 10, edited by Alvin Lucier, Composer/Performer Edition, Davis, California, Fall 1972.

Each drum is capable of producing two sounds differing in pitch, one from each end of the drum. Each player creates a different rhythmic pattern through irregular alternation of left hand with right hand; the drums, however, are interdependent and their patterns dovetail into each other to create an unbroken succession of tones.

Anklung Gamelans in Bali, Colin McPhee, 1937

Hocket. In medieval music, a peculiar technique of composition characterized by the quick alternation of two voice parts with single notes or short groups of notes, one part having a rest where the other has notes.

The Harvard Brief Dictionary of Music, 1961

On Lincoln's birthday in 1968, I had the idea that if a number of single tones were all pulsing at the same tempo but with gradually shifting phase relations, a great number of musical patterns would result. If the tones were all in phase (struck at the same instant), a pulsing chord would be heard. If the tones were slowly shifted just a bit out of phase, a sort of rippling broken chord would be heard that would gradually change into a melodic pattern, then another, and so on. If the process of phase shifting were gradual enough, then minute rhythmic differences would become clearly audible. A given musical pattern would then be heard to change into another with no alteration of pitch, timbre, or loudness, and one would become involved in a music that worked exclusively with gradual changes in time.

In terms of performance, this meant that each performer could play two notes (one hand, one note), pause, play two notes, pause, and so on. Depending on when performers played and paused (their phase relation), various interlocking melodic patterns would occur. This would be in contrast to the Western and generally non-Western practice of creating melodies that one person can play or sing by himself, but would resemble the interlocking figuration of the Balinese Gamelan and the hocketing procedures in medieval music. Performing such inter-

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locking music would not be too hard to do, but to play, pause, and also very gradually shift one's phase relationship to the other players would be almost impossible. Clearly an electronic device was needed that would be both an instrument in itself, and also a sort of phase variable metronome enabling several performers to play together.

Later, in February 1968, I visited Larry Owens, an electronic engineer at the Bell Laboratories in Holmdel, New Jersey, and, after several months, the block diagrams and descriptions shown in figure 4-1 resulted.



Component digital clock

Each of the 12 channels must concern itself with periodically gating an analog signal for a programmable length of time, and then must be capable of being programmed to shift phase position so that this gating occurs at any one of 120 subdivisions of the constant time period.

The digital clock, common to all channels, is shown on the previous page. The constant time period for all channels is determined by the period of the astable multivibrator divided by the counting ratio of 120. The period of the astable multivibrator can be varied over a specified range. The constant time period is thus divided into 120 equal intervals, or counts, any one of which may be selected by simple digital logic (fig. 4-2).

Figure 4-1. Technical description of phase shifting pulse gate.



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Pre-channel equipment

The per-channel equipment shown above must select one of the 120 intervals or counts (phase positions) from the common clock, develop the gate, and gate the incoming analog signal. The choice of one of the 120 counts is made by two selector switches (one with 10 positions and the other with 12) in tandem. The digital outputs of these selector switches are logically combined to select the desired interval or phase position. The gate is then derived from the selected interval with a pulse width determined by the adjustable time constant of a monostable multivibrator. This gate waveform is then applied to an analog switch that, when gated, allows the analog signal to pass through it.

Figure 4-2. Diagram of phase shifting pulse gate.

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From a more musical viewpoint, one could describe each channel as capable of dividing a repeating time period or "measure" into 120 equal parts or "120th-notes." Thus, if all channel selectors switches are set to one, and one channel is moved one unit ahead of the other, that pulse will be heard one "120th-note" before the others, or one "120thnote" out of phase. Since even at very slow tempos the rhythmic movement from one "120th note" to the next is barely perceptible, each channel becomes, on a perceptual level, continously phase variable in relation to all the others.

The device is purely rhythmic in nature and produces no sound of its own. Provision is made to patch



Figure 4-3. Steve Reich with phase shifting pulse gate at Whitney Museum of American Art, 1969. PHOTO BY RICHARD LANDRY.

in any 12 constant sounds one wishes. These sounds may be either acoustical via microphone (droning violins, voices, or one's finger constantly rotating on the moistened lip of a thin vibrating wine glass), or electronic (oscillators). When one of the gates opens, a short pulse, varying from one-fifteenth to one-half second in width, is passed through the gate, into a power amp, and out to a loudspeaker. When the gate is closed, there is no sound, or simply the acoustical sound of the instrument if an acoustical source is used.

More than a year after my first visit to Bell Labs, the Phase Shifting Pulse Gate was completed. I constructed it myself with a good deal of help from Larry Owens and David Flooke.

#### Musical Applications

In April 1969, I first performed Pulse Music on the Phase Shifting Pulse Gate at a concert at The New School in New York. On May 27, 1969, I gave the second performance of Pulse Music in a more elaborated form at the Whitney Museum of American Art. For that performance, eight oscillators were patched into the gate and tuned to the same natural minor scale as four log drums used earlier in that same concert. Although only eight different pitches were used, four of them were patched into two channels each, so that 12 oscillator tones were actually used. In bars 13 through 16 (see ex. 4-1), one can see this separation of the doubled tones into two separate phase positions. All the dotted lines between bars indicate



and the second second



Example 4-1. Pulse Music.

the gradual 120th-note-by-120th-note phase shifting. The small numbers in parenthesis indicate the position of the rotary selector switches. If (1) is the first eighth-note in a measure of  $\frac{12}{8}$  divided into 120 equal divisions, then (1 1) will be the second eighth-note, (21) the third, and so on. These numbers helped me correlate the musical notation with the actual movements of the rotary selector switches during performance. At bar 21, the final pattern is very gradually accelerated to more than twice its original tempo, creating a sound better described as a blur of color than as a series of discrete pulses. After bar 21, the long dotted lines indicate the final gradual phase shifting of this blur into a fast pulsing chord at bar 22.

Preceding the performance of Pulse Music at the Whitney Museum was the first and only performance of Four Log Drums, in which the gate functioned as a programming device for four performers each playing a two-note wooden log drum. The pulses from the gate were transmitted to each performer via head-phone, and each performer played his log drum in exact synchronism with the pulses that I sent them from the gate. Since the earphones only somewhat softened the sounds going on in the room, the performers could and did listen to each other. It was found during rehearsals that although performers tried to follow their pulses exactly, they could only create the musically correct overall pattern when they listened to each other as well. It will be noted that not only are the pitches the same as in Pulse Music but the tempo as well. Pulse Music began directly and without pause from the end of bar 14 of Four Log Drums (see ex. 4-2).

#### Four Organs – An End to Electronics

After the performance at the Whitney Museum, I brought the Phase Shifting Pulse Gate back to my studio in its fiber case, and didn't immediately unpack it. The pressure of performing with a device that was essentially a prototype—and could easily have ceased functioning at any time—was one of the reasons. Another, and more serious, reason was that the "perfection" of rhythmic execution of the gate (or any electronic sequencer or rhythmic device) was stiff and unmusical. In any music that depends on a steady pulse, as my music does, it is actually tiny microvariations of that pulse created by human beings, playing instruments or singing, that gives life to the music. Last, the experience of performing by simply twisting dials instead of using my hands and body to actively create the music was not satisfying. All in all, I felt that the basic musical ideas underlying the gate were sound, but that they were not properly realized in an electronic device.

Three months later, in August 1969, I had the idea that if a group of tones were all pulsing together in a repeating chord, as at the beginning of Pulse Music, one tone at a time could gradually get longer and longer in duration until the gradual augmentation (lengthening) of durations produced a sort of slow motion music. This would simply be using the variable pulse width aspect of the gate

#### FOUR ORGANS 45



Figure 4-4. Four Organs being rehearsed at the Walker Art Center, Minneapolis, 1969, by, left to right: Arthur Murphy, Phillip Glass, Jon Gibson, Steve Chambers, and Steve Reich. PHOTO BY RICHARD LANDRY.

(which I hadn't used in the Whitney Museum version at all) exclusively, and to enormous proportions. The tones would simply begin in unison in a pulsing chord, and then gradually extend out like a sort of horizontal bar graph in time. Instead of loading my pulse width control with more and more capacitors, I thought about playing a repeated chord on an organ, and then holding one and then several of the notes down longer. Instead of the common digital clock, I thought of a musician playing a steady pulse with a rattle (maracas) that would enable the organists to count together as they held their notes down longer and longer (see fig. 4-4). Since I was unable to start work on this piece for several months, it took until January 1970 to see Four Organs for four electric organs and maracas completed. Four Organs, like Piano Phase, is an example of a piece of live instrumental music with a rhythmic structure (see ex. 4-3), the basic idea of which derives from an electronic device. This feedback of ideas from electromechanical devices and processes to instrumental music has brought me to think of electronic music as a kind of interlude filled with new ideas for the ongoing history of instrumental and vocal music.

It was my intention to resume work with the Phase Shifting Pulse Gate after I finished *Four Organs*, but the experience of composing and then rehearsing with my ensemble was so positive, after more than a year of preoccupation with electronics, that another piece for four organs, *Phase Patterns*, happened very spontaneously a month later in February 1970. In this piece, the four of us were literally drumming on our keybords in what is called a "paradiddle" pattern in Western rudimental drumming. This piece proved to be as positive an experience as *Four Organs* and led, together with other factors, to a trip to Africa to study drumming.

The Phase Shifting Pulse Gate is still in its fiber case on top of the closet in my bedroom. I haven't unpacked it yet.





Example 4-2. Four Log Drums.



Example 4-3a. Four Organs, mm. 0–4. COPYRIGHT © 1980 BY UNIVERSAL EDITION (LONDON) LTD., LONDON. REPRODUCED BY KIND PERMISSION.



Example 4-3b. Four Organs, m. 41. COPYRIGHT © 1980 BY UNIVERSAL EDITION (LONDON) LTD., LONDON. REPRODUCED BY KIND PERMISSION.

#### Four Organs-Program Note

Four Organs is composed exclusively of the gradual augmentation (lengthening) of individual tones within a single (dominant 11th) chord. The tones within the chord gradually extend out like a sort of horizontal bar graph in time. As the chord stretches out, slowly resolving to the tonic A and then gradually changing back to the dominant E, a sort of slow-motion music is created. The maracas lay down a steady time grid of even eighth-notes throughout, enabling the performers to play together while mentally counting up to as much as 256 beats on a given cycle of sustained tones.

Four Organs is the only piece I am aware of that is composed exclusively of the gradual augmentation of individual tones within a single chord. From the beginning to the end there are no changes of pitch or timbre; all changes are rhythmic and simply consist of gradually increasing durations. This process of augmentation was suggested by the enormous elongation of individual tenor notes in *Organum* as composed by Perotin and others in the twelfth and thirteenth centuries in Paris at Notre Dame Cathedral. Tenor notes that in the original chant may have been equivalent to our quarter- or half-notes can take several pages of tied whole-notes when augmented by Perotin or Leonin.

Four Organs was composed in January 1970. It was first performed at the Guggenheim Museum in New York City by myself and members of my own ensemble later that same year. It also turned out to be one of my first pieces to be heard by a large concert-going public when Michael Tilson Thomas invited me to perform it with him and members of the Boston Symphony Orchestra in Boston in 1971 and at Carnegie Hall in 1973, where it provoked a riot.

#### Phase Patterns

Almost immediately after the completion of *Four Organs*, I composed another piece for four electric organs, *Phase Patterns*. In this piece, the performers are drumming on their keyboards. Each hand plays certain notes throughout the piece without change, only alternating up and down, left, right, left, left, right, left, right, which, in Western rudimental drumming, is called a paradiddle. The idea of drumming on the keyboard comes out of my limitations as a keyboard player, together with my studies of rudimental drumming as a teenager. Although the cause here is one of physical limitation, the effect is of a new approach to the keyboard. I now look at all keyboard instruments as extraordinary sets of tuned drums (see ex. 4-4).

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The presence of musicians who play certain instruments or sing encourages me to write more music for those instruments or voices. The percussionists and singers I began working with in *Drumming* encouraged me to write more percussion and vocal music. *Music for Mallet Instruments, Voices, and Organ* is one of the results.

These musicians are also my first and most important critics. During early rehearsals when a first version of a new piece is being tried out, the reactions of the players will often tell me whether the new piece really works, or not. Not only direct verbal comments during or after a rehearsal but also an appreciative laugh or an embarrassed averted glance may be enough to let me know when I am on the right or wrong track. This was particularly the case in the early fall of 1972, when the reactions of James Preiss, Russell Hartenberger, and Steve Chambers were enough to make me throw away several attempts at multiple piano pieces that preceded the finished version of *Six Pianos*.

There is also the question of frequency of rehearsals. Most new pieces of about 20 minutes in length will be rehearsed once or twice a week for two or three months. *Drumming*, which lasts about an hour and 20 minutes, took almost a year of weekly rehearsals. This amount of rehearsing allows for many small compositional changes while the work is in progress and at the same time builds a kind of ensemble solidity that makes playing together a joy.

## MUSIC AND PERFORMANCE (1969-74; 1993)

I-III were printed in *Writings*, 1974, under the title "From Program Notes"; IV-Statement about Time-was written for *Dance Ink* magazine October 1993.

#### (I)

I am not interested in improvisation or in sounding exotic.

One hardly needs to seek out personality as it can never be avoided.

Obviously music should put all within listening range into a state of ecstasy.

I am interested in music which works exclusively with gradual changes in time.

(||)

A performance for us is a situation where all the musicians, including myself, attempt to set aside our individual thoughts and feelings of the moment, and try to focus our minds and bodies clearly on the realization of one continuous musical process.

This music is not the expression of the momentary state of mind of the performers while playing. Rather the momentary state of mind of the performers while playing is largely determined by the ongoing composed slowly changing music.

By voluntarily giving up the freedom to do whatever momentarily comes to mind, we are, as a result, free of all that momentarily comes to mind.

#### (III)

As a performer what I want is to be told exactly what to do within a musical ensemble, and to find that by doing it well I help make beautiful music. This is what I ask of my own compositions, and those of any other composer, and this is what I looked for and found when I studied Balinese and African music. The pleasure I get from playing is not the pleasure of expressing myself, but of subjugating myself to the music and experiencing the ecstasy that comes from being a part of it.

#### (IV)

Music Dance Theatre Video and Film are arts in time. Artists in those fields who keep this in mind seem to go further than those mainly concerned with psychology or personality.

## / CI VIDEOTAPE AND A COMPOSER (1975)

Writien in September 1975, this essay was in included in Video Art—An Anthology, compiled and edited by Ira Schneider and Beryl Korot, and published in New York in 1976. Thus, it dates from the beginning of Reich's association with his future wife and clearly maps out the area in which they would eventually collaborate as artists. Beryl Korot's own essay in the same book offers a fascinating account of her approach to video art, and this takes-on added resonance when considered in the context of their later collaboration. Her essay is reprinted here in full as number 17b. In both essays, ideas are glimpsed that will be further developed in *The Cave* and *Three Tales*.

There are two ways I've worked or thought of working with videotape. The first is videotaping performances of musical compositions and the second is composing pieces for videotape.

# MUSIC FOR 18 MUSICIANS (1976) 18

Written as a program note for the first performance at New York Town Hall on April 24, 1976.

*Music for 18 Musicians* is approximately 55 minutes long. The first sketches were made for it in May 1974 and it was completed in March 1976. Although its steady pulse and rhythmic energy relate to many of my earlier works, its instrumentation, harmony, and structure are new.

As to instrumentation, *Music for 18 Musicians* is new in the number and distribution of instruments: violin, cello, two clarinets doubling bass clarinet, four women's voices, four pianos, three marimbas, two xylophones, and metallophone (vibraphone with no motor). All instruments are acoustical. The use of electronics is limited to microphones for the voices and some of the instruments, in order to obtain a balance in the overall sound.

There is more harmonic movement in the first five minutes of *Music for 18 Musicians* than in any other complete work of mine to this date. Although the movement from chord to chord is often just a revoicing, inversion, or relative minor or major of a previous chord, usually staying within the key signature of three sharps at all times, nevertheless, within these limits, harmonic movement plays a more important role here than in any of my earlier pieces.

Rhythmically, there are two basically different kinds of time occurring simultaneously in *Music for 18 Musicians*. The first is that of a regular rhythmic pulse in the pianos and mallet instruments that continues throughout the piece. The second is the rhythm of the human breath in the voices and wind instruments. The entire opening and closing sections plus part of all sections in between contain pulses by the voices and winds. They take a full breath and sing or play pulses of particular notes for as long as their breath will comfortably sustain them. The breath is the measure of the duration of their pulsing. This combination of one breath after another gradually washing up like waves against the constant rhythm of the pianos and mallet instruments is something I have not heard before and would like to investigate further (see ex. 18-1).<sup>1</sup>

The structure of *Music for 18 Musicians* is based on a cycle of 11 chords played at the very beginning of the piece and repeated at the end (see ex. 18-2). All the instruments and voices play or sing pulsing notes within each chord. Instruments like the strings that do not have to breathe nevertheless follow the rise

<sup>1.</sup> See Reich's comments on Michael Snow in the editorial introduction to "Music as a Gradual Process" (no. 2b), p. 33.



Example 18-1. *Music for 18 Musicians,* mm. 624–25. Copyright © by Hendon Music, Inc., a Boosey & Hawkes company. Reprinted by Permission.

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Example 18-2. Music for 18 Musicians, cycle of chords.

and fall of the breath by following the breath patterns of the bass clarinet. Each chord is held for the duration of two breaths, and the next chord is gradually introduced, and so on, until all 11 are played and the ensemble returns to the first chord. This first pulsing chord is then maintained by two pianos and two marimbas. While this pulsing chord is held for about five minutes a small piece is constructed on it. When this piece is completed there is a sudden change to the second chord, and a second small piece or section is constructed. This means that each chord that might have taken 15 or 20 seconds to play in the opening section is then stretched out as the basic pulsing harmony for a five-minute piece, very much as a single note in a cantus firmus or chant melody of a twelfth-century organum by Perotin might be stretched out for several minutes as the harmonic center for a section of the organum. The opening 11-chord cycle of *Music for 18 Musicians* is a kind of pulsing cantus for the entire piece.

On each pulsing chord one or, on the third chord, two small pieces are built. These pieces or sections are basically either in the form of an arch (ABCDCBA), or in the form of a musical process, like that of substituting beats for rests, working itself out from beginning to end. Elements appearing in one section will appear in another but surrounded by different harmony and instrumentation. For instance, the pulse in pianos and marimbas in sections 1 and 2 changes to marimbas and xylophones and two pianos in section 3A, and to xylophones and maracas in sections 6 and 7. The low piano pulsing harmonies of section 3A reappear in section 6 supporting a different melody played by different instruments. The process of building up a canon, or phase relation, between two xylophones and two pianos, which first occurs in section 2, occurs again in section 9, but building up to another overall pattern in a different harmonic context. The relationship between the different sections is thus best understood in terms of resemblances between members of a family. Certain characteristics will be shared, but others will be unique.<sup>2</sup>

One of the basic means of change or development in many sections of this piece is to be found in the rhythmic relationship of harmony to melody. Specifi-

2. A concept Reich first encountered in Wittgenstein's Philosophical Investigations, 1953.

cally, a melodic pattern may be repeated over and over again, but by introducing a two- or four-chord cadence underneath it, first beginning on one beat of the pattern, and then beginning on a different beat, a sense of changing accent in the melody will be heard. This play of changing harmonic rhythm against constant melodic pattern is one of the basic techniques of this piece, and one that I had never used before. Its effect, by change of accent, is to vary that which is in fact unchanging.

Changes from one section to the next, as well as changes within each section, are cued by the metallophone, whose patterns are played once only to call for movements to the next bar—much as in a Balinese Gamelan a drummer will audibly call for changes of pattern, or as the master drummer will call for changes of pattern in West African music. This is in contrast to the visual nods of the head used in earlier pieces of mine to call for changes and in contrast also to the general Western practice of having a nonperforming conductor for large ensembles (fig. 18-1). Audible cues become a part of the music and allow the musicians to keep listening.

- PH: How was *Music for 18 Musicians* composed—I think you told me there was a lot of collaboration in putting it together?
- SR: It was composed during 1974–75 and at that point there were more regular rehearsals with the ensemble than at any other time. In those days I wasn't commissioned, but there was a clear understanding that there were concerts available. It was first done as a work-in-progress in 1975.
- PH: Did the musicians work for free during the rehearsals?
- sR: Yes, basically—they were mostly then students—Russ Hartenberger and Bob Becker were studying non-Western music at Wesleyan University [about a twohour drive north of New York City in Middletown, Connecticut], and I paid the bus fare. I lived across the street from here in a loft and I rented four spinets for the rehearsals, which took place every two to four weeks. I would write a lot in my notebook in shorthand and then transfer it to individual parts for the musicians, just adding occasional notes in the parts. Then there was a lot of discussion in rehearsal: "No, no, you come in here," and the musician would just write it on his part. So this oral tradition grew and the notation shrunk; the parts had everything on them that the musicians needed to play the piece, but no bar numbers common to all players. There are 11 sections with Roman numerals that mark off the sections, but once you're into a section there's no number to call out. We just continued working that way and the piece was going well, and when the piece was done, that's what there was. I started to make a score. I got to section 2 and I began realizing I wasn't even sure how to notate everything, and there were hundreds of pages to go, so I stopped. Basically there were 22 years without a score: between 1976 and 1998, when Marc Mellits finally made the score (in conjunction with me) for Boosey & Hawkes.

-From a discussion with the editor.

an increasing amount of sixteenths, the effect is one of becoming more and more florid and melismatic. At all times throughout the piece there are at least two wind instruments playing the melodic pattern in harmony with each other, while a third plays in canon with the upper voice.

The winds, three oboes doubled by electric organs, or three flutes doubled by two pianos and electric organs, play the melodic material throughout while the slowly changing harmonies are played by the strings also doubled by electric organs. During the first and last variations, a full brass section of three trumpets, three trombones, and tuba gradually fades in and out to complete the harmony of the middle register strings and organs.

23 TEHILLIM (1981)

Tehillim (pronounced teh-hill-leem) is the original Hebrew word for Psalms. Literally translated, it means *praises* and derives from the three-letter Hebrew root *hey, lamed, lamed (hll)*, which is also the root of halleluyah. *Tehillim* is a setting of Psalms 19:2-5 (19:1-4 in Christian translations), 34:13-15 (34:12-14), 18:26-27 (18:25-26) and 150:4-6.

The ensemble version is scored for four women's voices (one high soprano, two lyric sopranos, and one alto), piccolo, flute, oboe, english horn, two clarinets, six percussion (playing small tuned tambourines with no jingles, clapping, maracas, marimba, vibraphone, and crotales), two electric organs, two violins, viola, cello, and bass. The voices, winds, and strings are amplified in performance. In the orchestral version, there are full strings and winds with amplification for the voices only.

The first text begins as a solo with drum and clapping accompaniment only. It is repeated with clarinet doubling the voice and with a second drum and clap in canon with the first. It then appears in two-voice canon and at last the strings enter with long held harmonies. At this point, all four voices, supported by a single maraca, doubled by two electric organs and harmonized by the strings, sing four four-part canons on each of the four verses of the first text. When these are completed, the solo voice restates the original complete melody with all drums and full string harmonization. The second text begins immediately after a short drum transition. Here, the three verses of text are presented in two- or three-voice harmony in a homophonic texture. Sometimes the voices are replaced by the english horn and clarinet or by the drums and clapping. Soon the melodic lines begin augmenting (or lengthening) and then adding melismas. The effect is of a melodic line growing longer and more ornate. After a pause, the third text begins in a

#### TEHILLIM 101

slower tempo and with the percussion changed to marimba and vibraphone. The text is presented as a duet first between two and then all four voices. This third text is not only the first slow movement I have composed since my student days but also the most chromatic music I have ever composed (with the possible exception of *Variations*). The fourth and final text resumes the original tempo and key signature and combines techniques used in the proceeding three movements. It is, in effect, a recapitulation of the entire piece that then, in a coda based solely on the word halleluyah, extends the music to its largest instrumental forces and its harmonic conclusion. This last movement affirms the key of D major as the basic tonal center of the work after considerable harmonic ambiguity earlier.

The tambourines without jingles are perhaps similar to the small drum called *tof* in Hebrew in Psalm 150 and several other places in the biblical text. Hand clapping as well as rattles were also commonly used throughout the Middle East in the biblical period, as were small pitched cymbals. Beyond this, there is no musicological content to *Tehillim*. No Jewish themes were used for any of the melodic material. One of the reasons I chose to set Psalms as opposed to parts of the Torah or Prophets is that the oral tradition among Jews in the West for singing Psalms has been lost. (It has been maintained by Yemenite Jews.) That means that, as opposed to the cantillation of the Torah and Prophets, which is a living 2,500-year-old oral tradition throughout the synagogues of the world, the oral tradition for Psalm singing in the Western synagogues has been lost. This meant that I was free to compose the melodies for *Tehillim* without a living oral tradition to either imitate or ignore.

In contrast to most of my earlier work, Tehillim is not composed of short repeating patterns; although an entire melody may be repeated either as the subject of a canon or variation, this is actually closer to what one finds throughout the history of Western music. While the four-part canons in the first and last movements may well remind some listeners of my early tape pieces It's Gonna Rain and Come Out, which are composed of short spoken phrases repeated over and over again in close canon, Tehillim will probably strike most listeners as quite different from my earlier works. There is no fixed meter or metric pattern in Tehil*lim* as there is in my earlier music. The rhythm of the music here comes directly from the rhythm of the Hebrew text and is consequently in flexible changing meters. This is the first time I have set a text to music since my student days and the result is a piece based on melody in the basic sense of that word. The use of extended melodies, imitative counterpoint, functional harmony, and full orchestration may well suggest renewed interest in classical-or, more accurately, baroque and earlier Western musical practice. The nonvibrato, nonoperatic vocal production will also remind listeners of Western music prior to 1750. The overall sound of Tehillim, however, and, in particular, the intricately interlocking percussion writing that, together with the text, forms the basis of the entire work, marks this music as unique by introducing a basic musical element that one does not find in earlier Western practice including the music of this century. Tehillim may thus be heard as traditional and new at the same time.





Example 23-1. *Tehillim,* from fourth movement. Copyright © 1981 by Hendon Music, Inc., A Boosey & Hawkes Company. Revised Version Copyright © 1994 by Hendon Music, Inc. Reprinted by permission.

A further question may arise for some listeners familiar with any earlier music: Why is there no repetition of short patterns in Tehillim? The basic reason for avoiding repetition in *Tehillim* was the need to set the text in accordance with its rhythm and meaning. The Psalm texts set here not only determine the rhythm of the music (which is basically combinations of two or three beats throughout the piece combined so as to form constantly changing meters) but also demand appropriate setting of the meaning of the words. In this respect, I have tried to be as faithful to the Hebrew text as possible, and some examples of "word-painting" should be pointed out. In the second text, "Sur may-rah va-ah-say-tov" ("Turn from evil and do good") is set with a descending melodic line on "Sur may-rah" ("Turn from evil"), and a strongly rising line for "va-ah-say-tov" ("and do good"), ending in a crystal clear Al major triad on the word "tov" ("good"), with the third of the chord voiced as a high C in the high soprano voice. In the third text, the verse "Va-im-ee-kavsh, tit-pah-tal" ("and with the perverse You are subtle") is set in C<sup>‡</sup> minor with a strong G natural (lowered fifth, tritone, or diabolus in musica) on the word "ee-kaysh" ("perverse"). Another example is found in the first movement on the words "Ain-oh-mer va-ain deh-va-rim, Beh-li nish-mah ko-lahm" ("Without speech and without words, Nevertheless their voice is heard"), which is set with only four notes, G, A, D, and E. Although the original key signature is one flat and seems to be D minor, these four tones alone can be interpreted (especially when they are repeated over and over again in the four-part canons) as either in D minor, C major, G major, or D major (among others), depending on their rhythm and the chords harmonizing them. They are interpreted, at least in the first movement, as being in D minor and then in G major, but their basic ambiguity suggests that when we hear a voice without speech and words we are not only hearing music but also music of the most open sort that is consonant with many harmonic interpretations. This four-note scale-recurring later on "Halleluya" at the end of the piece-supplies one of the basic means of harmonic change and was suggested by the text. Returning then to the question about repetition as a musical technique, my reason for limiting it to repetition of complete verses of the Psalm text is basically that, based on my musical intuition, the text demanded this kind of setting. I use repetition as a technique when that is where my musical intuition leads me, but I follow that musical intuition wherever it leads (see ex. 23-1).

*Tehillim* was commissioned by the South German Radio, Stuttgart (SDR); the West German Radio, Cologne (WDR): and The Rothko Chapel, Houston. Additional support was received from Betty Freeman, The Rockefeller Foundation, and The Memorial Foundation for Jewish Culture.

The first two movements of *Tehillim* were premiered by the South German Radio Orchestra and soloists in Stuttgart conducted by Peter Eötvös in June 1981. The world premiere of the completed work was given at the West German Radio in Cologne by Steve Reich and Musicians conducted by George Manahan and was subsequently performed in London, Paris, Frankfurt, Munich, Utrecht, and Vienna by the same ensemble.

The American premiere of Tehillim was presented at The Rothko Chapel in Hous-

o

ton in November 1981 as part of the tenth Anniversary of that institution, performed by Steve Reich and Musicians conducted by George Manahan.

The New York premiere performances of *Tehillim* were presensed by the same ensemble at the Metropolitan Museum of Art on March 15, 1982, in the Museum's Twentieth Century Galleries, and on April 19, 1982, in the Museum's Grace Rainey Rogers Auditorium.

The orchestral premiere of *Tehillim* was presented by the New York Philharmonic conducted by Zubin Mehta on September 16, 17, 18, and 21, 1982, on the opening concerts of the orchestra's 1982–83 subscription season.

# HEBREW CANTILLATION AS AN INFLUENCE ON COMPOSITION (1982) 24

Reich wrote "Hebrew Cantillation" a few years after coming back from a visit to Israel in 1977 when he recorded Sephardic Jews from Bagdad, Yemen, Kurdistan, and Cochin, India, all chanting the same opening verses of Bereshith (Genesis). "I was very interested in the structure of the cantillation that was constant, though the melodies varied from culture to culture, and wanted to present it to musicians who were not aware of it, or at least not aware of its structure. I had no specific plans for publication. I assumed something would just come up." In fact, it was first published in French (Reynaud, 1981) and Italian (Restagno, 1994). This is its first publication in English.

Cantillation is the word given to the chanting of the Hebrew Scriptures. In the late 1970s, it was an influence on one of my compositions. Before discussing it, however, I would like discuss briefly two earlier influences: West African drumming and Balinese gamelan music.

In the case of West African drumming, my acquaintance with it began, as with most musicians in the West, via recordings, which I heard during the late 1950s and early 1960s. In 1963, while attending a conference on contemporary music at Ojai, California, I heard the American composer Gunther Schuller speak of his attempts to find out more about African music as preparation for his *History of Early Jazz*. He said that the most important book he had found was the two-volume *Studies in African Music* by the Englishman A. M. Jones.<sup>1</sup> In this book, which I bought immediately after the Ojai conference, I found complete scores of music by the Ewe tribe in Ghana. These scores made clear what records did not reveal; they showed how the music was made. Briefly, it is made of short repeat-

1. Jones, 1959.

After telling you that I write music for unusual ensembles with a great deal of percussion, I must now tell you that I also write for string quartet, but not quite what you might expect. *Different Trains*, completed in 1988, was commissioned by Betty Freeman for the Kronos Quartet. The piece is for string quartet and tape and begins a new way of composing that has its roots in my early tape speech pieces *It's Gonna Rain* (1965) and *Come Out* (1966). The basic idea is that speech recordings generate the musical material for musical instruments.

The piece presents both a documentary and a musical reality and begins a new musical direction by introducing a kind of theatrical element into a traditional chamber music form. In this particular piece the theater is, so to speak, in the mind, since there is nothing visual beyond the musicians. *Different Trains* points in a direction, however, that may very well lead to a new kind of documentary music video theater.

From all this, I conclude that the history of chamber music is very much in progress.

# 40 QUESTIONNAIRE (1989)

Musiques en Création, Festival d'Automne, Paris, 1989—accompanying booklet to celebrate the Bicentenary of the French Revolution, with responses to the same questions also from Boulez, Anthony Braxton, Ornette Coleman, Ligeti, Nono, Kagel, Busotti, and Takemitsu. The booklet also includes a fragment of musical notation by Steve Reich, which is in fact a short passage from *The Cave* at the words "his hand against all and the hand of all against him."

#### The Composer and the Concept of Pure Music

As a composer I have become interested, once again, in speech melody as a source for music. Back in 1965 and '66 I made *It's Gonna Rain* and *Come Out*, which were tape pieces using a speaking voice as their sole source.<sup>1</sup> Thereafter, from 1967 until 1982, I was concerned with purely instrumental music, and my use of the singing voice was exclusively vocalise with syllables chosen to imitate specific instruments within an ensemble. Starting with *Tehillim* and then *The Desert Music*, I became involved with setting text for singers. What I found was that once I had chosen the text, the text then *forced* me to do things musically I would not otherwise have done. This I found to be extremely stimulating. For example, I found myself writing constantly shifting meters to accomodate the shifting stress of syllables. Harmonically, I found myself using more chromatically altered chords to accom-

1. Plus small elements of ambient sound in the background of It's Gonna Rain.

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modate problematic aspects of the text. In 1988, with *Different Trains*, a totally new situation evolved that combined my earliest interest in using recorded speech as source material, with my ongoing instrumental writing—in this case, the string quartet. The recorded voices were chosen for their melodic content, then written out in musical notation; and, finally, in the finished piece, each time a woman speaks she is doubled by the viola, and each time a man speaks he is doubled by the cello. All the melodic musical material comes out of the speech melodies used, harmonically supported for much of the time by the pulsed paradiddle patterns that suggest the constant motion of the trains. The result makes me want to spend considerable time in the future investigating the use of documentary material—both speech and other sounds—as the generating source of instrumental/vocal music.

#### Serialism

Perhaps one can see an influence between "serial thinking" and my early pieces like *Piano Phase*. No serial technique is used, but the degree or organization (albeit a totally different one) may remind one of the "total organization" in serial music. Of course, my early works are usually understood as a complete turning away from the general lack of pulse and tonal center in serial music, and certainly this is true. I sometimes see both serial music and Cage as influencing my music, however, by suggesting that any radical kind of organization is possible, on the one hand, and, on the other, forcing me back on my own rhythmic and tonal inclinations that received no satisfaction whatever from either of these musics. Serialism and Cage gave me something to push *against*.

#### The Function of Today's Music

I can do no better than paraphrase J. S. Bach: The function of music is to refresh the spirit and stimulate the mind.<sup>2</sup>

#### Technique and Musical Thinking

Perhaps serial and 12-tone music were a kind of break with natural principles of resonance and with human musical perception. This might explain why this music has remained so extremely unpopular, and why, after considerably more than 50 years, the postman does not whistle Schönberg. For myself, natural principles of resonance and human musical perception are not limitations; they are facts of life.

As to electronic technology, it has become part of our folk music. Look in the window of any popular music store and you will see what I mean. Personally, I find two technological tools of particular interest—the computer and the sampling machine. (In fact they are both computers, but the sampler is dedicated ex-

<sup>2.</sup> SR is referring to the title page of Bach's *Clavierübung*, Third Part, Leipzig, 1739. "For Music Lovers / and especially for Connoisseurs / of such Works, to refresh their Spirits."

clusively to making digital recordings.) I use the computer to generate publication quality musical notation for scores and parts. I use the sampler to record and integrate speech and other real sounds into a piece of instrumental/vocal music. Obviously, new instruments make new music.

#### Contemporary Music and Institutions

From about 1979, with the writing of Variations, until 1987 and the writing of The Four Sections, I was genuinely interested in writing for the orchestra. I was concerned with using multiples of strings and winds much as I had used multiple percussion and keyboards (and sometimes strings and winds) in my earlier pieces. In The Desert Music, in particular, I was able to create my own orchestra not only through composition but also through reseating the strings into three groups in an arc around the centrally positioned percussion (see the Desert Music performance placement diagram in no. 41, p. 164). This kind of orchestral thinking was later extended in The Four Sections so that each of the four movements was devoted in turn to strings alone, then to percussion, then to winds, and finally to full orchestra. Immediately on finishing The Four Sections, I felt very clearly that I had no further interest in writing for the symphony orchestra in the foreseeable future. I felt that, finally, most of the clichés about the orchestra are true: It was designed to play the music of Haydn through Schönberg, and does not reflect at all the impact of microphones, non-Western music, jazz, rock, computers, electric instruments, and so on. That is to say, in its bones the orchestra reflects eighteenth- and nineteenthcentury Europe . . . but it is almost the twenty-first century, and I live in America.

There is also the "sociology" of the orchestra, undoubtedly connected to the music it plays, which also means that somewhere from 20 to 80 percent of the players would rather not play my music nor the music of my contemporaries. In contrast to this, the Ensemble Intercontemporain in France, the Schönberg Ensemble in Holland, the Ensemble Modern in Germany, the London Sinfonietta in England, and the Group 180 in Hungary, among others, are a new generation of musicians whose basic repertory begins with Schönberg, Stravinsky, and Bartók. These players can give definitive performances of my music and that of my contemporaries because: (1) they are usually no more than 15 to 30 in number, with each player taking sole responsibility for his or her part since there is generally no doubling; (2) they are utterly at ease with electronics of all sorts; and (3) they know this kind of music in their bones. It is with these kinds of musicians all over the world (of which my own ensemble is a part) that I cast my lot for the future.

#### Music of Today and Traditions

My connections to Western classical music have little or nothing to do with music from Haydn to Wagner. The influences I *would* mention include Debussy, Ravel, Satie, Stravinsky, Bartók, and Weill in the twentieth century, as well as Perotin, and much other music from before 1750. From French impressionism, I unconsciously began working with harmonies where the bass was coloristic, while the

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middle register was structural. I say "unconciously," because all Americans of my generation were surrounded by music influenced by Impressionism in movies, popular music, Gershwin, jazz, and so on. Debussy a little, Bartók more, and most of all jazz, aroused my interest in non-Western music. From Weill, I received, first, confirmation that popular sources are to be taken seriously and, second, that one must create one's own instrumental ensemble and vocal style.<sup>3</sup> From Perotin, I received the suggestion that augmentation could be taken to great extremes and not just in simple multiples of two. From other medieval, Renaissance, and baroque sources (as well as Bartók and Webern), I learned that canon is a powerful compositional tool that can be applied to *any sound* whatsoever.

Early influences other than Western classical music include jazz, particularly the be-bop of Miles Davis and Kenny Clarke, and the so-called modal jazz of John Coltrane. From Davis, I learned that fewer notes could be more effective than many, while from Clarke I learned similarly that a buoyant, floating, rather simple pulse was more effective than a cluttered, "filled" one. Coltrane taught me that a lot of music can be made with few changes of harmony.

Slightly later influences, during the 1960s and early '70s, were West African drumming, Balinese gamelan, and Hebrew chant. From West African music, I learned that repeating patterns superimposed so that their downbeats do not coincide occurred not just in tape loops but in other musical traditions as well. Balinese music taught me about music moving in different speeds simultaneously, and, in Gamelan Gambang, suggested much longer patterns. Hebrew chant historically showed the roots of Gregorian chant, and technically showed how shorter motifs can be combined to form longer monophonic lines, all in the service of a sacred text. From all these non-Western sources I learned about oral tradition as a way of passing on music without notation—this also clarified my need to work with my own ensemble (or ensembles like it) who were not only traditionally well trained but also well aware of, equipped for, and disposed toward my own music.

#### The Oeuvre

My pieces begin in basically two ways: whether I first think of the form, or I first hear the content. In pieces as disparate as *Four Organs* and *Different Trains*, I thought first of the form or compositional techniques, without having the slightest idea of what the piece would sound like. In *Four Organs*, I thought, "short chord gets long via augmentation." In *Different Trains*, I thought, "sampled speech and other sounds generate melodic lines for strings." In neither case did I have any idea how the music would sound until I actually began to work on it. In contrast to this, I dreamed the basic pattern to the early (1966) tape piece *Melodica*, and in many pieces, starting with *Music for 18 Musicians*, I started with a cycle of chords as the basis for the entire composition.

3. See Kurt Weill, the Orchestra, and Vocal Style, no. 44, p. 166.

The means for composing has also varied. Most pieces I have written at the piano or electric keyboard. Usually I have used multitrack tape to hear and test contrapuntal details. Recently I used a sampling keyboard loaded with guitar sound when writing *Electric Counterpoint*, since using a piano gave a mistaken impression of how the guitar would sound, especially with many guitars super-imposed on each other. In *Different Trains*, I used both the sampling keyboard (this time loaded with speech and train sounds), together with a sequencer on my computer, in order to prepare the first few tracks of the multitrack tape in the studio. Then the Kronos Quartet began adding their four superimposed string quartet recordings.

The final stage for all pieces is rehearsal, during which small changes in instrumental parts are usually made so as to improve ease of execution. Any composer who does not take the suggestions of good players in order to improve individual parts is foolish indeed.

My approach is therefore a practical one. I begin with the original conception form or content—and use whatever tools are appropriate to complete the work.

# 41 on the size and seating of an orchestra (1990)

First printed in *Contemporary Music Review*, Vol. 7, Part 1—an issue devoted to "Contemporary Percussion—the Performer's Perspective," guest editor Bob Becker. (The issue also includes a reprint of "Some Optimistic Predictions" and "Notes on the Ensemble," both from *Writings*, 1974.)

In 1979, after more than 15 years of composing for my own ensemble, I gradually became interested in composing for the orchestra. One of my main interests was to transfer certain techniques I was developing in smaller ensembles to the orchestra. In particular, I was interested in interlocking unison canons for instruments of identical timbre. For instance, three flutes in unison canon simultaneous with three clarinets, three oboes, and all the first violins divided in three equal groups also playing harmonically related unison canons. These ideas found orchestral form in 1984 in *The Desert Music*, for chorus and orchestra, and in 1987 in *The Four Sections*, for orchestra. In both pieces I found questions of orchestral size and seating to be essential for performance.

In 1984 in Cologne, during the rehearsals and first performance of *The Desert Music* by the West German Radio Orchestra, chorus, and members of my own ensemble conducted by Peter Eötvös, I became aware of certain ensemble difficulties within the orchestra that were related to its size and seating arrangement. Later that same year, during the rehearsals for the American premiere of the piece