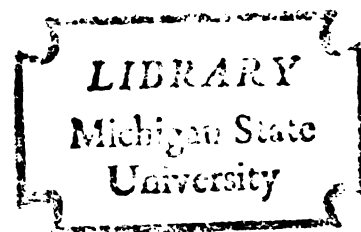MODERN INNOVATIONS IN MUSICAL
NOTATION FOR STRINGED INSTRUMENTS

Thesis for the Degree of M. M.
MICHIGAN STATE UNIVERSITY
JOHN LeROY SNYDER
1974

THESIS

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ABSTRACT

MODERN INNOVATIONS IN MUSICAL

NOTATION FOR STRINGED INSTRUMENTS

By

John LeRoy Snyder

This thesis is concerned with the problems of notating
modern string music. Many new effects are now in use which
are in want of adequate symbols, and many symbols have been
utilized for such diverse purposes that they are now nearly
uselss for any purpose. This treatise is an effort to
organize, clarify, and consolidate the written language of
string music into a precise and logical system, free of
duplication and ambiguity.

In searching for this ideal, standard notational
guides and orchestration books were consulted, along with
treatises and articles on the subject by noted contemporary
theorists and composers. A survey of twentieth-century
music was undertaken in an effort to determine general
trends in notational innovation, and to observe contemporary
applications of notational theory. Using conventional
notation as a starting-point and as a framework for
expansion, this thesis presents a comprehensive notation
for stringed instruments, including all modern devices
known to the author, and providing guidelines for further

exploration. E

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exploration. Every effort has been made to insure that all of the symbols and directions contained in this notation are fully compatible with each other, so that each symbol and direction will be unequivocal and truly meaningful.

MODERN INNOVATIONS IN MUSICAL

NOTATION FOR STRINGED INSTRUMENTS

By

John LeRoy Snyder

A THESIS

Submitted to

Michigan State University

in partial fulfillment of the requirements

for the degree of

MASTER OF MUSIC

Department of Music

1974

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TABLE OF CONTENTS

INTRODUCTION

"There are as many inventors of new

signs as there are scribes."

Walter of Odington

Summa de Speculatione Musica,

c. 1300

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"Music notation is the symbolic language of musical
thought." So Gardner Read sums up the nature of notation.[1]
He likens the symbols of this language to the letters of the
alphabet, each set of symbols being visual means of defining
aural phenomena.[2] Presently ". . . musical notation
is . . . pursuing two diametrically opposite paths - the
one utilizing traditional means and leading to ever more
uncompromising exactitude and predictability; the other
based on new visual methods and directed towards ambiguity
and chance. . . "[3] Certainly, new concepts require the
invention of new symbols, for thought and language are
interdependent.[4] In spite of all of the experimentation
with "new visual means," however, ". . . it must be con-
cluded that conventional notation, no matter how cumbersome
and alien it is as a graphic vehicle for today's music, is
still the only method which ensures that the performer will

---

[1]Gardner Read, "Self-indulgent Notational Aberrations",
The World of Music, Nr. 1, 1973, pg. 36. Used by permission
of B. Schott's Söhnne.

[2]Ibid.

[3]Ibid., pp. 38-9.

[4]Hugo Cole, "Some Modern Tendencies in Notation",
Music and Letters, July, 1952, pg. 243. Used by permission
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[5]Kurt S

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[6]G. Read

be able to reproduce exactly what he sees."[5] Conventional notation, then, should not be abandoned, but expanded carefully, adding new directions and symbols as they are needed.

The addition of new symbols to the vocabulary of written music must be weighed against the addition of new phenomena to the aural aspects of the language. In short, there is seldom any cause to introduce a new symbol to represent a phenomenon (sound, technique, expression, etc.) which is already represented in the written language. To behave otherwise would lead to many duplications and contradictions. As Read states, "It ought to be obvious that to achieve maximum effectiveness any notational symbol must be unequivocal."[6] Conversely, new aural phenomena need not be accompanied by new symbols when clear and logical modification of existing symbols or directions can be made to represent the desired end.

It is the intent of the present work, therefore, to eliminate equivocation and ambiguity in notation which concerns the modern string family. The merits of various proposals regarding the introduction of symbols to represent new effects will be discussed, and those notations and

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[5]Kurt Stone, "Problems and Methods of Notation", Perspectives of New Music, V.1 #2 (Spring 1963), pg. 37. Used by permission.

[6]G. Read, op.cit., pg. 36.

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terms found to be most compatible with conventional notation and with each other will be recommended. New symbols will be proposed only when all existing attempts at the notation of a particular effect have proven inadequate.

When existing directions occur in several languages, the most prominent languages will be represented, so that equivalent terminologies may be established. If music is to become an international language, or if international exchanges of ideas are considered worthwhile,[7] then a common terminology must be found. Rather than invent a language, musicians have conventionally used Italian phrases and terms; although nationalistic movements of the last century encouraged the use of other languages, there is evidence that this trend has reversed.[8] It is only logical that musicians can more easily learn one language (perhaps foreign) than two (at least one foreign), and much more easily than several (more than one foreign). Since the violin is of Italian origin, and since so many of the terms relating to violin techniques are of Italian origin, it is

---

[7]The fact that Krzysztof Penderecki has been commissioned to compose an opera (for the Chicago Lyric Opera) for the American Bicentennial Celebration indicates that such sentiment exists and is a viable force in the musical world.

[8]Penderecki and Lutoslawski use Italian (and some German) pharaseology rather than their native Polish. This is certainly a recognition of the need to reduce the language barriers in the interests of widening the circle of understanding.

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[11] H.

only logical to settle upon Italian as the proposed common language. Exclusive use of that language would promote common understanding and eliminate such polyglot directions as "col legno gestrichen"[9] and "col legno fast ohne Haare."[10] Polyglot phraseology is annoying to players for whom one of the languages is native, and a serious burden for those to whom both of the languages are foreign.

Pitch designation will be based upon "c^1 - b^1" for "middle c" and to seventh above it, "c^5" being the highest note on the modern piano. The octave below "middle c" is indicated by small letters, the octave below that by capital letters, and the octave below that by double capital letters. In all discussions and examples, the instruments are assumed to be tuned as usual unless otherwise specified.

It is sincerely hoped that the agreements sought in this treatise will help to provide an updated musical language and thus restore the lines of communication and trust between composers and performers, which have decayed somewhat in recent years.[11]

---

[9]Alban Berg., Lyric Suite. The Italian is "col legno tratto".

[10]György Ligeti, Apparitions. The Italian is "col legno, senza crini."

[11]H. Cole, op.cit., pg. 245.

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CHAPTER ONE

THE NOTATION OF PITCH

"The fingers are like blind people who

guide themselves through a sightless

existence . . . continually helped, guided,

and controlled by the ear."

Ivan Galamian

Principles of Violin Playing and

Teaching, 1962

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The lowest tone possible on a stringed instrument is
the pitch of the lowest open string. The upper limit,
however, cannot be so definitely fixed. An octave is
produced each time the string is divided in half, and the
number of times the string length can be so divided is
theoretically boundless. In general, two octaves above the
highest string approximates the limits of practicability,
with an extra fifth and an extra octave possible for
advanced performers on the violin and violoncello
respectively. The normal tunings for the string family
are as follows:

Example 1-1

bass   'cello   viola   violin
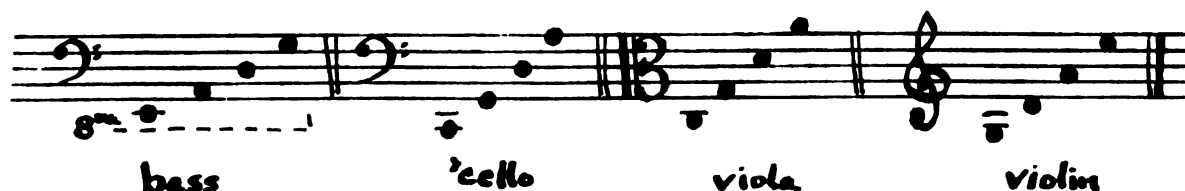
The notation of the rather long ranges of the string
family involves the careful use of clefs and the ottava
sign. The violin is written in the treble clef [𝄞]
throughout its range; the "French violin clef" [𝄞] is

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archaic and should not be used.[1] The ottava sign [8ᵛᵃ----ꟷ]

must be used carefully. Stringed instruments differ from

keyboard instruments in that each octave is different from

the others both in size and in "feel", due to the fact that

the intervals become physically smaller as the hand moves

up the string. Consequently, inconsistency in its use

may lead to confusion in the mind of the performer. Ledger

lines are used commonly up to a^3 and b^3. Higher notes are

also occasionally written with ledger lines, if the music

reaches that part of the range only briefly. In all cases,

the change of octave should be made at a logical place

metrically and rhythmically--if possible, during a rest--so

as to avoid obscuring the direction of the line.

Example 1-2[2]

The remaining members of the string family present

special notational problems in that several clefs are

_____

[1]G. Read, Music Notation, pg. 48.

[2]Camille Saint-Saëns, Concerto No. Three for violin
and orchestra in b minor, op. 6, first movement.

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[3]Peter
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involved. The viola is the only instrument still written for in the alto clef [𝄡]. As this clef places the staff a seventh below the treble clef (e.g., the first line denotes f rather than e^1), and the instrument is normally tuned a fifth below the violin, more ledger lines are required above the staff to accommodate the same compass. Consequently, the treble clef is employed for the upper part of the range of the instrument. The alto clef is used with ledger lines up to a^2, and occasionally higher; however, the treble clef may be used for much of this part of the range simply to avoid excessive ledger lines. The treble clef is nearly always used in higher passages. The use of the treble clef in viola music is not to be equated with the use of the ottava sign in violin music, as no transposition is involved in clef changes. However, care must be taken to change clefs logically, and to avoid unnecessary changes. This example from the finale of Tschaikowsky's Sextette, op. 70, shows unnecessary clef changes:[3]

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[3]Peter Tschaikowsky, Sextette, op. 70, "Souvenir de Florence", fourth movement.

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Example 1-3

Viola II

The f-sharp[2] has been written several times in the alto clef; there is no need to begin using treble clef on alternate quarter-notes in the last bars. For extremely high passages, the ottava sign may be used in conjunction with the treble clef, although this is seldom necessary; the same general principles apply as in writing for the extreme upper register of the violin.

Igor Stravinsky is responsible for a unique instance where two clefs are employed, on separate staves, to be read simultaneously:[4]

---

[4]I. Stravinsky, Chant du rosingol, mm. 4-5. Copyright 1919 by Boosey and Hawkes. Reprinted by permission of Boosey and Hawkes, Inc.

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Example 1-4a

This is unnecessary, as these chords would have occupied less space if written on one staff in either clef, e.g.:
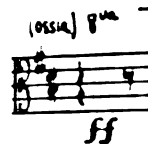
Example 1-4b

This form is more intelligible to string players, as two-stave notation implies divisi (cf. Chapter 7).

The only use of the ottava sign with the alto clef known to this writer from printed music is an _ossia_ passage from William Walton's Concerto for Viola:[5]

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[5]William Walton, Concerto for viola and orchestra, fig. 28. Reprinted with permission of Oxford University Press.

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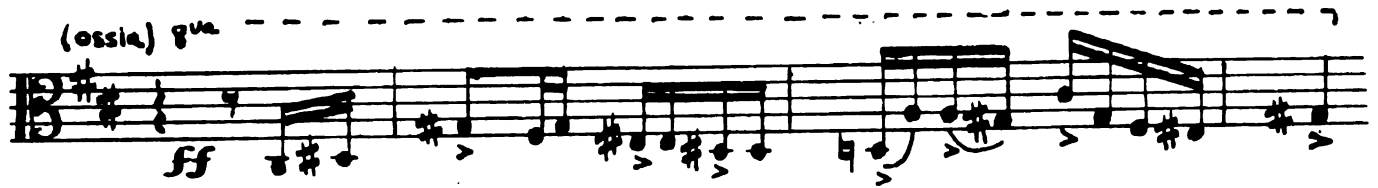written in

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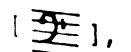
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Example 1-5

The octave is optional; otherwise, the part should be
written in the intended octave, possibly with the treble
clef. The change of clef should be considered preferable
to any transposition, even transposition of an octave.

The violoncello ('cello) uses three clefs: the bass
[☰], the tenor [☰], and the treble. The bass
clef is used commonly with ledger lines up to a^1. Passages
that remain above d^1 or e^1 (approximately) for more than a
single phrase, or which exceed a^1, are usually written in
the tenor clef, which is used up to approximately c^2.
Above this, the treble clef is used. One may use the treble
clef without having first used the tenor clef; in fact,
there is a growing tendency to replace c-clefs entirely with
the bass and treble clefs.[6] As with the viola, the ottava
sign is used only with the treble clef, and only under the
circumstances discussed in connection with the violin.

---

[6]Thurston Dart, "Notation", Grove's Dictionary of
Music and Musicians, pg. 122. Some nineteenth-century
composers used the treble clef in 'cello parts as an octave-
transposing clef. This practice is archaic and should be
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The string bass uses the same clefs as the 'cello, and the same principles apply, except that all notated pitches for the bass sound one octave lower. Thurston Dart points out that the transposed treble clef [   ], sounding an octave below the regular treble clef, has already replaced the tenor clef to a large extent. He suggests an extension of this principle to include a transposing bass clef [   ].[7] One can also imagine a transposing tenor clef: [   ]. The transposing treble clef should not be used to replace the tenor clef in 'cello music, since that instrument also uses the regular treble clef. Confusion would almost certainly result from mingling the two varieties of treble clef. It may be unfortunate that the tenor clef is losing favor, as it can save ledger lines and clef changes for all concerned (cf. examples 1-9a and b); careful choice of clef is therefore recommended as a basic skill in writing for the lower strings.

Two avant-garde composers have invented new clef signs which, although convenient, have serious disadvantages. Hans Otte, in Alpha-Omega, uses the following symbols for the treble and bass clefs, respectively:[8]

---

[7]Ibid.

[8]Hans Otte, Alpha-Omega, quoted by Erhard Karkoschka in Notation in New Music, pg. 24. Used by permission of Universal Edition A. G., Vienna.

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Example 1-6

Boguslaw Schäffer, in _Imago musicae_, goes even further, using identical symbols:[9]

Example 1-7a
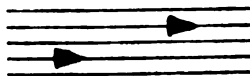
These depend entirely upon the most common placement of the traditional G and F clefs for meaning. There is a special symbolization for changing clefs:[10]

Example 1-7b

---

[9]Boguslaw Schäffer, _Imago musicae_, quoted by E. Karkoschka, _Notation in new music_, pg. 24. Used by permission of Universal Edition A. G., Vienna.

[10]_Ibid_. Used by permission of Universal Edition A. G., Vienna.

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C-clefs are problematic in either system for lack of ready identification; it would be difficult or impossible to distinguish one from the other, or from the other clefs (e.g., the tenor and bass clefs would be identical in Schäffer's system). No provision is made in either system to circumvent this difficulty. Consequently, the conventional system of clefs remains the preferred notation, as it is the clearest and most comprehensive.

Another aspect of pitch notation is voice leading. Modern trends in composition tend to make that concept seem irrelevant, but in fact make it more important (and more complex) than ever before. Like the human voice, stringed instruments are capable of producing an unbroken continuum of pitches throughout their ranges. Since the instruments have no frets or other devices for dividing the strings into scales, the performer must rely on his ear. Therefore, in tonal music, tonal spellings should be used; in non-tonal music the simplest possible spellings of intervals are generally the best, in that they are more readily recognized and "heard" in the mind of the performer than augmented or diminished intervals. (The tritone can only be spelled as an augmented or diminished interval, and the harmonic minor scale system uses, for instance, the augmented second and the diminished fourth. Outside the framework of tonality, however, augmented and diminished intervals should generally be avoided when another spelling is available. Furthermore, much of the technique of stringed instruments is associated

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with generic interval size. This example, adapted from Read's <u>Music</u> <u>Notation</u>, shows that spelling intervals in any but the simplest fashion may lead to technical difficulty.[11] These four notes are in the first position:

Example 1-8a
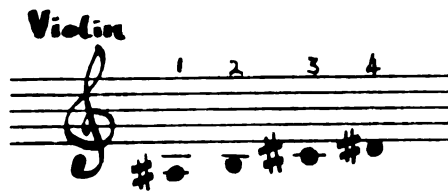
These four notes lie in the second position:[12]

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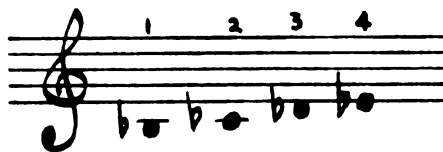
These notes involve two mental shifts, even if fingered as shown in the above examples:

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[11]G. Read, <u>op.cit.</u>, pg. 383.

[12]They are, of course, the same pitches; position is reckoned by generic interval size without considering enharmonic equivalents, i.e., by letter name, rather than by actual pitch.

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Example 1-8c

It is not possible to write all music so that it could appear diatonic on the page, unless, of course, all music were diatonic in sound. For instance, one cannot complete a whole-tone scale to the octave without writing a diminished third, unless one uses an augmented seventh in place of the octave. However, composers should endeavor to be consistent and clear in their spellings of chords and intervals. The following example, from Leoš Janáček's Mša Glagolskaja contains three clef changes, three doubly-diminished fifths in the 'cello part, and other voice-leading peculiarities in the other parts:[13]

---

[13]Leoš Janáček, Mša Glagolskaja, mm. 70-73. Used by permission of Universal Edition A. G., Vienna.

If written

diatonic a

clef also

Example 1-9a

If written entirely in E major, the parts will look as
diatonic as they sound; writing the 'cello part in the tenor
clef also eliminates clef changes:

Example 1-9b

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Modern tendencies in pitch notation include "novel"
uses of accidentals, as well as novel accidentals. In many
works of the early atonal and serial composers, each note
is preceded by a sharp, flat, or natural sign; this practice
can be found at least as recently as the Canoni Enigmatici
of Arrigo Benvenuti, composed in 1959.[14] Earlier music
has conditioned performers to remember key signatures and
to observe accidentals for the duration of a measure; the
unnecessary use or repetition of accidentals only serves to
clutter the page and add to the difficulty of realizing the
music. So long as the music is organized into measures
(or some comparable unit), it seems most expedient to assume
that notes are to be "natural" unless altered by signatures
or accidentals, which should be applied and cancelled in
the conventional manner.[15]

In music that is not organized into measures or
similar units, the application and cancellation of acciden-
tals becomes a more complex problem. Chaillez suggests
the incorporation of chromatic alteration into the note-
heads:[16]

---

[14]Arrigo Benvenuti, Canoni Enigmatici. See Example
7-2a.

[15]A complete guide to conventional use of signatures
and accidentals is found in Read's Music Notation, pp. 122-
44.

[16]T. Dart, op.cit., pg. 123.

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Example 1-10
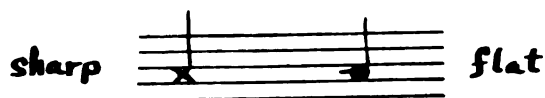
This seems at first to be a good idea, but his symbol for "sharp" has acquired another meaning, "indefinite" or "approximate" pitch, so that using it to mean "sharp" would now make it ambiguous. Furthermore, use of these shapes would be a hindrance in the notation of harmonics.[17]

Roland Kayn, in Galaxis, uses black note-heads for natural tones and white note-heads for sharps:[18]

Example 1-11a
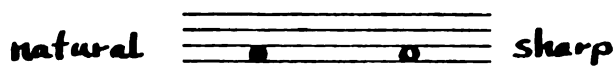
Henry Pousseur, in Madrigal I and Bernd Zimmerman, in Présence, use black note-heads to signify natural tones and white note-heads to signify flats:[19]

---

[17]See chapter two. Harmonics themselves involve altered note-heads.

[18]Roland Kayn, Galaxis, quoted by E. Karkoschka, loc. cit., used by permission of Universal Edition A. G., Vienna.

[19]Henri Pousseur, Madrigal I, and Bernd A. Zimmermann, Présence, quoted by E. Karkoschka, Ibid.

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Example 1-11b

Neither system contains both sharps and flats, leading to
severe difficulties in regard to voice leading; the
inability to spell any interval in simplest terms makes the
correct notation of many harmonics impossible.[20] Further-
more, Zimmermann finds difficulty in distinguishing half-
note and quarter-note values.[21] These systems have the
advantage of eliminating the need to cancel accidentals and
thus reducing the number of symbols to be read; the
shortcomings mentioned above, however, greatly outweigh this
advantage, and these procedures are not to be recommended.

Boguslaw Schäffer, in Azione a due, uses dots preceding
the note-heads to indicate sharps and flats:[22]

---

[20]See the discussion preceding examples 2-25a & b.

[21]Zimmermann reclarifies the relationship between half-
notes and quarter-notes by replacing the half-note with the
whole-note, i.e., two ♩ now equal ○ . Karkoschka
(loc. cit.) admits that this in turn confuses rhythmic
notation.

[22]B. Schäffer, Azione a due, quoted by E. Karkoschka,
loc. cit. Used by permission of Universal Edition A. G.,
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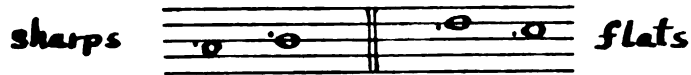
This is rather like Renaissance notation, in which acciden-
tals are applied to one note only, sometimes including
immediate repetitions of that note. Since the accidentals
have not been incorporated into the note-heads, the dots
are really substitutions for the traditional sharp and flat
symbols; not only are they less easily distinguished than
the conventional signs, but they might also be confused
with augmentation dots, or possibly, with articulation
markings. It seems preferable, therefore, to use the
traditional symbols for all music which is organized into
measures or comparable units.

Witold Lutoslawski, in his Second Symphony, directs
that in "ad libitum" sections, accidentals are to apply to
one note only. This is carried out even to the elimination
of ties: the following example shows that what appears to
be a tie is in Lutoslawski's notation a slur:[23]

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[23]Witold Lutoslawski, Second Symphony, preface. The
illustrations are the composer's own. Reprinted with kind
permission of Edition Wilhelm Hansen, London, Limited.

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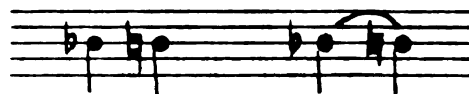
written (Lutoslawski)   played (conventional)

The inconvenience of having to repeat the accidental when
an altered tone is repeated is circumvented with the use of
headless stems:[24]

Example 1-13b

written (Lutoslawski)   played (conventional)

Krzysztof Penderecki also uses this procedure in his works.

This notation has three disadvantages. First, it
confuses the distinction between tie and slur, handicapping
the notation of rhythm. Secondly, it may discourage careful
voice-leading--the tones in example 1-13a would have been
more simply written:

Example 1-13c

_____

[24]Ibid. In both cases there are three d-flats and one
d-natural.

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Lastly, headless stems have been used by these same composers (among others) for certain percussive effects on stringed instruments.[25] Ambiguity in the use of headless stems could be alleviated if, in non-metered pieces or sections of pieces, accidentals were rewritten for each repetition of an altered tone, or if accidentals were applied to a note and immediate repetitions of that note. To advance the dual aims of reducing ambiguity and promoting clarity, the latter suggestion is recommended. The recommended solution has been proven in the un-barred music of the Renaissance.

Micro-tones are a long-standing notational problem. Division of the semitone in half produces quarter-tones, which Penderecki notates as follows:[26]

Example 1-14

† 1/4 tone sharp   ♭ 1/4 tone flat

♯ 3/4 tone sharp   ♮ 3/4 tone flat

Witold Lutoslawski, in his Second Symphony, uses the following system:[27]

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[25]See examples 5-30a & b; chapter six.

[26]K. Penderecki, De Natura Sonoris, preface, and Threnody, preface.

[27]W. Lutoslawski, loc. cit.

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[28]W. Lu

[29]Ibid.

[30]Ianni

[31]Sylv

op.cit., pg.

A. G., Vienn

Example 1-15a

† 1/4 tone sharp   � 1/4 tone flat

♯ 3/4 tone sharp   ♩♭ 3/4 tone flat

In his own String Quartet, however, he uses the following symbol:[28]

Example 1-15b

♯♯   1/4 tone sharp

Notice that this symbol is exactly the same as that used by Penderecki to mean three-quarter-tone sharp (cf. example 1-14). Lutoslawski then uses another symbol for the three-quarter-tone alteration:[29]

Example 1-15c

♯   3/4 tone sharp

In Polytope, Iannis Xenakis uses two symbols:[30]

Example 1-16

† 1/4 tone sharp   ♯ 3/4 tone sharp

In Siciliano, Sylvano Bussotti uses a slightly different pair of symbols:[31]

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[28]W. Lutoslawski, String Quartet.

[29]Ibid.

[30]Iannis Xenakis, Polytope.

[31]Sylvano Bussoti, Siciliano, quoted by E. Karkoschka, op. cit., pg. 25. Used by permission of Universal Edition A. G., Vienna.

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Example 1-17

✝ 1/4 tone sharp   ♯♯ 3/4 tone sharp

Marek Kopelent, in his <u>Third String Quartet</u>, uses three markings:[32]

Example 1-18

♯♯ 1/4 tone sharp   ♭ 1/4 tone flat

♯♯ 3/4 tone sharp

Mauricio Kozel, in his <u>Sexteto de cuerdas</u>, uses a six-symbol system, which Karkoschka finds both "convenient" and "illustrative."[33]

Example 1-19

♮ ♯ ♭   sharpen 1/4 tone

♮ ♯ ♭   flatten 1/4 tone

One has only to look at these systems once to recognize the many duplications and contradictions.

Some composers have attempted to integrate quarter-tone alterations into note-heads. David Reck, in <u>Blues and Screamer</u>, uses triangular note-heads:[34]

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[32]Marek Kopelent, <u>Third String Quartet</u>, quoted by E. Karkoschka, <u>Ibid.</u>, pg. 27.

[33]Mauricio Kozel, <u>Sexteto de cuerdas</u>, quoted and evaluated by E. Karkoschka, <u>op.cit.</u>, pg. 25.

[34]David Reck, <u>Blues and Screamer</u>.

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[36]Alois
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Example 1-20

▲　△　1/4 tone sharp　▼　▽　1/4 tone flat

Zimmermann, in _Présence_, uses diamond-shaped note-heads:[35]

Example 1-21

♩　1/4 tone sharp　♩　1/4 tone flat

Both of these suffer from the fact that the notation of harmonics becomes very difficult, if not impossible, because of the altered note-heads involved in harmonic notation.

The recommended notation for the quarter-tone system is that used by Penderecki (example 1-14), because it is comprehensive, clear, and simple. The Kozel system is also clear, but has more symbols, which creates duplications and complexity.

Intervals smaller than the quarter-tone were exploited by Alois Hába. His work includes not only quarter-tones, but also sixth-tones and twelfth-tones. His quarter-tone notation is quoted by Karkoschka from the _Neue Harmonielehre_ of 1927:[36]

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[35]B. Zimmermann, _op.cit._, quoted by E. Karkoschka, _op.cit._, pg. 27. Used by permission of Universal Edition A. G., Vienna.

[36]Alois Hába, _Neue Harmonielehre das diatonischen, chromatischen, Viertel-, Drittel-, Sechstel-, und Zwölftel-Tonsystems_, quoted by E. Karkoschka, _op.cit._, pg. 2. Used by permission of Universal Edition A. G., Vienna.

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37 Ibid.

38 Ibid.

Example 1-22

♭ ⸘ 1/4 tone sharp   ᶜ ♯ 1/4 tone flat

♯ 3/4 tone sharp   ♭ 3/4 tone flat

Notice that two of the symbols have duplications. Sixth-tones are notated thusly:[37]

Example 1-23a

✝ 1/6 tone sharp   ♯♯♯ 2/3 tone sharp

♯ 1/3 tone sharp   ♯ 5/6 tone sharp

♯ 1/2 tone sharp

However, in the Suite for <u>Violoncello</u> <u>Solo</u> of 1955, he employs a different scheme:[38]

Example 1-23b

♭ 1/6 tone sharp   ᶜ 1/6 tone flat

♯ 1/3 tone sharp   ♭ 1/3 tone flat

♯ 1/2 tone sharp   ♭ 1/2 tone flat

♯ 2/3 tone sharp   ♭ 2/3 tone flat

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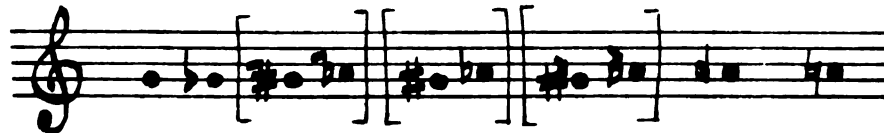
[37]<u>Ibid</u>.

[38]<u>Ibid</u>. The brackets enclose enharmonic equivalents.

In <u>Neue</u> <u>Harmonielehre</u>, a complete system of sharping by twelfth-tones is given, but only six symbols for flatting by that interval are mentioned:[39]

Example 1-24

sharps		flats

sharps: ⫯ 1/12 tone   ⫴ 7/12 tone   flats: 1/12 tone

ꝗ 1/12 tone   7/12 tone   1/12 tone

1/6 tone   2/3 tone   1/6 tone

1/4 tone   3/4 tone   1/4 tone

1/3 tone   5/6 tone   1/3 tone

5/12 tone   11/12 tone   5/12 tone

1/2 tone   1/2 tone

Furthermore, the symbols for flatting by twelfth-tones are not used, as enharmonic equivalents have become, in so complex a scale, a useless "reductio ad absurdam."[40] These symbols are arranged logically, but conflict in many cases with previously-discussed micro-tonal notation systems, including some of Hába's own. However, this system may be a useful reference for those composing in such a temperament.

The Committee for Notation of the International Musicological Society has proposed a scale and companion notation based on the diesis; the octave is divided into

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[39]<u>Ibid</u>. Used by permission of Universal Edition A. G., Vienna.

[40]<u>Ibid</u>.

thirty-one equal parts, and the resulting micro-intervals notated and named in the following manner:[41]

Example 1-25

♯ semisharp   ♭ semiflat

♯ sharp   ♭ flat

♯ sesquisharp   ♭ sesquiflat

𝄪 double sharp   ♭♭ double flat

It is important to observe that this system does not coincide with twelve-tone equal temperament: e-sharp is not equivalent with f, nor is g-double-sharp equivalent to a. This does not hinder the application of this system to stringed instruments, since stringed instruments are not necessarily based on any particular temperament.[42]

Iannis Xenakis, in Nomos, has used "beat" speeds to indicate the sizes of very small intervals. He writes a

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[41]"Report of the Committee for Notation", Report of the Tenth Congress of the International Musicological Society.

[42]The semiflat and sesquiflat were taken, with the symbols used for them, from G. Tartini's Trattato di musica of 1754. Further discussions on this topic may be found in L. Mozart's Treatise on Violin Playing and J. M. Barbour's Tuning and Temperment.

double-stopped unison, and then indicates a slight inflec-
tion up or down in one voice by means of this symbol
[✓   ✎   ]; the degree of inflection is to be such
that the resulting micro-interval will "beat" at the given
rate (cycles per second).[43]

Example 1-26

The size of any interval can be adjusted by this method.
For intervals other than the octave and unison, beats will
occur at more than one pitch, and at different speeds, so
that instructions would have to be included regarding the
pitch at which "beats" would be counted. Furthermore, this
procedure is impossible when more than one instrument is
being played, if not because of the greatly increased
difficulty in hearing the "beats," then because physical
interference will upset the regularity of the "beats."

Voice-leading in micro-tonal music is very difficult,
and many compromises must be made. This example from
Lutoslawski's String Quartet involves three different

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[43]I. Xenakis, Nomos. Copyright c 1967 by Boosey and
Hawkes. Used by permission of Boosey and Hawkes, Inc.

alterations of F which, while making the lower line difficult to read, is far preferable to untangling different alterations of G simultaneously.[44]

Example 1-27
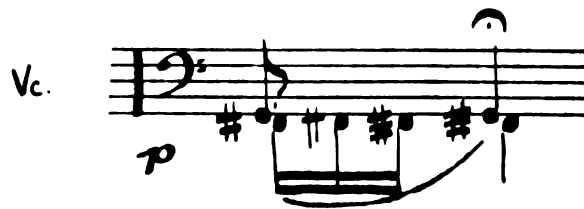
In the following example, from Penderecki's Sonata for Violoncello and Orchestra, a "half-diminished" ninth is diminished by an additional three-quarters of a tone to a doubly-diminished ninth, which is the same as a major seventh in sound (Penderecki's quarter-tones are based on twelve-tone equal temperament, cf. example 1-14).[45]

Example 1-28a

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[44]W. Lutoslawski, op.cit., rehearsal number nine. Reprinted with kind permission of Edition Wilhelm Hansen London Limited.

[45]K. Penderecki, Sonata for Violoncello and Orchestra, pg. 23. Copyright 1966 by PWP, Waraw, used by arrangement with Belwin-Mills Publishing Corp.

In this case, it may be more desirable to respell the lower
tone enharmonically, so that the performer may more easily
recognize the harmony he is to produce:

Example 1-28b

Scordatura, or altered tunings, have always been
notational dilemmas. J. S. Bach, in the fifth Suite for
solo 'cello, directs the performer to tune the a-string to
g ; he then writes all notes intended for that string a tone
higher than they are to sound. Notice that he writes as if
another key signature (d minor) were present for these
notes; he does not cancel the written signature of c minor.
The a-flat in this example (marked with an asterisk) is
read as "the 'a-string' re-tuned to sound g".[46]

Example 1-29a

---

[46]J. S. Bach, Suite V for solo violoncello, Gesammte
Ausgabe, v. 27, pg. 23. Prelude, mm. 5-7.

The same is true of the e-flat[1] in the next example. Notice also that Bach writes flats duplicating the signature to differentiate between those a-flats which are to sound as a-flats and those which are to be read as "the re-tuned 'a-string'".[47]

Example 1-29b

* redundant a-flat   + sounds d-natural[1]

A clearer notation is to cancel the written signature with accidentals wherever necessary, so that the transposition is real (rather than tonal), and to mark plainly those notes which are to be played on the re-tuned string (or strings), so that there can be no error in deciding which notes will sound as written and which will be transposed in sound. Specific strings are designated in two ways: with Roman numerals, assigned to the strings from the top down, or with the letter names of the strings' pitches, frequently with the Italian preposition "sul," e.g. "sul G." Taking note that this accordatura has two "g-strings," the former method of designation is to be preferred in this case.

---

[47]Ibid., pg. 91. Allemande, m. 12.

Example 1-29c

In Contrasts for violin, clarinet, and piano, Béla Bartók writes for a re-tuned violin using sounding pitch. He ten uses footnotes to explain the required fingerings:[48]

Example 1-30

This has the advantage of eliminating transpositions, but the footnoting of all fingerings could become rather cumbersome if the writing were more complex (these are the only two harmonies involved in the violin-part in this movement). It is asking too much to expect string players

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[48]Béla Bartók, Contrasts, mvt. III. c 1942 by Boosey and Hawkes. Used by permission of Boosey and Hawkes, Inc.

to realize complex music in any given tuning; consequently this procedure must be discarded.

For the third movement of Ingolf Dahl's Divertimento for viola and piano, the violist is directed to tune his c-string down to B. All notes intended for that string are written a semitone higher than they are to sound and are designated to be played on the altered string by Roman numerals. The score is entirely in concert pitch, but contains notice that the viola part is transposed where necessary.[49]

Example 1-31

viola part:

score (sound):

This practice is to be emulated.

When a stringed instrument is to be tuned in the usual intervals, but at a different pitch than usual, it is treated as a transposing instrument. This is fairly common for the string bass, where "orchestra tuning" (example 1-1) contrasts with "solo tuning" (one tone higher). The violino piccolo, which was often used in the Baroque era,

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[49]Ingolf Dahl, Divertimento, mvt. III. c 1951 by G. Schirmer. Used by permission of G. Schirmer, Inc.

was tuned as much as a fourth higher than the normal violin and transposed accordingly; one example is Bach's First Brandenburg Concerto of 1718. Mahler's Fourth Symphony (1900) calls for a full-sized violin tuned a whole-tone higher than usual; the part is written in D.

Modern, heavy strings and higher concert pitch have caused the tension on stringed instruments to reach a level close to the tolerances of the strings and the instruments themselves. While many colorful effects are possible through scordatura, one should thoroughly consider the alternatives before directing that a stringed instrument be tuned higher than usual.

CHAPTER TWO

HARMONICS

"Cold and transparent in soft passages, cold
and brilliant in loud ones, harmonics form
no fundamental part of orchestral writing . . ."

Nicholai Rimsky-Korsakoff

Principles of Orchestration, 1908

Stringed instruments have the dual capability of producing different pitches both by stopping the string and by "breaking" it--touching it lightly at a node. This difference has led to a unique notational system, which clearly indicates the nodal point to be touched, but not always the resultant pitch.

Natural harmonics are the partials of the open (unstopped) strings. They are notated as note-heads with a small circle (zero) above or below the head, if, and only if, the pitch indicated by the note head is also the location of the node. The following example gives the natural harmonics of the violin or viola G-string, with indications of the positions in which these harmonics lie:

Example 2-1
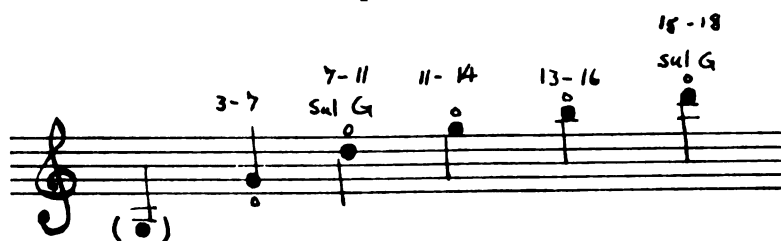
The second and fifth harmonics must be specified as "sul G", as they would occur as lower partials of the D string, and would otherwise be played on that string.

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The partials above the second partial may be sounded
if the string is broken at nodes which lie on the string in
locations different from the locations of the sounding
pitches. These locations should be indicated by white,
diamond-shaped note-heads, written to specify the finger-
positions of these alternate nodes, rather than the
sounding pitches. Example 2-2 gives the alternate nodes
and notation for the partials given above.

Example 2-2
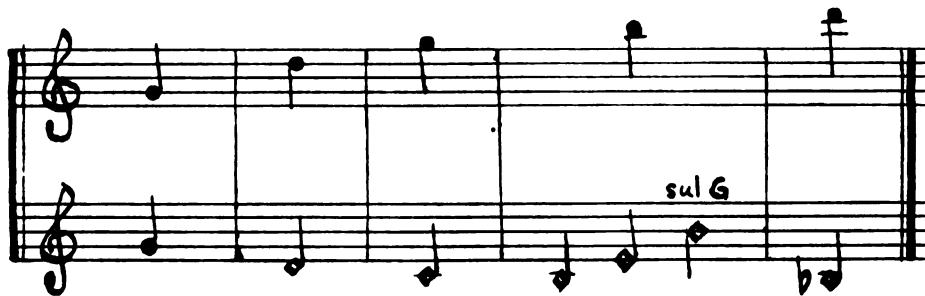
Notice that the pitch b^2 has a total of four nodes.
The locations of the three nodes, not at the same location
as the pitch itself, may be easily determined by con-
sidering that b^2 may be the first, second, third, fourth,
or fifth partial of harmonic series beginning on b^2, b^1,
e^1, b, and g respectively. When any of these harmonic
series are considered simultaneously, the <u>first</u> <u>common</u>
<u>partial</u> is the pitch that will sound:

Example 2-3
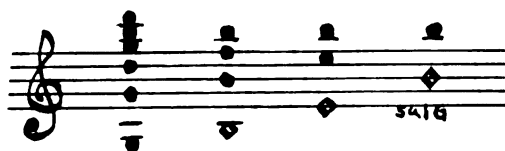
This exemplifies the basic principles behind the
notation of harmonics. First, there are always two pitches
involved in the production of a harmonic (which may be a
third pitch): the fundamental and a node of that funda-
mental. Secondly, diamond-shaped note-heads indicate a
node, and must be used anytime that the location of the
note differs from the location of the sounding pitch, if
the latter were produced as a stopped note on the same
string. In the case of natural harmonics, the fundamental
is assumed to be the next open string lower than the
written diamond-shaped note-head, except for intervals
which will not produce a harmonic (within six partials), or
when a still lower string is indicated. Hence, the
necessity for writing "sul G" below the written b^1 in the
last example, but not below the written e^1.

It frequently happens that a harmonic-quality sound is
desired on a pitch which does not fall into the harmonic
series of any open string. In this case, a string may be
stopped, creating a new fundamental, and a node of this
fundamental is broken, sounding a third pitch, which is
not necessarily written. The stopped note, the fundamental,

is written as a regular note-head, and the node to be
touched is written with a diamond-shaped head:

Example 2-4

As before, the first common partials sound. These are
referred to as artificial harmonics, or, occasionally, as
"false" harmonics. The distance between the fundamental
and the node touched is limited by the physical capacity of
performers; a fifth is the widest possible reach for the
violin and viola (and may be too wide for many violists);
for the 'cello, a fifth would require the use of the thumb
and a fourth would be an extension; for the bass, a major
third is a wide reach in the low positions, and a fourth
always requires the use of the thumb. Major thirds are the
closest interval in common use; some players can produce
harmonics using minor thirds and even smaller intervals,
but these are less common, and less reliable.[1]

---

[1]G. Read, Music Notation, pp. 376-78.

Gardner Read demonstrates a type of notation in which the sounding pitch is given, in small notation and/or in parentheses, above the notation for the harmonic:

Example 2-5

He terms this type of notation "unnecessary."[2] He calls the following notation, which he credits to Arnold Schoenberg, "redundant":[3]

Example 2-6

These realizations are usually best avoided, as they can be cumbersome when writing becomes complex. Read credits Béla Bartók with occasional use of the dotted tie to connect diamond-shaped note-heads:[4]

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[2]G. Read, op.cit., pg. 379.

[3]Ibid.

[4]Ibid., pp. 119, 391.

Example 2-7

The lower notes (regular heads) are connected by regular
ties; regular ties may also be used for diamond-shaped
note-heads.

String bass harmonics, like the other notes for that
instrument, are written an octave higher than they sound.
György Ligeti, in a preface to Apparitions, says "the
harmonics of the Contrabass are not notated in 'suoni reali'
but sound an octave lower, as do the other Contrabass
tones."[5] The same composer, however, states in his Requiem
that the bass harmonics are notated at sounding pitch
("suoni reali").[6] Penderecki, in Strophen, writes a har-
monic for the bass which includes a realization which is an
octave too low compared to the written harmonic.[7]

[5]György Ligeti, Apparitions, preface. Copyright 1964;
used by permission of Universal Edition A. G., Vienna,
publishers.

[6]G. Ligeti, Requiem, preface, C 1965; used by
permission of C. F. Peters, publishers.

[7]K. Penderecki, Strophen, pg. 20. Copyright 1960 by
PWP, Warsaw, used by arrangement with Belwin-Mills
Publishing Corp.

Example 2-8

Burtram Turetzky, a string bass virtuoso, recommends
writing harmonics an octave higher than actual pitch,
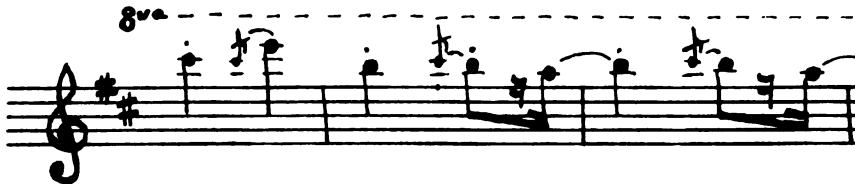"retaining the traditional double bass notation."[8]

Maurice Ravel, in _Tzigane_, used a number of interesting
harmonics, all correctly notated. This passage is entirely
in natural harmonics:[9]

Example 2-9a

The result is the following melody:

Example 2-9b

---

[8]Bertram Turetzky, "Notes on the Double Bass", _Source
#1_, Jan. 1967, pp. 64-66. Used by permission.

[9]Maurice Ravel, _Tzigane_, p. 6. Copyright 1924; used
by permission of Durand et C$^{\underline{ie}}$, publishers.

This passage uses two kinds of artificial harmonics:[10]

Example 2-10

This measure includes a chord containing a natural harmonic and an artificial harmonic:[11]

Example 2-11
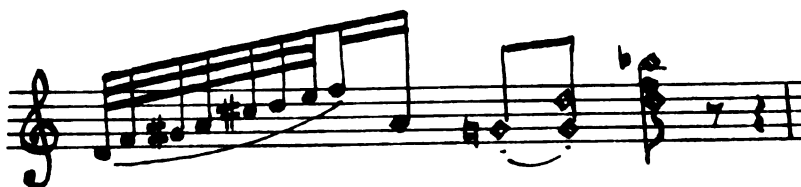
Mario Davidowsky, in Synchronism Number Two, writes the open string as a regular note-head for natural harmonics:[12]

Example 2-12a

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[10]Ibid., pg. 1.

[11]Ibid., pg. 2.

[12]Mario Davidowsky, Synchronisms Number Two, m. 65.
C 1964; used by permission of Joseph Marx, publisher.

This is unnecessary; diamond heads would have sufficed, and would have allowed clearer alignment of the double stops, e.g.,

Example 2-12b

Stravinsky uses the same notation in his <u>Suite</u> <u>Number</u> <u>Two</u>:[13]

A diamond-head "a^2"

is all that is needed. Lutoslawski, in his <u>String</u> <u>Quartet</u>, writes the fundamentals of certain natural harmonics in parentheses:[14]

---

[13] Igor Stravinsky, <u>Suite</u> <u>Number</u> <u>Two</u>, pg. 9. Copyright 1925; used by permission of J. & W. Chester, publishers. The fundamental, e^2, would be written only if the harmonic were to be played as an artificial harmonic on a lower string (e.g., in fourth position on the A string).

[14] W. Lutoslawski, <u>String</u> <u>Quartet</u>, pg. 43. C 1968; used by permission of Wilhelm Hansen, publisher.

Example 2-13

This section is not metered, however, and this device helps to clarify the difference between half and quarter note values, which could not be gleaned from the context.

Penderecki, in Emanations, writes the following harmonics:[15]

Example 2-14
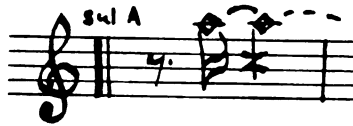
The direction "sul A" is necessary, as the diamond-shaped head would otherwise be understood as a nodal point on the E string, sounding the pitch e^4. Since this sounds where the diamond-shaped head is written (a^2), the correct notation would be:

---

[15]K. Penderecki, Emanations, pg. 6. C 1960 by Moeck Verlag, used by arrangement with Belwin-Mills Corp.

Example 2-15

Stravinsky, in the _Firebird_ _Suite_ (re-scored version
of 1919), writes a series of natural harmonics which involve
impossible leaps; then, below the staff, directs the
players to sound the pitch using a different string and a
more convenient nodal point:[16]

Example 2-16a

Vc.
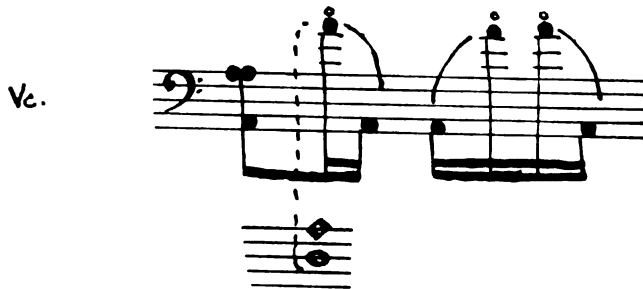
This could have been more simply written:

Example 2-16b

---

[16]I. Stravinsky, _Firebird_ _Suite_, p. 27. Used by
permission of Edwin F. Kalmus.

In Sacre du Printemps, Stravinsky uses a natural harmonic of a re-tuned string:[17]

Example 2-17a
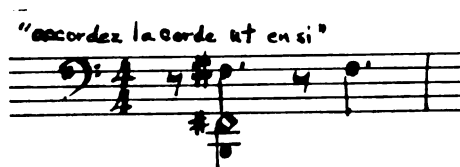
Following the recommendations for scordatura discussed in the previous chapter, and the principles of harmonic notation outlined above, a better notation would be:

Example 2-17b

In the same work, Stravinsky writes a double-stop involving a harmonic:[18]

---

[17]I. Stravinsky, Le Sacre du Printemps, pg. 80. C 1921, assigned 1947 to Boosey and Kawkes; used by permission of Boosey and Hawkes, Inc.

[18]Ibid., pg. 73.

Example 2-18a

The harmonic, a^3, is understood to lie on the a-string; **since** two-octave reaches are not possible, as the a-string **is** being played for the harmonic, this double-stop appears **to** be unplayable. In fact, however, if the harmonic a^3 **were** understood as a partial of the d-string, the double **stop** could be played using the open a-string. The correct **notation** is:

Example 2-18b
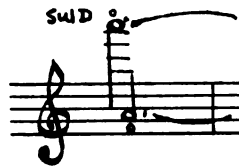
in which case the harmonic would lie at the end of the **fingerboard**; a likely alternative is:

Example 2-18c

or:

Example 2-18d

An interesting notation for harmonics occurs in Penderecki's Threnody:[19]

Example 2-19a

"harmoniques"
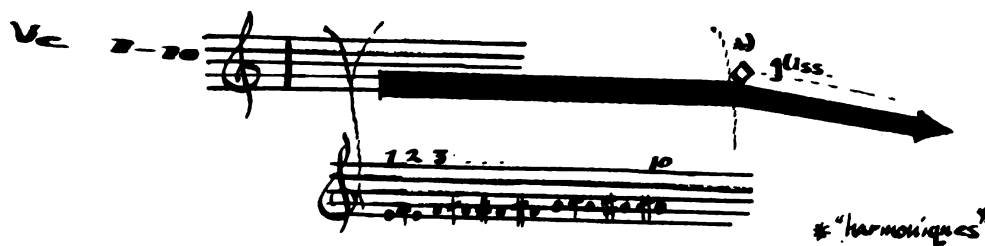
[19]K. Penderecki, Threnody, pg. 10. Copyright 1961 by PWP, Warsaw, used by arrangement with Belwin-Mills Publishing Corp.

These tones can be realized as harmonics on the 'cello in
any of these ways:

Example 2-19b

Example 2-19c

Example 2-19d

These will sound quite different, and will present differ-
ent technical problems. The first solution is fairly
reliable, but the players at the lower end of the cluster
will reach the lowest note possible after a glissando of
only a major third; this problem will be even more acute
if the second solution is employed. Probably, the best
technical solution is the third, as it allows the most
space for the glissando, but is also rather difficult, as
a fifth is a wide reach on the 'cello.

Another interpretation of this notation is also
possible. Since the diamond lies above the cluster, one
might take the notes of the cluster to be fundamentals of
artificial harmonics, and touch a nodal point above these
notes. There is no indication as to which nodal point
should be touched, and any of these solutions is possible:

Example 2-19e

Example 2-19f

Example 2-19g

Example 2-19h

The interval of a fourth is the most common artificial harmonic, as it lies well under the hand for the upper strings, and sounds two octaves above the fundamental, making realization easy. Evidence that this is the correct solution may be found in another of Penderecki's compositions, Polymorphia, where this notation is used, and a solution is given (cf. Examples 7-4a and b). The solution should be given in each instance.

This uncertainty would be spared if Penderecki had specified the meaning of his notation in the same way he has specified the elements of the cluster; e.g.

Example 2-19i
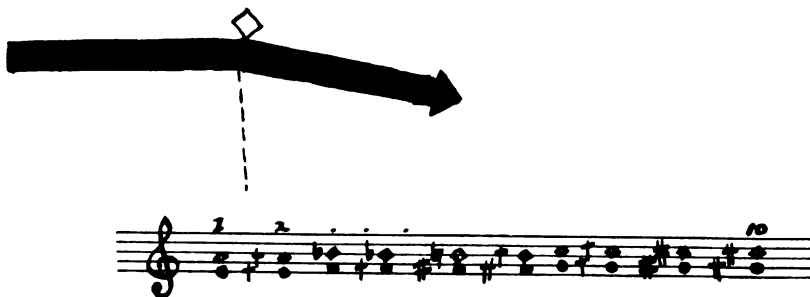
One pitfall in notating string harmonics is the temptation to write all harmonics as if they were natural harmonics which sounded at the same pitch as the location of the node. Stravinsky wrote such harmonics in the Firebird Suite:[20] (Violins)

---

[20]I. Stravinsky, Firebird Suite, pg. 15. Used by permission of Edwin F. Kalmas.

Example 2-20a

Neither of these harmonics is a natural harmonic of any
open string (the instruments are assumed to be tuned
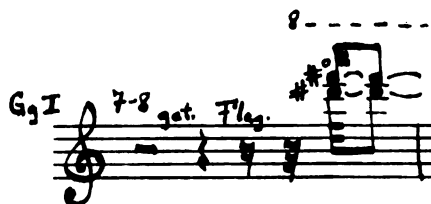normally). The most likely solution is given below:

Example 2-20b

Other solutions would be notated according to the same
principles. Ligeti, in Apparitions, makes the same error,
and includes the redundant instruction "Flag":[21]

---

[21]G. Ligeti, Apparitions, pg. 9. Used by permission
of Universal Edition A. G., Vienna.

Example 2-21a

The solution for this would require separate staves for each player:

Example 2-21b

Alban Berg, in his Lyric Suite, uses the direction "Flageolet", and omits the circles over most of the harmonics:[22]

---

[22]A. Berg, Lyric Suite, pg. 8. Copyright 1927 Universal Edition, A. G., Vienna, used by permission.

Example 2-22a
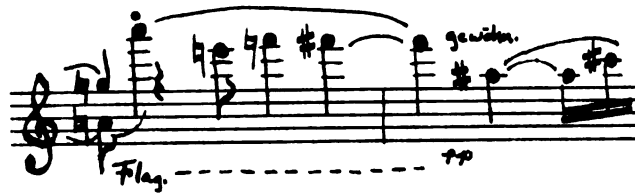
This would be more correctly written as:

Example 2-22b

Heitor Villa-Lobos, in Amazonas, uses a version of harmonic notation which is deceptive:[23]

Example 2-23a

The circles are unnecessary, and are even misleading, as these are not the sounding pitches (as the circles would

_____

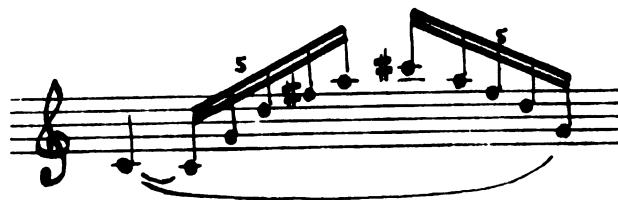[23]H. Villa-Lobos, Amazonas, pg. 21. Copyright 1917 Max Eshig, Paris; used by permission.

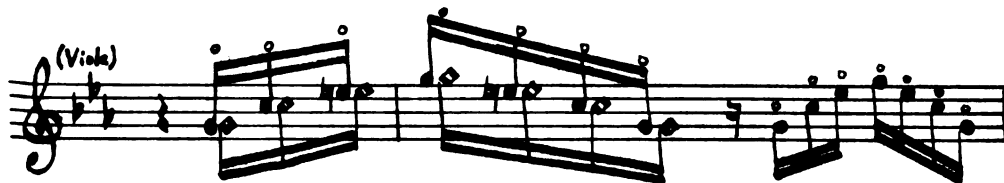indicate). The white notes are apparently a variant of diamond-shaped heads:

Example 2-23b
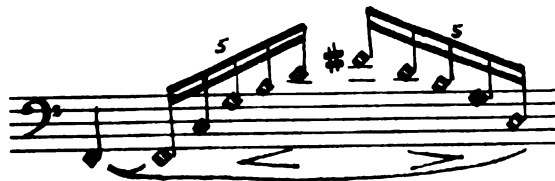
The realization is:

Example 2-23c

Stravinsky similarly combines the two types of nota-tion in Sacre du Printemps:[24]

Example 2-24a

---

[24]I. Stravinsky, Le Sacre du Printemps, pp. 16-17. C 1921, 1947, Boosey and Hawkes. Used by permission of Boosey and Hawkes, Inc.

This is quite confusing, as the two notations have different realizations in sound; the diamond-shaped g^2 in the second measure has no meaning on the viola, as it denotes no usable node on either the A or the D string, and would sound at that pitch if played on the G or the C string:

Example 2-24b

In all probability, it is the lower line which is meant, and the notation would simply be the notes with circles above them, to be played as natural harmonics of the C string.

Berg, in the Lyric Suite,[25] writes harmonics which are patently impossible as they appear in the score:

Example 2-25

_____

[25]A. Berg, op.cit., pg. 60. Used by permission of Universal Edition A. G., Vienna.

Only one of the harmonics indicated for the second violin can be played at one time. The a-flat and the d-flat for the viola would require the eighth partial of the C-string and the sixteenth partial of the G-string. The former is considered beyond practicality; the latter is quite impossible. One cannot speculate from this notation just what Berg might have intended; it is certain only that the notation cannot be realized as it stands.

Since harmonics are derived from the harmonic series, their intonation is just; i.e., not equal tempered. The problem of intonation may be pursued by reference to J. Murray Barbour's Tuning and Temperament, or "Temperament" in The Harvard Dictionary of Music; one may compare just intonation with equal temperament (or with any other temperament) and make what allowances one deems necessary. Briefly, the greatest difference will be with harmonics sounding the fifth partial. This will be a pure third (theoretically), and will be some fifteen cents closer to the fundamental than would an equal-tempered third.[26]

The second implication of this feature is that harmonics must be spelled correctly from the fundamental; i.e., perfect fourths cannot be spelled as augmented thirds, nor major thirds as diminished fourths:

---

[26] W. Apel, Harvard Dictionary of Music, "Temperament", pg. 835-836.

(violin or viola)

Example 2-26a
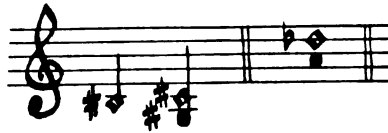
These are incorrect; they must be written as:

Example 2-26b

even at the occasional expense of smooth voice leading.

CHAPTER THREE

ARTICULATION WITH THE BOW

"Note to the director: No mistake!

To be bowed with the wood."

       Gustav Mahler

       Symphony No. 1 (1889)

The fundamental sounds of stringed instruments are the
bowed sounds and the plucked sounds. The bow is capable of
a wide variety of articulations, ranging from the very
short and the percussive to the very legato and sustained.

Basic use of the bow is to alternate the direction of
the strokes, "down-bow" [⊓] and "up-bow" [V]. More than
one note may be played in each stroke; however, these are
not necessarily slurred, nor is slurring necessary to pro-
duce a legato. The basic strokes are: legato [♩♩♩♩ ♩♩♩];
portato or louré [♩♩♩♩] which is a legato stroke with a
"pulsation" in it; détaché (no special marking; used in
fast passages where even pressure is desired); martelé
[♩], "hammer-stroke," which has a sharp attack and is well-
detached from surrounding notes; staccato [♩ ♩♩♩♩], rather
like the martelé, but with a decisive stopping of the tone;
spiccato [♩♩♩♩], where the bow is bounced relatively near
the frog; sautillé [♩♩♩♩], which sounds very much like a
rather fast spiccato--it is lighter and usually softer
dynamically; and ricochet (or saltando) [♩♩♩♩], which is a
bouncing bow performed near the tip, and consequently a
rather light stroke.[1]

---

[1]I. Galamian, Principles of Violin Playing and Teaching,
pp. 64-83. Galamian explains several variations of some of
these bowings, and discusses some special bowing problems
not mentioned here. Used by permission of Prentice-Hall,
Inc.

Modifications of these basic strokes are notated with the dot, line, and accent marks used in combination. The literal meanings of these marks and the results of combining them are discussed by Hugo Cole in his article "Some Modern Tendencies in Notation."[2] He describes the functions of these symbols as follows: The dot [$\dot{\mathsf{p}}$] means "well detached," the accent [$\overset{>}{\mathsf{p}}$] means "accented," and the line [$\bar{\mathsf{p}}$] indicates "sustained and slightly detached."[3]

For the combination of line and dot [$\dot{\bar{\mathsf{p}}}$], Cole suggests the interpretation "sustained while note lasts, but not lasting full length."[4] He then cites Stravinsky's remarks in the forward to The Rake's Progress: "a sharp attack without accent."[5] This marking is used by Galamian to designate the "détaché lancé" [♪♪♪♪], which he describes as a "rather short, quick stroke."[6]

When the accent occurs in combination with the line [$\overset{>}{\bar{\mathsf{p}}}$], Cole suggests the interpretation "accent, then

---

[2]H. Cole, "Some Modern Tendencies in Notation," Music and Letters, July 1952, pp. 243-9. Used by permission.

[3]Ibid.

[4]Ibid., pg. 245.

[5]I. Stravinsky, The Rake's Progress, quoted by H. Cole, loc. cit.

[6]I. Galamian, op.cit., pg. 68.

maintain the tone at a constant level."[7] He then quotes
an example from Prokovieff's Fifth Symphony,

Example 3-1

and asks how notes lasting only a fifth of a second can be
sustained after being accented.[8] Galamian, however, refers
to this type of stroke as an "accented or articulated
détaché," and uses the same marking.[9] Cole apparently
thinks of the accent and the sustained remainder of the
note as two separate actions, while Galamian finds this
result obtainable in a variation of a single, basic stroke.

The accent-and-dot combination [♩], which Cole calls
the "most necessary" of these combinations, occurs in
de Falla's Three-cornered Hat (page 71 of the miniature
score).[10] Galamian gives no special mention to this type
of stroke, although accents are possible in most types of
bowing.

---

[7]H. Cole, loc. cit.

[8]Ibid.

[9]I. Galamian, op.cit., pg. 67.

[10]H. Cole, loc. cit.

All three marks are used together in Bartók's <u>Hungarian</u> <u>Peasant</u> <u>Songs</u>[11]

Example 3-2

Cole asks how a player can do justice to this passage at this speed.[12] Actually, this would only require a détaché lancé with an added "bite"; this is not easy, nor will there be complete agreement among string players regarding the execution of this passage. However, the marking indicates a more practiced bowing than Cole seems to believe.

Cole states that the pointed dot [ ] implies accent,[13] which is consistent with Galamian's use of this mark to indicate martelé.[14] However, its use if often mixed with the applications of the round dot, dependent in part upon copyists and engravers.[15] In <u>The</u> <u>Three-cornered</u> <u>Hat</u> of de Falla, for instance, the horns are marked with the dot-and-accent (see above example), while the strings simultaneously alternate between this and the simple accent,

---

[11]H. Cole, <u>loc</u>. <u>cit</u>.

[12]<u>Ibid</u>.

[13]<u>Ibid</u>.

[14]I. Galamian, <u>op.cit</u>., pg. 70.

[15]H. Cole, <u>loc</u>. <u>cit</u>.

"apparently at random."[16] And in the final chord of
Elgar's 'Cello Concerto, Trombones I and II and the strings
have pointed dots, while everyone else has round ones.[17]

Cole observes that careful marking has its value, but
that increased specificity has increased the possibility
of inconsistency, as the previous examples illustrate.[18]
He further states that many notes are now marked which
previously would have been left unmarked;[19] he declares
that "Stravinsky is the composer who has gone furthest along
the road towards eliminating the element of uncertainty in
music . . . string passages are not only bowed, but also
fingered . . ."[20]

Stravinsky's bowing indications include the terms
"staccatissimo sempre,"[21], "staccato, accompagnando,"[22]
and this passage:[23]

---

[16]Ibid.

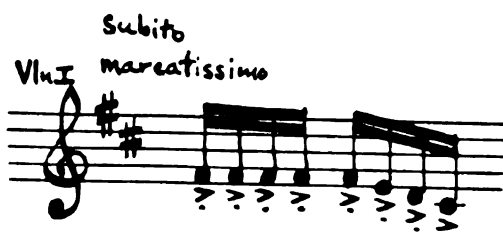[17]Ibid.

[18]Ibid.

[19]Ibid.

[20]Ibid., pg. 244.

[21]I. Stravinsky, Divertimento, pg. 21. Copyright 1950
by Boosey & Hawkes. Used by permission of Boosey and
Hawkes, Inc.

[22]Ibid., pg. 13.

[23]Ibid., pg. 33.

69

Example 3-3

from the <u>Divertimento</u> of 1934 (re-orchestrated in 1949). A
reversed bowing occurs, with other markings, in the <u>Firebird</u>
<u>Suite</u>:[24]

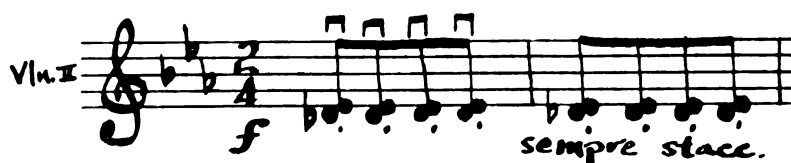Example 3-4

Repeated down-bows occur in this famous section of <u>Sacre du</u>
<u>Printemps</u>:[25]

---

[24] I. Stravinsky, <u>Firebird Suite</u>, pg. 9. Used by permission of E. F. Kalmus, Inc.

[25] I. Stravinsky, <u>Sacre du Printemps</u>, pg. 11. Copyright 1947 by Boosey and Hawkes. Used by permission of Boosey and Hawkes, Inc.

Example 3-5

Two articulations are mixed in this passage from <u>Suite</u>
<u>Number</u> <u>One</u>:[26]

Example 3-6

Stravinsky has also made interesting use of the
ricochet bowing, which he indicates, in the following
examples, with the term "jeté." The Italian term "saltando"
is also widely used, along with the French term "ricochet";
the three terms are equivalent.[27] This example is from
<u>Histoire</u> <u>du</u> <u>Soldat</u>:[28]

---

[26]I. Stravinsky, <u>Suite</u> <u>Number</u> <u>One</u>, pg. 21. Copyright
1926. Used by kind permission of J. & W. Chester, London,
Limited.

[27]Hugo Norden, "Bowing," <u>The</u> <u>Harvard</u> <u>Dictionary</u> <u>of</u>
<u>Music</u>, pg. 103. "Ricochet" is the most precise term.

[28]I. Stravinsky, <u>Histoire</u> <u>du</u> <u>Soldat</u>, pg. 3. Used by
kind permission of J. & W. Chester, London, Limited.

Example 3-7

In Galamian's terms, it probably would be notated (and performed) thus:

Example 3-8

The dots are missing from the top part of this passage from the Firebird Suite:[29]

---

[29] I. Stravinsky, Firebird Suite, pg. 8. Used by permission of E. F. Kalmus, Inc.
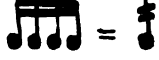
Example 3-9

Also, the upper part involves a great deal of down-bow,
especially difficult as the jeté is performed near the tip.

This marking, [ ], which occurs both in Sacre
du Printemps and in Chant du Rossignol, may be interpreted
as a ricochet bowing. However, this is rather beyond the
usual practice, where all but the last note of the figure
lie in one direction; it is sometimes performed in separate
bows as a sautillé.[30]

The tremolo is a characteristic string articulation,
which may be either measured or unmeasured. If measured,
note-values are written, although shorthand notations are

_____

[30]This is indicated by markings in parts borrowed from
the library of the Philadelphia Symphony Orchestra.

often used: [𝄞 = 𝄿].[31] For unmeasured tremolo, three

slashes in the stems of quarter-notes and half-notes and

over or under whole-notes are usually sufficient. Fewer

slashes are used for shorter values (e.g., two for eighth

notes, one for sixteenth notes):[32] [𝅝 𝅘𝅥 𝅘𝅥 𝅘𝅥𝅮𝅘𝅥𝅮].

In slow tempi, however, where measured thirty-second notes

would be possible, a fourth slash is used to specify

unmeasured tremolo.[33] The word "tremolo" or the abbrevia-

tion "trem." is also sometimes used. Gardner Read

attributes to Béla Bartók the origin of the dotted tie in

use with the tremolo: [𝅘𝅥‿𝅘𝅥]; he calls this "a

psychological effect rather than an actual one."[34] Regular

ties are also used with the tremolo.

Penderecki has introduced a modification of the

tremolo: the "irregular" or "non-rhythmical" tremolo. For

this effect he uses the modified slashes:[36] [𝅘𝅥]. This

---

[31]G. Read, *Music Notation*, pg. 39.

[32]*Ibid.*

[33]C. Franck, *Symphony*, *Lento*.

[34]G. Read, *loc.* *cit.*

[35]*Ibid.*

[36]K. Penderecki, *Emanations*, general instructions; also
many other works of Penderecki.

is a clear marking, the use of which has spread along with
the effect.[37]

Another type of bowing indication is one which refers
to the part of the bow to be used. Passages to be played
at the point of the bow are marked "al' punta," "punta
dell'arco," or the equivalent, although Italian phraseology
is most frequently encountered.[38] For passages to be
played at the frog, the directions "al tallone" (Italian),
"(arco)du talon" (French),[39] and "am Frosch" (German)[40]
are used. Penderecki has a special notation for one effect
obtainable from this bowing:

Example 3-10

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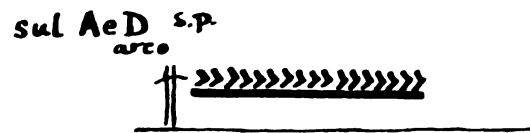
[37]It also occurs in Lutaslowski and Gerard Victory
(Scathain).

[38]G. Read, A Thesaurus of Orchestral Devices, pg. 307.

[39]I. Stravinsky, op.cit., pg. 9. Used by permission
of E. F. Kalmus, Inc.

[40]G. Ligeti, Apparitions. Used by permission of
of Universal Edition A. G., Vienna.

The explanatory footnote reads: "At the heel [frog] with many [sic] pressure so that's to hear a violent creaking."[41]

Bowing normally takes place between the bridge and fingerboard, at the sounding point which produces the optimum balance of harmonics--that is, the "richest" tone. The tone can be altered by playing closer to or further from the bridge. Closer to the bridge is indicated by the terms "sul ponticello" (Italian), "am Steg" (German), "pres du chevalet" (French), and the abbreviations "pont." or "sul pont." or "Steg."[42] Further from the bridge than normal (towards or over the fingerboard) is indicated thus: "(sul) tasto" (Italian), "sur la touche" (French), or "am Griffbrett" (German).

Penderecki has abbreviated the Italian forms of these directions further: "s.t." for "sul tasto" and "s.p." for "sul ponticello."[43] These abbreviations are always explained in the general instructions to his scores, which is necessary, as the extremity of the abbreviation would leave the uninformed guessing at the language as well as the meaning. Ligeti has used "Grffbr" for "Griffbrett"

---

[41]K. Penderecki, Flouresences, pg. 31. C 1962, Moeck Verlag. Used by arrangement with Belwin-Mills Corp.

[42]G. Read, Music Notation, pg. 382-3.

[43]K. Penderecki, De Natura Sonoris, preface. C 1967 by Moeck Verlag. Used by arrangement with Belwin-Mills Corp.

(sul tasto);[44] although it is a less extreme abbreviation,
players unfamiliar with German will have difficulty under-
standing it. Ligeti uses this abbreviation only after
having used the entire word, with translations available
in the score. These instructions must be cancelled when
the performer is to return to the ordinary bowing position.
The Italian term "position naturale" is often used,
abbreviated by Ligeti to "pos. nat."[45] Penderecki has used
both "normale," abbreviated "N"[46] and "ordinario,"
abbreviated "ord."[47]

The German equivalent is "gewöhnlich," abbreviated
"gewöhn."[48] All of these are clear in meaning, but, again,
extreme abbreviations should be explained. These abbrevia-
tions are necessitated by space considerations in scores
where frequent and rapid changes in timbre would crowd these
directions, one on top of another.

"Sul pont." and "sul tasto" are used in conjunction
with dotted horizontal lines,[49] e.g.:

---

[44]G. Ligeti, op.cit.

[45]Ibid.

[46]K. Penderecki, Quartetto, preface.

[47]K. Penderecki, De Natura Sonores, preface.

[48]A. Berg, Lyric Suite.

[49]G. Read, op.cit., pg. 383.

Example 3-11

sul pont. ----------¬ *naturale*

The termination of the line implies a return to normal pro-
cedure, but as Gardner Read advises, "the verbal direction
must also be written."[50] Stravinsky has combined these
procedures, eliminating the horizontal line, with the
instruction "col legno sino al segno ☒ ," "col legno until
the sign ☒ ."[51] This saves the trouble of writing the
horizontal line to show duration of the effect, and the
sign probably occupies less space even than the abbreviation
of the verbal instructions for normal bowing. The line,
however, is not completely necessary, and the sign is an
additional symbol to be recognized, making it somewhat
superfluous.

The hair of the bow will automatically be used in the
absence of any indication to the contrary. The wooden
part of the bow can also be used, either similarly to normal
bowing or struck, rather as a percussive technique. Often,
the context will determine the appropriate technique.

---

[50]Ibid.

[51]I. Stravinsky, Le Sacre du Printemps, pg. 17.
Copyright 1921, 1947 by Boosey & Hawkes. Used by per-
mission of Boosey and Hawkes, Inc.

This passage, from the Finale of Rachmaninoff's <u>Third</u>
<u>Piano</u> <u>Concerto</u>, is performed with a struck style of bowing,
rather like a ricochet:[52]

Example 3-12

all
strings:

col legno

The most common term for this bowing style is the Italian
"col legno"; the German "mit (dem) Holz" and the French
"avec bois" are occasionally encountered.[53]

Two differing uses of wood may be distinguished by the
directions "col legno tratto", meaning "bowed with the
wood," or "(col) legno battuto," meaning "struck with the
wood."[54] Penderecki has abbreviated these terms in various
ways: for "col legno", "c.l."[55]; for legno "battuto",

---

[52]S. Rachmaninoff, <u>Third</u> <u>Piano</u> <u>Concerto</u>, Finale.

[53]Mahler uses the Italian and German terms apparently
at random, although he seems to differentiate between "col
legno" or "mit Holz (geschlagen)", meaning to use the wood,
and "mit dem Bogen geschlagen", meaning to strike with the
bow, possibly with the hair between the stick and the
string.

[54]K. Penderecki, <u>Quartetto</u> and <u>De</u> <u>Natura</u> <u>Sonoris</u>.

[55]<u>Ibid</u>.

"l. batt."[56], and "x".[57] This passage from his <u>Quartetto</u> illustrates the two techniques:[58]

Example 3-13

Berg and Ligeti use polyglot phraseology: "col legno, gestrichen" and "col legno, geschlagen";[59] abbreviations are "gestr." and "gestrich.", "geschlag." and "geschl."[60] The following example, from Berg's <u>Lyric Suite</u>, further illustrates the difference in character between the two bowings:[61]

---

[56]K. Penderecki, <u>Capriccio per Siegfried Palm</u>; <u>De Natura Sonoris</u>.

[57]K. Penderecki, <u>Quartetto</u>.

[58]<u>Ibid</u>., sec. 23-24. Copyright 1963 by PWP, Warsaw, used by arrangement with Belwin-Mills Publishing Corp. The slide is not possible as it is written, because at least one string crossing is necessary to accommodate both endpoints. Cf. chapter five.

[59]A. Berg, <u>Lyric Suite</u>, and G. Ligeti, <u>Apparitions</u>.

[60]<u>Ibid</u>.

[61]A. Berg, <u>Lyric Suite</u>, pg. 39. Used by permission of Universal Edition A. G., Vienna.

Example 3-14
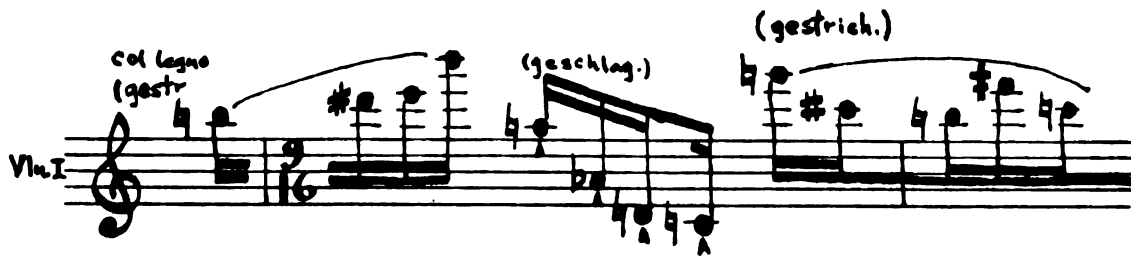
David Reck has used the symbol [⊔] for "col legno,
[bounced]";[62] he has not provided a symbol for col legno
tratto [bowed], and this symbol resembles the down-bow
symbol used in French editions too closely for clarity.
Col legno bowing is cancelled in the manner discussed in
connection with ponticello and tasto: "modo ord.", "ord.",
"naturale", etc.

The use of the wood with ricochet technique has been
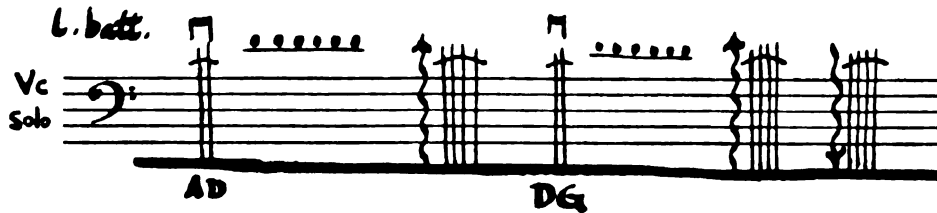exploited by Davidowsky:[63]

Example 3-15
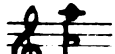
[62]D. Reck, Blues and Screamer, Source #1, Jan. 1967.
Used by permission.

[63]M. Davidowsky, Synchronisms No. 2, m. 42. C 1964 by
Josef Marx, used by permission.

The same technique occurs in this display in Penderecki's
Capriccio per Siegfried Palm:[64]

Example 3-16

When chords comprising more than two tones are written
for a single stringed instrument, a bowing problem is
involved. Three tones can be struck simultaneously, but
not four (normally), and only two can be sustained. Chords
are, therefore, normally "broken." Galamian gives several
possibilities for a chord written simply :[65]

Example 3-17

---

[64]K. Penderecki, Capriccio per Siegfried Palm, C 1969
by B. Schott's Sohnne, used by permission.

[65]I. Galamian, op.cit., pp. 88-89.

From these examples it is clear that chords are normally arpeggiated from the lowest tone up. (Actually, the direction is from the lowest string upwards by string-- this chord illustrates the difference:

Example 3-18

If the direction of arpeggiation is to be altered, special instructions must be given. The following modifications of the "roll" symbol are found in Berg's Lyric Suite:[66]
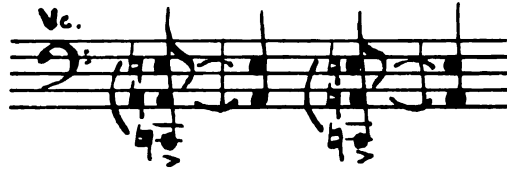
Example 3-19

For chords which are not to be arpeggiated, the instruction "non-arpeggiato" or "non arp." must be given; or a bracket may be used, as in harp notation:[67]

---

[66]A. Berg, Lyric Suite, pg. 10. Used by permission of Universal Edition A. G., Vienna.

[67]Ibid., pg. 75.

Example 3-20

Square brackets, however, are more standard: [(cf.

Example 4-7).

It is not necessary to fill out a measure with rests

in the lower parts when part of a chord is released; that

is, a chord is not usually treated as a polyphonic piece

would be treated. This chord is from Beethoven's Fifth

Symphony:[68]

Example 3-21a

Rests would be redundant and would even imply divisi:[69]

---

[68]L. v.Beethoven, Fifth Symphony, Mvt. I, mm. 19-22.

[69]The notation of chords may be studied in detail in
Galamian's edition of the Sonatas and Partitas for Solo
Violin by J. S. Bach.

Example 3-21b

In polyphonic music for individual stringed instruments, voices may cross. This is usually shown, as in choral music, by stem direction. In this example, paraphrased from Luciano Berio's Folksongs, the voices are not crossed:

Example 3-22a

written   probable execution

As Berio has written this passage, however, the parts are crossed as follows:[70]

---

[70]Luciano Berio, Folksongs, pg. 3. Used with permission of Universal Edition A. G., London.

Example 3-22b
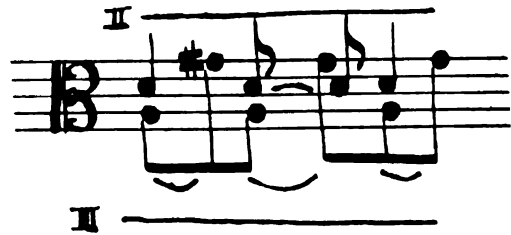
written (Berio)   probable execution

Stravinsky also has used alternating stem directions to indicate multiple voices. This example is from <u>Histoire du Soldat</u>.[71]

Example 3-23

In many instances, the crossing of lines will have no audible effect. For example, the following two figures would have to be played in the same way, and consequently would sound the same.

---

[71]I. Stravinsky, <u>Histoire du Soldat</u>, pg. 47. Reprinted with kind permission of J & W Chester, Ltd., London.

Example 3-24

written   both executed
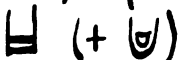
CHAPTER FOUR

PIZZICATO

.

"Rather in the manner of a guitar."

Nicholai Rimski-Korsakoff

Capriccio Español, 1888

Notes written for stringed instruments are assumed to be bowed unless otherwise indicated. Pizzicato, or plucking, is the second major means of playing stringed instruments. The term "pizzicato" and the abbreviation "pizz." have long been the recognized means of indicating this technique. Penderecki has shortened the abbreviation to "Pz,"[1] which is clear and recognizable. Reck has used a symbol,[2] [⊎] which does require explanation. Since nothing is gained in terms of space, either the standard abbreviation or Penderecki's abbreviation would be preferable, as they are self-explanatory. The direction "pizz." cancels the direction, given or assumed, for bowing. The standard direction for cancelling pizzicato is the Italian term for "bow," "arco." Penderecki has also shortened this term, to "A";[3] Reck has used the same idea:[4] " ⋀ ." Although arco and pizzicato normally cancel each other, Reck uses his symbols to ask for free mixtures of the two: " ⋀⊎ " means "use both arco and pizz. ad. lib."; " ⊔ (+ ⊎) "

---

[1]K. Penderecki, Quartetto.

[2]D. Reck, Blues and Screamer.

[3]K. Penderecki, op.cit.

[4]D. Reck, op.cit.

indicates "predominantly col legno [battuto] with some pizz."; and "⌒ ⑭ " calls for "simultaneous arco and pizz."[5] The standard terminology is recommended, because it is self-explanatory.

When the string is to be plucked with the fingers of the left hand, special directions are necessary. Stravinsky uses the standard abbreviation of the French "main gauche," and mixes it with Italian: "pizz. de la m. g."[6] The Italian equivalent is "m. s." for "mano sinistra." These designations for the left hand are common in piano music; violin music, however, has a very compact symbol for left-hand pizzicato: a plus-sign [+] placed over the note to be plucked with the left hand. This example, from Ravel's Tzigane, illustrates the usefulness of so small a symbol.[7]

Example 4-1

---
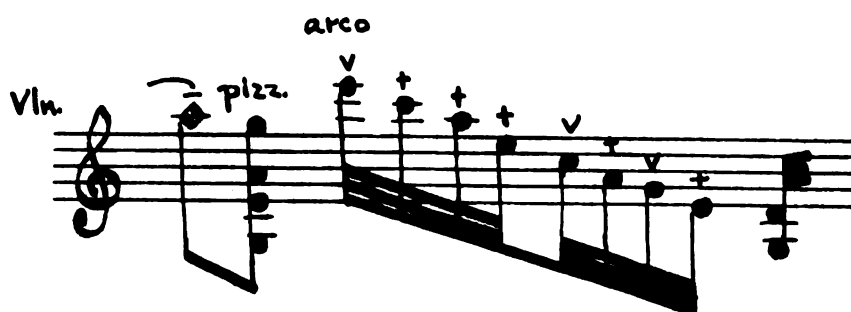
[5]Ibid. It is impossible for the solo bass player to take the last direction literally.

[6]I. Stravinsky, Histoire du Soldat, pg. 44.

[7]M. Ravel, Tzigane, pg. 2. Reprinted with permission of Durand et Cie.

Notice that the plus-sign applies to one note only; it must

be repeated for each note so played, and, unlike regular

pizzicato, needs no cancellation.

This passage demonstrates the possibility of using

left-hand pizzicato simultaneously with arco playing:[8]

Example 4-2
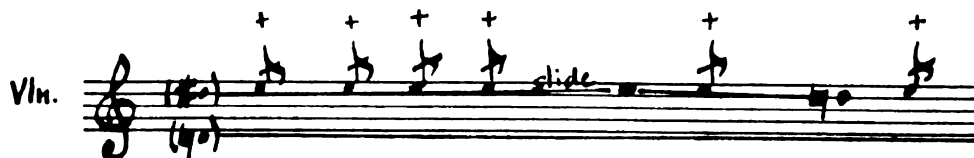
In the following case, the "pizz" means "left-hand pizz.",

as the right hand is employed with the bow; the c is played

simultaneously with the bow.[9]

Example 4-3a
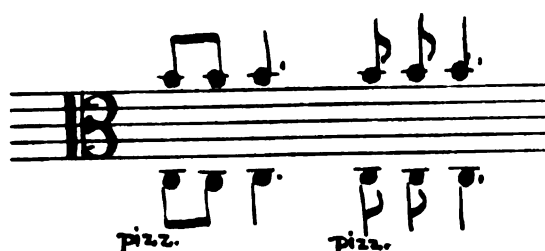
---

[9]Ben-Zion Orgad, Monologue for solo viola. Used by permission of Mr. Orgad. The method of execution determined by listening to a recorded performance with the composer.

In order to indicate clearly that the c is to be both bowed and plucked, the following notation might be used:

Example 4-3b
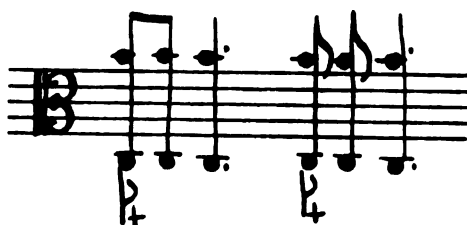
This bar contains left-hand pizzicato alternating with ordinary pizzicato. Notice also the slurred pizzicato. This is performed by dragging the finger across the strings rather than giving each note a distinct, separate pull.[10]

Example 4-4
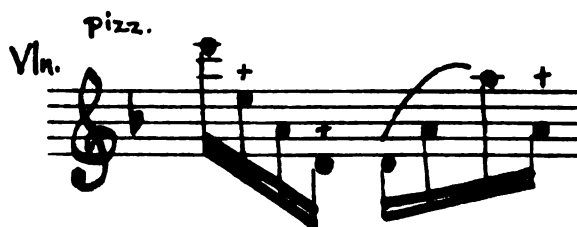
Xenakis has asked for left-hand pizzicato between the stopping finger and the saddle. He encloses the pitch to be stopped in brackets, and encloses the pitch resulting from plucking the string on the "wrong" side of the stopping

_____

[10]M. Ravel, op.cit., pg. 5. Used by permission of Durand et Cie.

finger in parentheses. The fingering is given above the
staff; the brackets and parentheses correspond with those on
the staff (this symbol [𝄐] is a common pedagogical device
indicating the use of the left thumb in 'cello and bass
playing).[11]

Example 4-5a

written   1st finger   thumb pizz.

In context, this effect appears thusly:[12]

Example 4-5b

This device produces a weak sonority because the
vibrating length of string does not contact the bridge, and

---

[11]I. Xenakis, Nomos for solo violoncello, preface. The
example is the composer's own. C Copyright 1967 by Boosey
and Hawkes. Reprinted by permission of Boosey and Hawkes,
Inc.

[12]Ibid., pg.

consequently the sound does not receive benefit of the resonating body of the instrument. Furthermore, the string length between the stopping finger and the saddle tends to lie very close to the fingerboard, and contacts the fingerboard at a very shallow angle; because this results in much greater friction than in the normal procedure, the sound decays very quickly. The following passages asks that the bowed notes be slurred into the following pizzicati:[13]

Example 4-6

Chords played pizzicato are bound to be arpeggiated somewhat as the finger moves across the strings. Stravinsky has sought to minimize this effect through the directions "non-arpegg.",[14] "avec deux doigts",[15] and through the use of brackets:[16]

---

[13]A. Berg, Lyric Suite, pg. 2.

[14]I. Stravinsky, Firebird Suite, pg. 36.

[15]I. Stravinsky, Divertimento, pg. 30.

[16]I. Stravinsky, Histoire du Soldat, pg. 14. Reprinted with kind permission of J & W Chester, London, Limited.

Example 4-7

Gardner Read lists this and one other type of bracket as means of indicating "non-arpeggiato."[17]

When pizzicato chords are to be pronouncedly arpeggiated, the wavy line is often used, as in this chord from Berg's Lyric Suite:[18]

Example 4-8

This chord carries the additional instruction "langsam", or "slowly".

---

[17]G. Read, Music Notation, pg. 399.

[18]A. Berg, op.cit., pg. 56. Used by permission of Universal Edition A. G., Vienna.

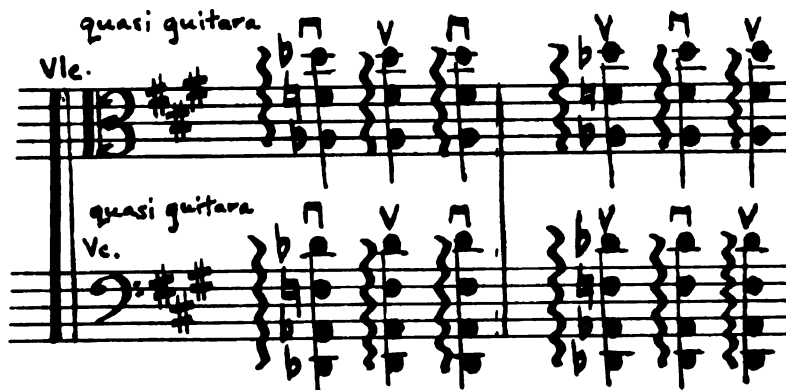Read lists a total of three notations for the arpeggiated pizzicato chord:[19]

Example 4-9

When the direction of the arpeggiation is to alternate between up and down, i.e., when the chords are to be strummed, special directions are necessary. Rimski-Korsakoff used the down-bow and up-bow signs:[20]
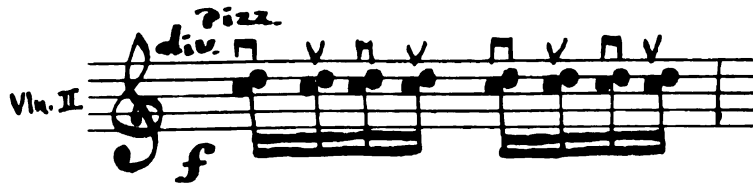
Example 4-10

---

[19]G. Read, loc.cit.

[20]N. Rimski-Korsakoff, Capriccio Español, "Fandango austuriano".

Stravinsky also used this notation in Le Sacre du Printemps:[21]

Example 4-11

In this case, the alternation of the direction of plucking will not produce alternation in the direction of arpeggiation (the chord is divided, and therefore not arpeggiated at all); strumming serves to facilitate performance at the required tempo. However, the use of bowing symbols for pizzicato creates ambiguity in the meanings of the symbols; furthermore, the direction of the down-bow for the upper strings is across the strings from lowest to uppermost, while for the 'celli and bassi it is the reverse. Consequently, the usage quoted from Rimski-Korsakoff (Example 4-10) is rather ambiguous for the 'celli.

Villa-Lobos uses grace-notes to indicate direction, but it is not clear whether he intends the pattern to continue:[22]

---

[21]I. Stravinsky, Le Sacre du Printemps, pg. 22. Copyright 1921, assigned 1947 to Boosey and Hawkes. Used by permission of Boosey and Hawkes, Inc.

[22]H. Villa-Lobos, Choros No. 10, pg. 61. Reprinted by permission of Edition Max Eschig, Paris.

Example 4-12

Another symbol is the arrow pointed in the direction of the arpeggiation. This application is from the _Dance Suite_ of Bartók:[23]

Example 4-13

Gardner Read catalogues several notations for this device under the heading "a la guitarra":[24]

---

[23]B. Bartók, _Dance Suite_, mm. 65-66. C 1939 by Boosey and Hawkes. Used by permission of Boosey and Hawkes, Inc.

[24]G. Read, _loc.cit._

Example 4-14

(In the lower pair, the down- and up-bow indications do not coincide with the directions indicated by the arrows; this is certainly an error.) Lutoslawski has combined the arrowhead with the wavy line; the arrow is used only for reverse arpeggiation (downward), as the unaltered wavy line has long denoted upward arpeggiation:[25]

Example 4-15

upward

(assumed)

downward

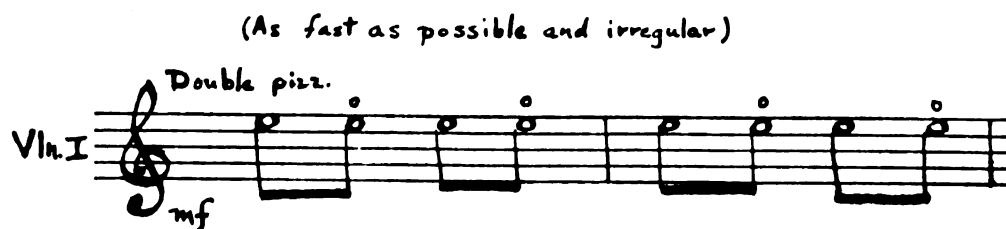[25]W. Lutoslawski, String Quartet.

A similar technique is involved in this <u>pizzicato</u> <u>tremolo</u> figure from Ferde Grofé's <u>Grand Canyon Suite</u>:[26]

Example 4-16a

The <u>tremolo</u> might be better notated:

Example 4-16b

Or, to show irregularity, the following method might be used:

Example 4-16c

A related technique is the mandolin-like strumming

asked by George Crumb in "Eleven Echoes of Autumn, 1965."

He notates this effect as single notes with tremolo slashes

in the stems, and gives directions indicating that the

string is to be strummed in alternate directions with the

fingernail or with the thumbnail and a fingernail

together.[27]

Example 4-17
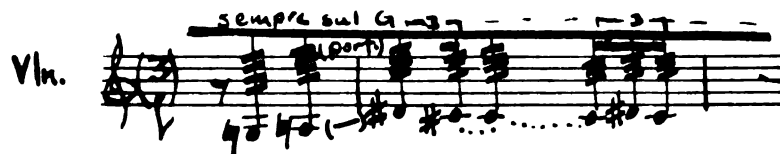
The direction "alla mandolino" in conjunction with this

notation would be sufficient, although the direction "pizz."

should also be in force during such passages.

The use of plectra may be indicated by stating "with

plectrum"; this could be modified to specify metal or

plastic composition of the plectrum. The Italian equivalents

are "col plettro" (with plectrum), "(col) plettro metallico"

(with metal plectrum), and "(col plettro plastico" (with

plastic plectrum). The direction "pizzicato" should be

given with these instructions, if it is not already in force.

---

[27]George Crumb, Eleven Echoes of Autumn, 1965; Eco. 3.
Copyright C 1972 by C. F. Peters Corp. Used by permission
of the publisher.

When pizzicati are to be allowed to vibrate after being plucked, aided by a pronounced vibrato, the tie symbol is used following the note:[28]

Example 4-18a

This practice is "contradictory":[29]

Example 4-18b

The accepted notation is found in Lutoslawski's Concerto for Orchestra:[30]

---

[28] G. Read, op.cit., pg. 391.

[29] Ibid.

[30] W. Lutoslawski, Concerto for Orchestra, pg. 44. Copyright 1956 by PWP, Warsaw. Used by arrangement with Magnamusic-Baton, Inc.

Example 4-19

and in this interesting bar in Davidowsky's <u>Synchronisms</u> <u>No</u>. <u>2</u>:[31]

Example 4-20
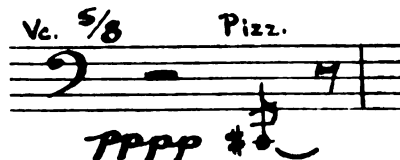
Stravinsky uses this notation with the added (and rather redundant) instruction "allow to vibrate":[32]

Example 4-21

---

[31]M. Davidowsky, <u>Synchronisms</u> <u>No</u>. <u>2</u>, m. 21. Used by permission of Josef Marx, publisher.

[32]I. Stravinsky, <u>Histoire</u> <u>du</u> <u>Soldat</u>, pg. 21. Reprinted by kind permission of J & W Chester Limited, London.

Gardner Read suggests the following notation when a
pronounced vibrato is to be started before the note is
plucked, and continued afterwards:[33]

Example 4-22

All of these applications of the pizzicato technique
(excluding left-hand pizzicato) can be modified through the
use of "sul tasto" and "sul ponticello" as discussed in
Chapter Three. The direction "arco", however, cancels only
"pizzicato"; if either of the modifying directions is in
force, it must be cancelled separately, otherwise it would
continue to apply in the ensuing arco passage.

Bartók is generally credited with the invention of the
"snap" pizzicato: the string is plucked in such a way that
it rebounds against the fingerboard, adding a percussive
edge to the attack. The symbols he has used for this effect
are:[34]

---

[33]G. Read, loc.cit. It is doubtful that this has any
real audible effect.

[34]Ibid., pg. 400.

Example 4-23

φ   φ

These are placed over or under the note-heads, and apply
only to the notes marked, much as in the left-hand
pizzicato designation. Ligeti, among others, has also used
this device and notation.[35]

    Bartók also asked for pizzicato plucked with the
fingernail, notated with these symbols:[36]

Example 4-24

Ο   Θ

These are applied in the same manner as the above. Ligeti
has invented a symbol which he uses to direct the players
to stop the string with the nail of the left-hand finger
involved.[37]

Example 4-25

⊛

---

[35]G. Ligeti, <u>Apparitions</u>, pg. 9.

[36]G. Read, <u>loc.cit.</u>

[37]G. Ligeti, <u>loc.cit.</u>, vln II, vla., and vc.

Read lists four symbols for the effect obtained by
allowing a plucked string to rebound against a fingernail
of the left hand placed sideways next to the plucked
string:[38]

Example 4-26

O- -O +O Ň

Ligeti has used the second of these, describing the effect
as a "rattling sound."[39] As the sound and technique are
related to the "snap" pizzicato, it seems appropriate that
the notation should also be related (although distinct).
The first three symbols given reflect this; since the
second sign is clear and simple, and because Ligeti has
made use of it in a major work, it is to be recommended.
The use of the fourth symbol is not recommended here because
of the rather widespread use of the letter "N" to mean
"normale" or "naturale."

Read lists three symbols designating pizzicato with
the left-hand finger only lightly touching the string:[40]

---

[38]G. Read, loc.cit.

[39]G. Ligeti, op.cit., pg. 14.

[40]G. Read, loc.cit.

Example 4-27

⌒ ⌒ ⊖

Ligeti has used this effect in <u>Apparitions</u>, notated with the first symbol mentioned above: [⌒ⲓ]; he described the effect as a "wooden sound."[41] This symbol is the simplest of the proposed markings, and is therefore recommended.

Pizzicato may be applied to harmonics, although the effect is unreliable, especially in the upper strings. No special notation is required, the direction "pizz." being simply added to the correct notation of the harmonic (cf. Chapter Two). Pizzicato may also be used with such devices as portamento and behind-the-bridge playing (cf. Chapter Five).

CHAPTER FIVE

SPECIAL EFFECTS WITH PITCHED SOUNDS

"And the late invention they call a wrist-
shake [vibrato] is inteded to that end,
viz: that the sound may waive, but not
stop or vary its tone. . . ."

                              Roger North

                              The Musical Grammarian, 1728

Modern string playing includes the fairly constant use of vibrato; this technique is so basic today that its use need not be directed. Control of vibrato is one way of adding to the colors or timbres available to the composer. Vibrato may be removed from the sound of the strings by the directions "senza vibrato" or "non vibrato";[1] the duration of this effect is sometimes indicated with the horizontal line.[2] A return to normal vibrato may be indicated by "naturale", "ordinario", or their abbreviations (which should be written even if a horizontal line is terminated).[3] Since these directions would also cancel other devices, such as "sul tasto" or "sul ponticello", that might be used along with "senza vibrato", care must be taken to insure that the directions are specific enough. For example, if a passage marked "sul tasto e senza vibrato" is followed by a passage to be bowed normally but still without vibrato, the cancellation "naturale" would be too broad; a clearer direction would be "arco naturale", or, to be very safe, "arco naturale, ma (nondimeno) senza vibrato".

_____

[1]The latter from Concerto for Orchestra by Witold Lutoslawski.

[2]G. Read, Music Notation, pg. 383.

[3]Ibid.

Penderecki has invented notations which indicate specialized applications of vibrato. This symbol indicates "slow, quarter-tone vibrato":

Example 5-1

This sign denotes "molto vibrato", i.e., a very fast (and consequently narrower) vibrato.[4]

Example 5-2

Penderecki has carried this principle further and used a straight line to signify "senza vibrato".[5]

Example 5-3

---

[4]K. Penderecki, *Anaklasis*.

[5]*Ibid*.

In many of his other scores, however, this line indicates only duration, and carries no implications regarding vibrato;[6] Penderecki uses the abbreviation "s.v." in some of these scores for "senza vibrato".[7] This is preferable to the preceding notation because it avoids ambiguity in the use of the straight duration line.

In Remembrances, Arthur Woodbury uses a symbol identical with Penderecki's sign for quarter-tone vibrato for "a note wavering aperiodically as to pitch".[8]

Example 5-4

This is not the same as vibrato, which is regular in oscillation; Woodbury indicates with the following notation, directing that this technique be used only when marked.[9]

---

[6]K. Penderecki, Quartetto, Threnody, et. al.

[7]K. Penderecki, Quartetto.

[8]A. Woodbury, Remembrances.

[9]Ibid.

Example 5-5

Since vibrato is considered a normal element of string tone, it seems superfluous to have a symbol for its use, especially a symbol which lends itself to individual notes rather than entire passages. It is simpler to assume that vibrato will be used when the performer can use it, and to label passages (or movements) where it is to be altered or avoided.

Directions affecting the decay of a sound have been employed by Penderecki. When the tone is to be allowed to "fade away", the symbol [⌒] is used,[10] much as in pizzicato-vibrato notation (cf. examples 4-18, 4-21). Both notations are derived from the tie. When the sound is to be "damped immediately", the symbols [⁄],[11] or [⌇][12] are used. Since only one symbol is needed, and as the latter one greatly resembles the breath-mark,[13] the
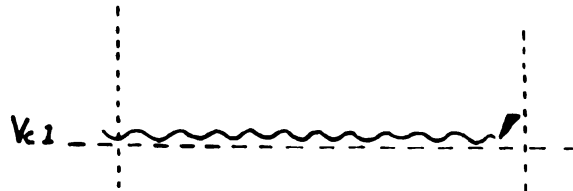
_____

[10]K. Penderecki, Dimensionen.

[11]Ibid.

[12]K. Penderecki, Anaklasis.

[13]The breath-mark is used editorially in string music to indicate a slight lifting of the bow, especially as this affects phrasing.

former sign is the logical choice.   The example below shows

an application:[14]

Example 5-6

David Reck has created notations which distinguish

tonal qualities at very low dynamic levels.   He uses the

symbol [♩] for "finger only", the sign [♩] for

"pitch barely intelligible", and the similar marking [♩]

for "almost inaudible, pitch slightly clearer than ♩ ".[15]

Considering the number of alterations to noteheads which

have already been discussed, it is clearer to use verbal

instructions such as "sotto voce" or "mezza voce" for the

last two of Reck's directions; instructions for "left hand

only" will be discussed on pages 138-139.

Regarding glissando, Willi Apel writes:

> The rapid execution of scales by a sliding
> movement . . .   On the violin the glissando is
> a virtuoso effect produced by a rapid succession
> of minute distinct movements of the hand.   This

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[14]K. Penderecki, Dimensionen, m. 18.   C 1961 by
Hermann Moeck Verlag, used by arrangement with Belwin-Mills
Publishing Corp.

[15]D. Reck, Blues and Screamer.

effect should not be confused with the portamento, which is easily produced by a continuous movement of the hand.[16]

Unfortunately, the distinction Apel draws between glissando and portamento is widely unobserved; furthermore, it is often not possible to make such a distinction.

The cadenza in the first movement of Tschaikowsky's Violin Concerto contains chromatic scales in sixths, which are played as true glissandi:[17]

Example 5-7

Stravinsky uses this notation in Petrouchka:

_____

[16]Willi Apel, "Glissando", Harvard Dictionary of Music, pg. 348.

[17]P. Tschaikowsky, Violin Concerto, first movement, cadenza. This figure is repeated, using minor sixths.

Example 5-8[19]

In many of his other scores, however, Stravinsky uses different notations, such as these two notations from <u>Le Sacre du Printemps</u>:[20]

Example 5-9
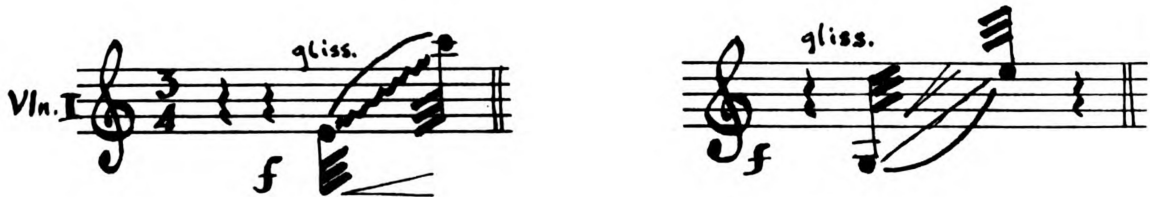
Although both are marked "gliss.", the second figure has a straight line rather than the wavy one used before. Both

---

[19]I. Stravinsky, <u>Petrouchka</u>, "Russian Danse" m. 48. Reprinted by permission of Boosey and Hawkes, Inc.

[20]I. Stravinsky, <u>Le Sacre du Printemps</u>, pp. 62, 65. C 1921, assigned 1947 to Boosey and Hawkes. Used by permission of Boosey and Hawkes, Inc.

of these cover extremely wide ranges very quickly, so that a true scalic realization is impossible; they are performed as _portamenti_. Actually, Stravinsky has used the two notations indiscriminately, obscuring the distinction between _portamento_ and _glissando_.

For purposes of clarity, this discussion will maintain the distinction between _portamento_ and _glissando_, even when the composers in question do not. The following example is marked with a wavy line and the direction "slow glissando".[21]
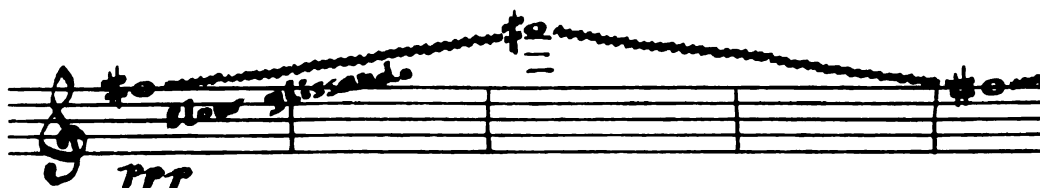
Example 5-10

Taken literally, this would be performed with a series of distinct movements, which, due to the slow rate of the figure, would probably be micro-tonal in size.[22] The next example uses a straight line and gives no other directions; literally, it is a portamento.[23]

---

[21]Ferde Grofé, _Grand Canyon Suite_, pp. 117-18. Copyright 1931, 1932, renewed 1959, 1960 Robbins Music Corporation, N.Y., N.Y. Used by permission.

[22]Recordings made by the composer and with Leonard Bernstein are inconclusive regarding the execution of this passage due to the large number of strings involved.

[23]W. Lutoslawski, _Second Symphony_, pg. 26. Reprinted with kind permission of Edition Wilhelm Hansen, London, Limited.

Example 5-11
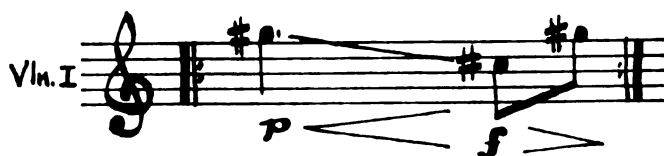
This interesting (and difficult) double-portamento in contrary motion is for solo string bass:[24]

Example 5-12

Normally, glissandi and portamenti must be performed entirely on one string (in the case of double-stops, entirely on the same pair of strings), as changing strings during either of these figures without disturbing the effect is prohibitively difficult.[25] When the lowest note of the figure (which determines which string must be used) is not close to the beginning of the glissando or portamento, as when a long slide or page turn is involved,

---

[24]P. Phillips, Sonata for String Bass, quoted by B. Turetzky, "Notes on Double Bass", Source #1, pg. 65. Used by permission.

[25]It can be done under some circumstances; it can be compared in difficulty to sliding over the break on the clarinet.

the string should be indicated as a courtesy. It is not
required, being rather an editorial marking which could,
along with fingerings and the like, be supplied by the
performer. If the glissando or portamento is to be
performed in the higher positions on a lower string when
the passage could be played in lower positions on a higher
string, this designation becomes necessary. In the
following example, designation of the D-string is a
courtesy:[26]

Example 5-13
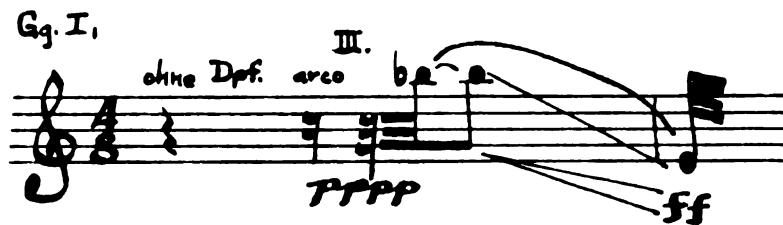
The reason for the marking is that the b-flat^2 lies, on
the D-string, in the ninth position at best, and is there-
fore not readily located; the marking serves as a warning
for the performers.[27]

One problem encountered in writing portamenti and
glissandi is that of rhythm, which frequently amounts to

---

[26]G. Ligeti, Apparitions, pg. 8. Used by permission
of Universal Edition A. G., Vienna.

[27]It may also remind the composer to allow time for
locating the pitch, or to write in such a way that the
players will arrive in the correct location before the
beginning of the slide.

"pacing" the slide. In this case, Lutoslawski indicates

that the portamenti are to arrive on the harmonics just

prior to the beginning of the third bar:[28]

Example 5-14

Xenakis marks the passing of time with stems drawn to the

portamento line; this example is from ST/48-1,240162:[29]

Example 5-15

For long glissandi and portamenti, this is much more

precise than the notation used by Grofé (Example 5-10) and

---

[28]W. Lutoslawski, op.cit., pg. 78. Reprinted with kind
permission of Edition Wilhelm Hansen, London, Limited.

[29]I. Xenakis, ST/48-1,240162, mm. 1-3. C 1967 by
Boosey and Hawkes. Used by permission of Boosey and
Hawkes, Inc.

Lutoslawski (Example 5-14). The notation used by Xenakis

could easily accommodate changes in the speed of the

slide.[30]

Lutoslawki uses a parenthetical note to pace a

portamento, but gives no endpoint:[31]

Example 5-16a
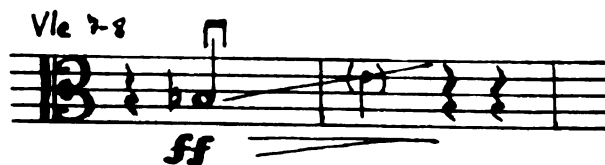
When the endpoint is not precisely defined, the "approxi-

mate pitch" (cf. pages 128-9) notation might be used to

limit the pitch variable somewhat and to define rhythm

more clearly, e.g.:

---

[30]Use of pitch-notated "checkpoints" is valuable for the performer, especially in slides of this length. The logarithmic scheme of pitch locations on a string (see page 8) means that a steady slide with regard to pitch will require an accelerating or decelerating motion with regard to distance. E.g., in a two-octave descending slide, the hand must move twice as fast for the second octave if the two octaves are to occupy equal amounts of time.

[31]W. Lutoslawski, op.cit., fig. 144 ff. Reprinted with kind permission of Edition Wilhelm Hansen, London, Limited.

Example 5-16b

Examples of portamento notation involving parenthetical notes and stems drawn to the portamento line may also be seen in Examples 1-26 and 4-5b. This system of notation is to be preferred, as it is the most accurate.

The left hand can slide through any articulation of the bow; portamento is the more likely technique when any but legato bowing is used, as distinct left-hand movements would be nearly impossible to coordinate with bowed articulations.[32] The effect, however, is that of a glissando. In the following example, a slide is articulated by a tremolo:[33]

Example 5-17

Vlni.

---

[32]It is not completely impossible, but has severe speed limitations.

[33]W. Lutoslawski, op.cit., pg. 41. Used by kind permission of Edition Wilhelm Hansen, London, Limited.

In the next case, the articulation is in sixteenth-notes:[34]

Example 5-18
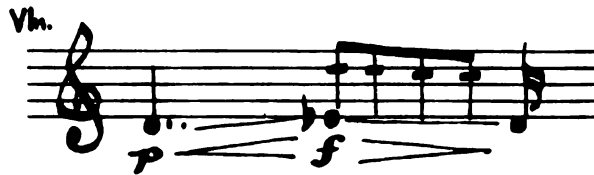
Penderecki here writes a slide articulated with irregular tremolo col legno:[35]

Example 5-19

Lutoslawski writes the rhythm of the bowing above the staff for this slide from Concerto for Orchestra:[36]

---

[34]W. Lutoslawski, String Quartet, pg. 22. Used by permission of Edition Wilhelm Hansen, London, Limited.

[35]K. Penderecki, Quartetto, sec. 23-25. Copyright 1963 by PWP, Warsaw, used by arrangement with Belwin-Mills Publishing Corp.

[36]W. Lutoslawski, Concerto for Orchestra, pg. 23. Copyright 1956 by PWP, Warsaw, used by arrangement with Magnamusic-Baton, Inc.

Example 5-20
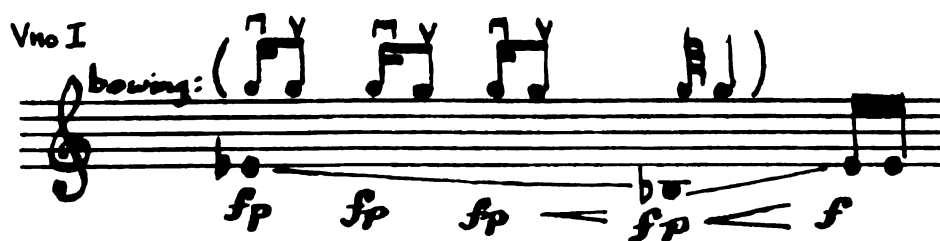
The following slide from the same work adds a minor third trill to the slide:[37]

Example 5-21
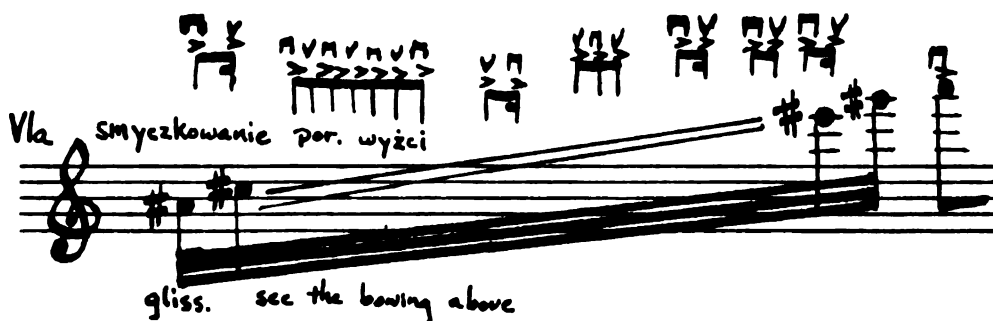
In the following passage, Penderecki has used quarter-tone vibrato with the first and third portamenti; the second is to approximate the shape of the line:[38]

---

[37]*Ibid.*, pg. 58.

[38]K. Penderecki, *De Natura Sonoris*, pg. 31. C 1967 by Hermann Moeck Verlag. Used by arrangement with Belwin-Mills Publishing Corp.

Example 5-22

Endpoints for the portamenti would be helpful; after all
the beginning pitches are specified to a quarter of a
tone.

This particular effect from Emanations is obtained,
as directed in the composer's footnote, ". . . by turning
the tuning peg; speed and interval of glissando ad lib."[39]

Example 5-23
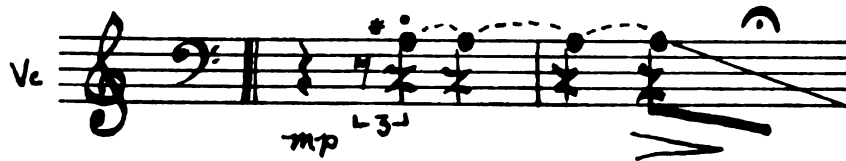
Glissandi and portamenti may be used with pizzicato,
but the range is limited by the rapid decay of the tone.
Gardner Read suggests the following notations:[40]

---

[39]K. Penderecki, Emanations, pg. 32. C 1960 Hermann
Moeck Verlag. Used by arrangement with Belwin-Mills
Publishing Corp.

[40]G. Read, op.cit., pg. 400.

Example 5-24

All of these obscure the distinction between portamento and glissando by using the direction "gliss." with the straight (portamento) line. The direction "gliss." should be used only when the pitches are written out, or with the wavy line (cf. Examples 5-8, 5-10). The direction "port." should be used with the straight line (cf. Example 4-17). If a limit-tone is desired, it is most clearly expressed by notating the pitch as in one of the ways discussed previously; the last of Read's notations, therefore, should be used only when there is no limit on the slide. This example from Apparitions is actually a portamento:[41]

Example 5-25

---
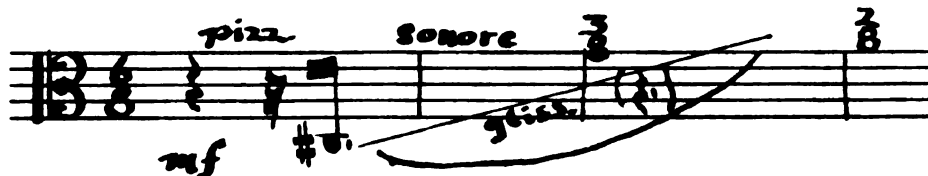
[41]G. Ligeti, op.cit., pg. 6-7. Used by permission of Universal Edition A. G., Vienna.

The composer's instructions read: "Pizzicato glissando. Press the finger firmly to the end. Quick glissando without upper limit-tone: do not stop until the sound has completely died away."[42]

The following is also a type of portamento:[43]

Example 5-26

The instructions read: "this pizz. gliss. is to be performed by turning the peg. (The string is first to be turned a little lower, then raised till approximately till the note in waches.) [sic] Lubricate the peg before performance."[44]

Stravinsky is apparently the inventor of the "harmonic glissando". The following passage occurs in the Fire-bird Suite, with a footnote reading, "en l'effleurant du doigt,

---

[42]Ibid.

[43]Ibid., pg. 27.

[44]Ibid.

les sons harmoniques ques notes se prodiurant alois
automatiquement."[45]

Example 5-27
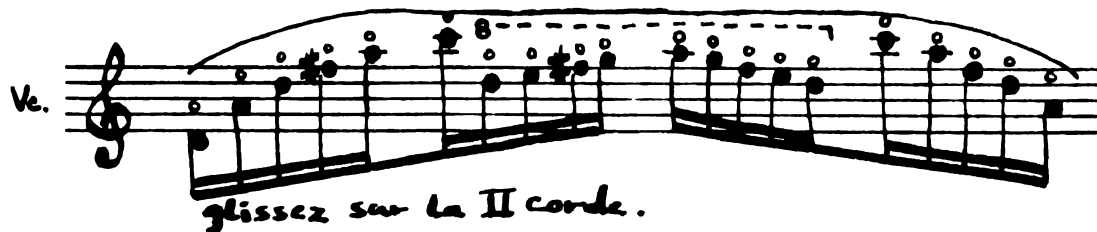
The motion involved is that of a portamento, but the term
"glissando" is more apt because the result is a series of
distinct (although often not adjacent) tones. In the
above case, Stravinsky has written to the twelfth
partial; the seventh partial (c^3) will be somewhat flat,
and the eleventh partial (written here as g^3) will sound as
a very flat g-sharp^3.[46] For the violas, he has written to
the ninth partial:[47]

---

[45]I. Stravinsky, Firebird Suite, pg. 3. Used by
permission. The footnote translates "in skimming with the
finger, the harmonics notated will be produced almost
automatically."

[46]W. Apel, "Harmonic Series", Harvard Dictionary of
Music, pg. 64.

[47]I. Stravinsky, Le Sacre du Printemps, pg. 9. C 1921,
assigned 1947 to Boosey and Hawkes. Reprinted by per-
mission of Boosey and Hawkes, Inc.

Example 5-28

Stravinsky's notation includes slurs and an indication of string, as well as the direction "glissando".

An interesting accoustical phenomenon is that, while the notes written are the tones of the harmonic series, they are not all the pitches which actually sound. The extra tone results from the sounding of a usable node while sliding between the second and third partials:
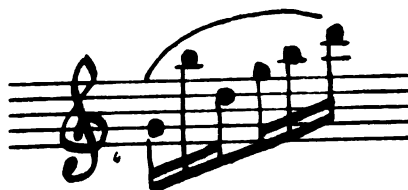
Example 5-29a
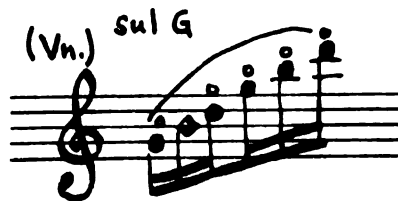
This results in the following sound:

Example 5-29b

Other nodes are, of course, crossed during the slide, but they involve harmonics so high in the series that they very seldom sound. Stravinsky's notation, which ignores the extra node of the fifth partial and uses only the tones of the harmonic series in order, has become fairly standard and is adequate.

Thurston Dart has noted the use of the symbol [⅄] for "indeterminate or semi-determinate pitch."[48] Lukas Foss suggests the use of "moments of incomplete notation" in composition, giving this example:[49]

Example 5-30a
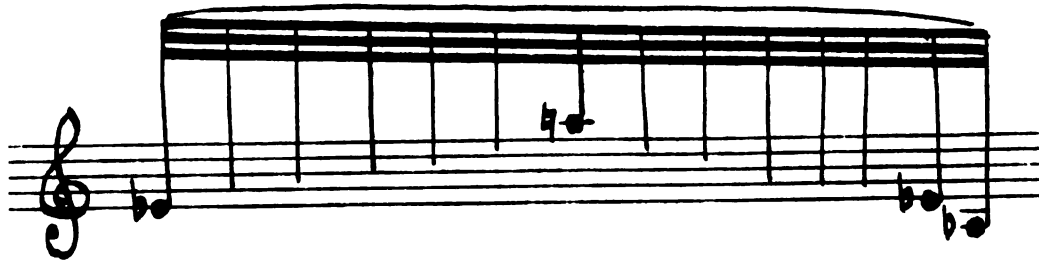
Headless stems, however, have also been used for repetition of previous pitch (cf. pages 23-4) and for percussive effects (cf. Chapter 6). The use of x-note-heads is therefore less ambiguous:[50]

---

[48]T. Dart, "Notation", <u>Grove's</u> <u>Dictionary</u>, VI, pg. 122.

[49]Lukas Foss, "The Changing Composer-Performer Relationship", <u>Perspectives</u> <u>of</u> <u>New</u> <u>Music</u>, Spring 1963, pg. 51. Used by permission.

[50]The use of headless stems for repetition of previous pitch has been discouraged (Chapter 1) to make the symbol unambiguous in denoting percussive effects (Chapter 6).

Example 5-30b
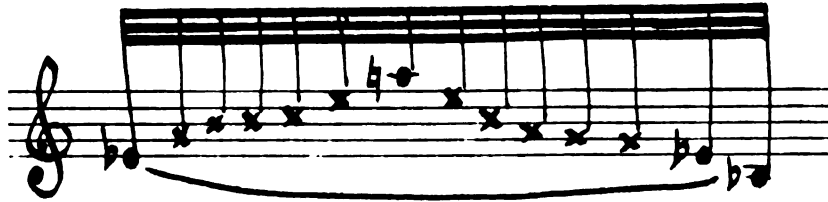
Gardner Read lists these current notations for

"highest note" (in reality, "a very high note"):[51]

Example 5-31

Of these, the first resembles Bartok's symbol for

arpeggio direction too closely for clarity (cf. Example

4-13), and the third (x-note-head) is also used for

"semi-determinate pitch", which is a slightly different

concept. Penderecki has used the triangular symbol,

usually placed well above the staff.[52] He specifies the

string when it is other than the highest, and has included

a means of notating very high (indeterminate) double

stops:[53]

---

[51]G. Read, op.cit., pg. 405.

[52]K. Penderecki, Capriccio per Siegfried Palm.

[53]Ibid. Copyright 1969 by B. Schott's Söhnne, Mainz; used by permission.

Example 5-32
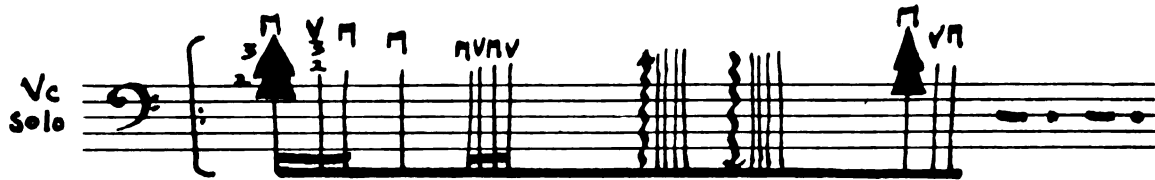
Ligeti has chosen to use the x-note-heads, qualifying them by adding the connotation of "highness" to their meaning:[54]

Example 5-33

The addition of this connotation to the meaning of the symbol negates its usefulness in the semi-determinate notation of pitches in other ranges; therefore, the separate symbol for extreme but indefinite height is a necessary one. The triangular note-head should be used exclusively for indefinitely very high tones, and the symbol [⨉] should be reserved for notating approximate pitch in all registers.

---

[54]G. Ligeti, op.cit., pg. 10. Used by permission of Universal Edition A. G., Vienna.

Penderecki has asked, in his <u>Capriccio</u> <u>per</u> <u>Siegfried</u>
<u>Palm</u>, for this unusual technique:[55]

Example 5-34

Bogen unter die Saiten vor dem Steg

The verbal direction translates "Bow under the strings in
front of the bridge." The last part of this direction is
unnecessary, because the pitches other than open strings
that are given indicate unquestionably that the double-
stop is to be played in front of the bridge; furthermore,
playing in front of the bridge is normal, and playing
behind the bridge would require special instructions
(cf. Examples 5-35 and 5-44). The Italian equivalent is
"arco sotto della corde". Because of the time required
for placing the bow under the strings and for removing it,
there is no need to condense these directions by
abbreviation, nor is there reason to invent a special
notation for this effect. The directions mentioned above

---

[55]K. Penderecki, <u>op.cit.</u>, pg. 3. C 1969 B. Schott's
Söhnne. Used by permission.

are adequate; they would be cancelled by "naturale",

"modo ordinario", "arco naturale", etc.

Villa-Lobos has asked performers to play between the

bridge and the tailpiece (behind the bridge - See Figure

6-1), which he notates in two ways in Amazonas (1917):[56]

Example 5-35
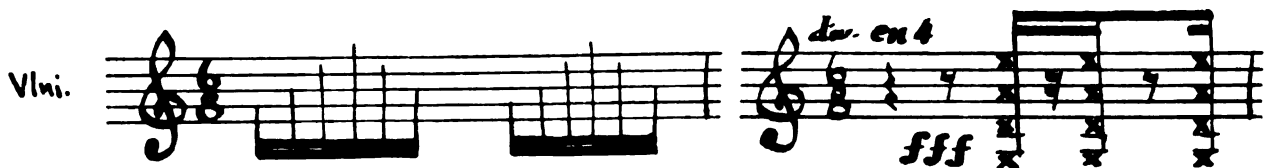
These occur simultaneously in some places. The headless

stems are not drawn in such a way that any one of them

would suggest a particular string. Gardner Read includes

these additional, similar notations:[57]

Example 5-36

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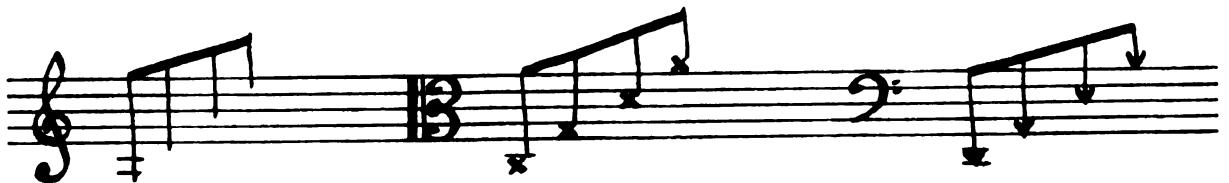
[56]H. Villa-Lobos, Amazonas, pg. 27. Reprinted with permission of Editions Max Eschig, Paris.

[57]G. Read, op.cit., pg. 406.

In the following solo violin cadenza, Grofé places the
x-note-heads in such a way that it is impossible to deter-
mine which strings are to be played "back of bridge":[58]

Example 5-37

As observed before, the symbol [𝅘𝅥] is associated with
semi-determinate pitch notations, and is inappropriate for
this purpose; headless stems, being associated with
percussive effects (cf. Chapter Six) are also ambiguous.

Penderecki has invented a symbol for behind-the-
bridge playing which is applicable to graphic as well as
to conventional systems of notation:[59]

Example 5-38a

---
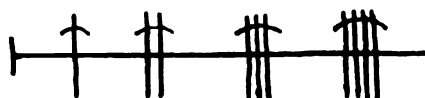
[58]F. Grofé, _Grand Canyon Suite_, pg. 53. Copyright C
1931, 1932, renewed 1959, 1960 Robbins Music Corporation,
N.Y., N.Y. Used by permission.

[59]K. Penderecki, _op.cit._, and in many other
compositions.

The number of vertical lines corresponds to the number of strings to be played; the strings are often specified by letter names.[60]

Example 5-38b

↑   ↟   ↑
A   DG   E

The following symbols refer to "rapid arpeggios between bridge and tailpiece (Direction is indicated)."[61]

Example 5-38c
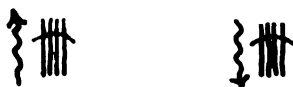
An example from Penderecki's Capriccio per Siegfried Palm demonstrates these symbols in context:[62]

---

[60]Ibid. The strings are not always specified in Threnody, however, and never in the Capriccio per violino e orchestra.

[61]Ibid.

[62]K. Penderecki, Capriccio per Siegfried Palm, pg. 2. C 1969 B. Schott's Söhnne. Used by permission.

Example 5-39
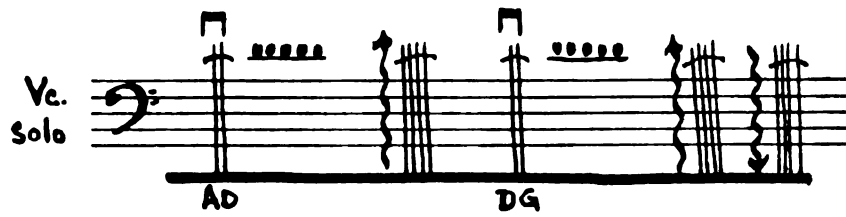
This symbology has, however, two major shortcomings. First of all, the placement of two vertical lines (stems) side by side to notate separate pitches which are to sound simultaneously confuses the normal axes of notation, in which the horizontal axis is time, and the vertical axis is pitch. Secondly, the fact that the symbols themselves carry no indication of pitch (string) necessitates the use of letter names, which is a cumbersome practice.

Mario Davidowsky has used variants of the "Arco" and "Pizzicato" directions to indicate execution behind the bridge: Arco and Pizz. mean "play behind the 'ponticello' on the written string." The string is indicated with the normally-written pitch of the desired open string.[63] This is a more workable solution than the foregoing; it does not involve symbols which have other meanings, it is concise, and it is easily cancelled by "naturale" or with ordinary "pizz." and "arco" markings.

_____

[63]M. Davidowsky, Synchronisms No. 2.

An even briefer device has been used by H. Owen Reed in his chamber dance-opera <u>Living</u> <u>Solid</u> <u>Face</u>; the symbol used by Penderecki [⸸] has been applied in the manner of the "snap" pizzicato symbol (cf. page 104).[64]

Example 5-40

The advantages of this procedure are its brevity, and the fact that it applies to one note only (unless extended with the broken horizontal line), eliminating the need for cancellation. Using this device, the passages quoted from Penderecki and Grofé (Examples 5-39 and 5-37) would read as follows:

---

[64]H. Owen Reed, <u>Living</u> <u>Solid</u> <u>Face</u>. Used by permission of the composer.

Example 5-41

Example 5-42

(The strings for the Grofé cadenza have been chosen arbitrarily, as they are unspecified in the original.) Because of its clarity and simplicity, this notation is recommended for general use.

Gardner Read lists the following notations for "pizzicato behind the bridge":[65]

Example 5-43

---
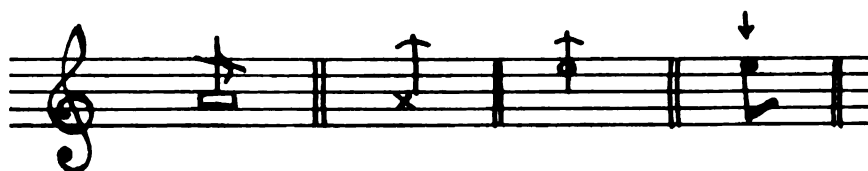
[65]G. Read, loc. cit.

In view of the conclusions reached in the foregoing discussion, these symbols may be dismissed as duplications of effort or as unnecessary inventions.

Tapping (not plucking) the strings behind the bridge has been used by Penderecki; he uses the instruction "con dita" in conjunction with his own behind-the-bridge notation:[66]

<div align="center">Example 5-44</div>
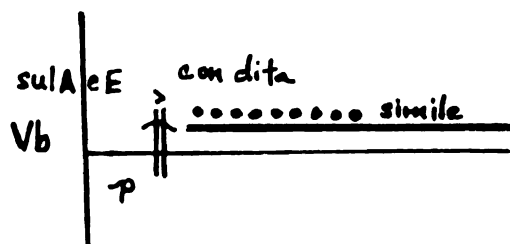
The figure is given an explanation in a footnote. The verbal direction is clear and brief, and could be applied equally well with the recommended "behind-the-bridge" notation (cf. Example 5-40 to 5-42).

A similar device involves the sound of the left hand fingers stopping the strings as in normal passage work, but with no other bowed or plucked articulation. Penderecki uses this sound in his Capriccio per Siegfried Palm, writing the notes as pitch-approximations with the direction "senza arco".[67] This direction is clear enough

---

[66]K. Penderecki, Polymorphia, pg. 12; also in Flourescences.

[67]K. Penderecki, Capriccio per Siegfried Palm. He uses headless stems; x-note-heads are preferable (cf. pp. 128-9).

that it should need no further explanation. Ligeti also
has used this device, which he marks with a special
symbol:[68] [⊖]. This notation is used in the manner of
the "snap" pizzicato sign. This notation, however, is
inadequate for the extended passages which can be played
in this way. Penderecki has used this technique in his
Quartetto, combining an unarticulated trill with a
portamento:[69]

Example 5-45

_____
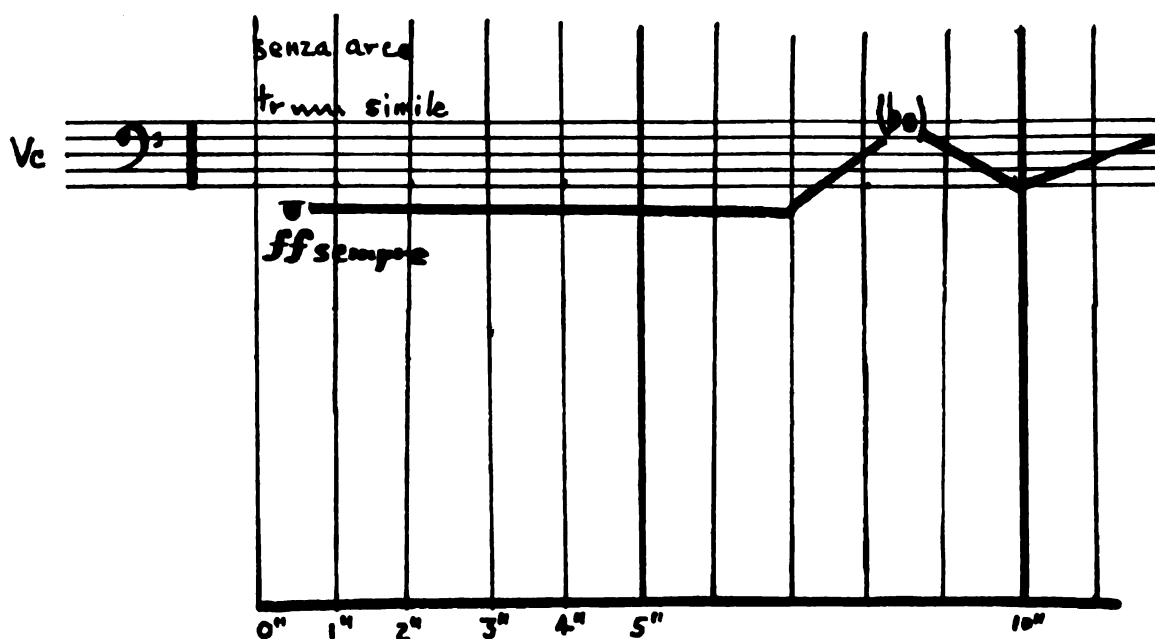
[68]G. Ligeti, op.cit., pg. 5.

[69]K. Penderecki, Quartetto, sec. 1-10. Copyright
1963 by PWP, Warsaw; used by arrangement with Belwin-Mills
Publishing Corp.

The only mechanical means of altering string tone now
in common use is the mute.[70] Passages to be muted are
marked at their beginning with the direction "con sordino",
which is sometimes abbreviated "con sord." or "sord." The
cancellation, which appears at the beginning of the next
passage to be played without mute, is "senza sordino". The
plural of sordino is sordini. Time must be allowed for
the placement and removal of mutes; when long rests are
available, advance warning is often given by the directions
"meta sordino" (put on mute) and "via sordino" (remove
mute). While German and French terminology are commonly
encountered, the Italian phrases are preferred. An
editorial marking has evolved among string players as a
shorthand means of indicating placement and removal of
mutes:[71]

Example 5-46

⊓ con sordino;   ⊔ senza sordino
  meta sordino   via sordino

---

[70]Electronic means have been invented, but are still
somewhat experimental, and are not nearly so common as
the mute. Electrification will not be discussed here
because the problems of notating electrified effects
exceed the application of electronics to the string
family. For compositions using electrified stringed instru-
ments, see George Crumb's Black Angels and Yoshi
Ichiyanagi's Appearance.

[71]The symbol seems to have become universal; the parts
for Josef Grešak's Améby arrived in East Lansing for the
work's U.S. premiere bearing these markings - penciled in
by European performers.

Because of its clarity and simplicity, this sign is worthy
of general use.

CHAPTER SIX

NOISE AND PERCUSSIVE EFFECTS

"The [second] violinists are to tap their
stand-lamp-shades with their bows"

Giaccomo Rossini

Overture to <u>Signor</u> <u>Bruchino</u> (1813)

Before any discussion of noise and percussive effects can be meaningful, a common terminology must be agreed upon regarding the various parts of stringed instruments and the bow. The set of terms accompanying the following diagrams represents the most precise terminology in English and Italian:[1]

	English	Italian
a	table	il piano armonica
b	ribs	le fasce
c	back	il fondo
above, collectively:	body or sound body	la casa armonica or il corpo risonanza
d	fingerboard	il tasto
e	neck	il manico
f	tailpiece	la cordiera
g	bridge	il ponticello
h	edge	il orlo

---

[1]G. Hayes, "Violin Family", Grove's Dictionary, VIII, pp. 806-811. There are many variant terms for many of the parts. Many of the Italian terms have been supplied by Mr. Franco Gulli of Indiana University. Only parts which have been utilized (to the authors knowledge) in modern composition have been included in this list.
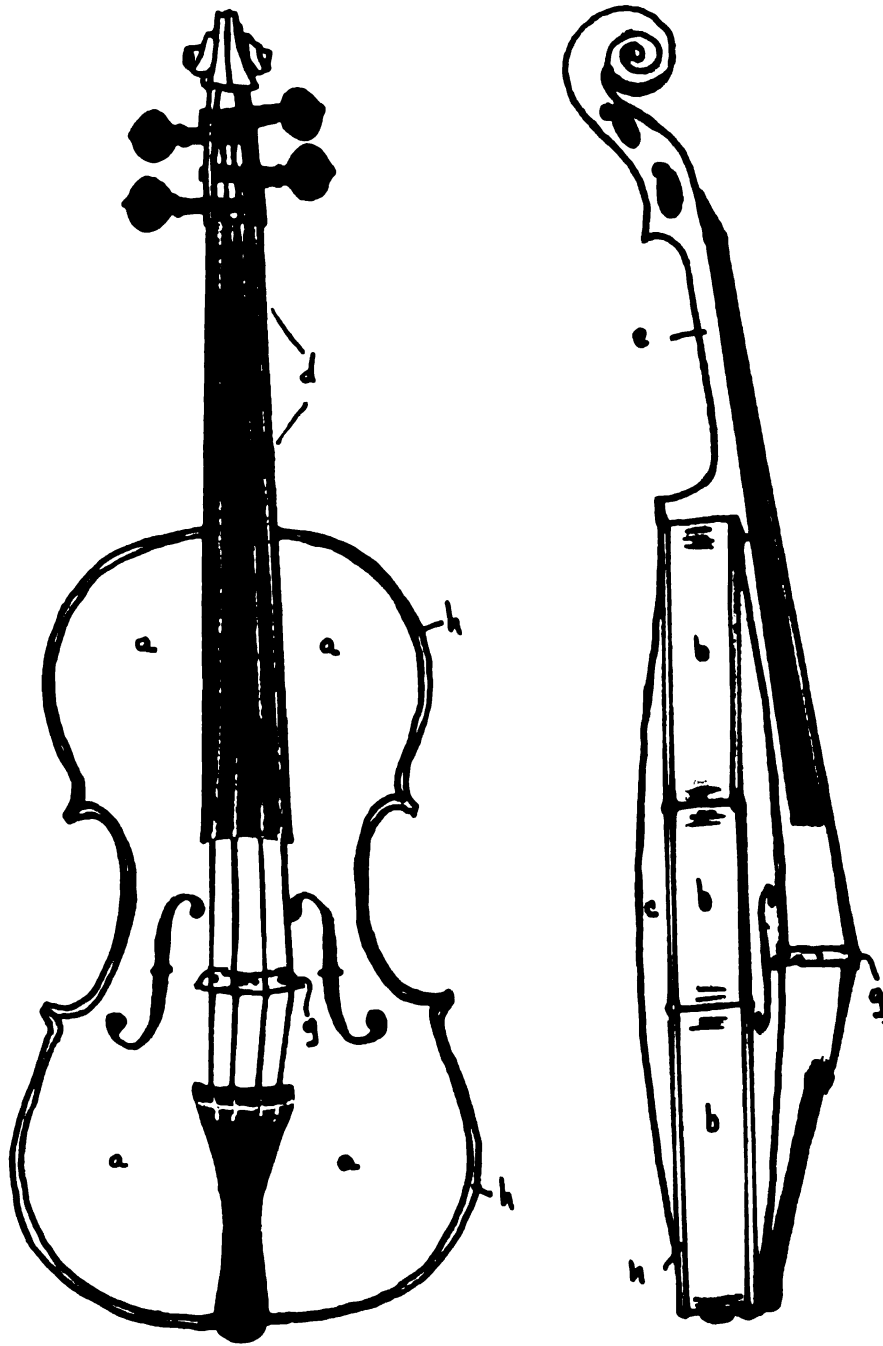
Figure 6-1

d	fingerboard	il tasto
e	neck	il manico
i	scroll	il riccio or la chiocciola
k	peg, pegs	il pirolo, i piroli
l	saddle (nut)	il capotasto

	bow	l'arco
m	stick	l'arco or la bacchetta
n	tip	punta (d'arco)
o	frog	la tallone
p	hair	dei crine
q	screw	la vite

	music stand (not shown)	il leggìo

Figure 6-1 (Cont'd)
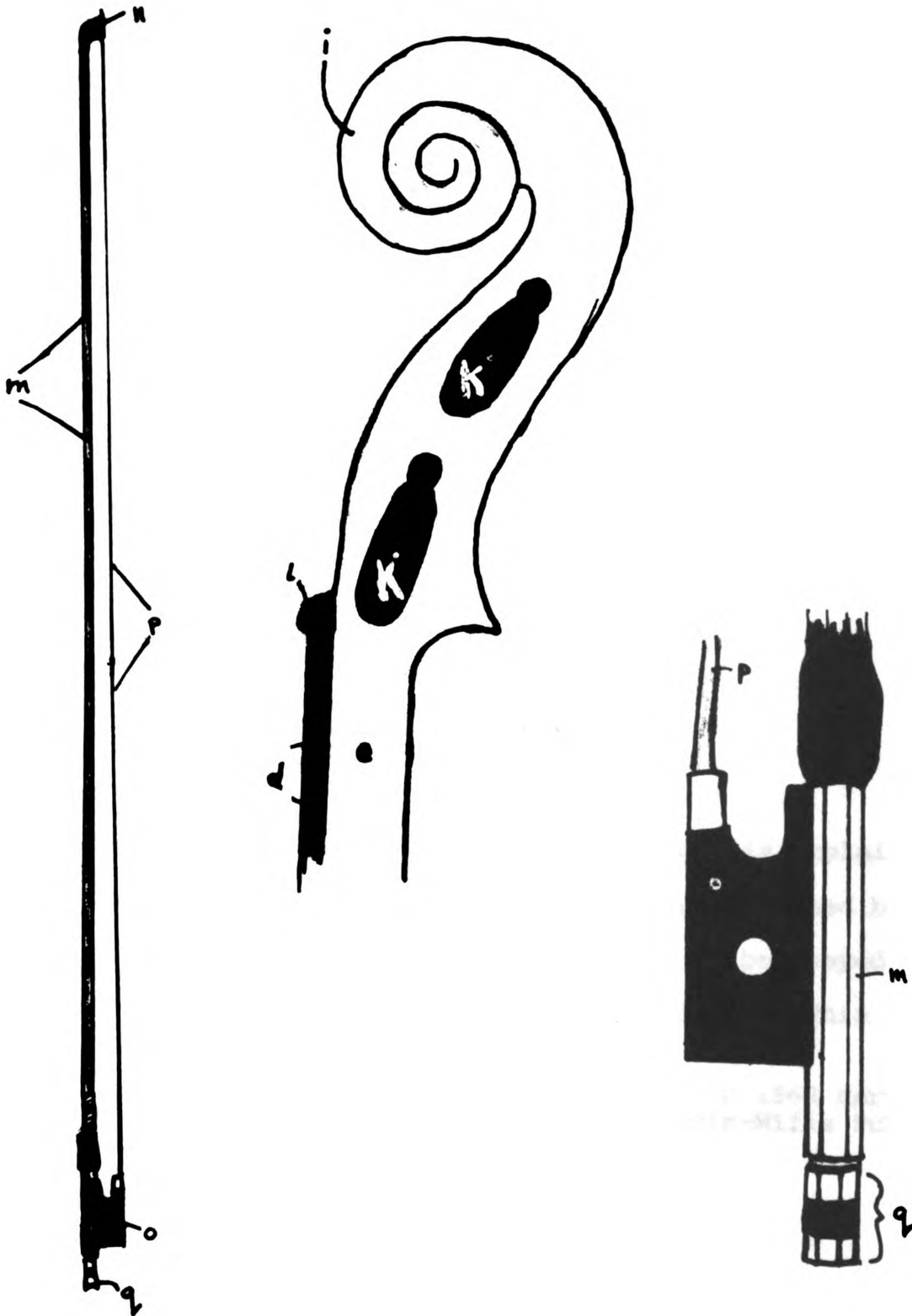
Stringed instruments can produce sounds of indefinite pitch (or sounds which have uncontrollable pitches), which may be classified as "noise". These instruments are also capable of non-pitched, or "percussive" sounds. The wide variety of pitches, timbres, and articulations used by the string family even in traditional music has given rise to a highly complex written language, and the addition of these new categories of sound to the corpus of technique has taxed notation considerably.

In Flourescences, Penderecki calls for "Bowing the edge of the soundboard [i.e. the table of the instrument, on the edge]", notated:[2]

Example 6-1

arco

No distinct symbol is employed; the technique is explained in a footnote.[3] This symbol [↑] has been invented by Penderecki for "play on bridge"[4] or ". . . to be played on the bridge rectangular to its right-hand edge."[5] This last

[2]K. Penderecki, Flourescences, pg. 21. C 1962 Hermann Moeck Verlag. Used by arrangement with Belwin-Mills Publishing Corp.

[3]Ibid.

[4]K. Penderecki, Threnody.

[5]K. Penderecki, Flourescences.

direction is possible only on the 'celli and bassi; in the

Threnody it is understood to mean this, although the

directions are not as specific.[6] For playing on the tail-

piece (not striking it), Penderecki has used the symbol

[✠].[7] Both the bridge and tailpiece symbols are written

above the staff when a staff is present; they are also

commonly used with a single-line style of notation. All

three of these produce sounds containing a number of

frequencies not in the same harmonic series, and the pitch

is not subject to control by the player.

Noise effects produced without the bow include this

device from Flourescences:[8]

Example 6-2
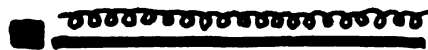
The explanatory footnote reads, "rub soundboard with open

hand". ("Soundboard" might mean either the table or the

back; the term denotes no part of a stringed instrument

in English terminology - cf. Figure 6-1). The result could

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[6]K. Penderecki, Threnody. Ascertained from perform-
ance by the Warsaw Philharmonic Orchestra.

[7]K. Penderecki, Threnody, and other works.

[8]K. Penderecki, Flourescences, pg. 21. C 1962 Hermann
Moeck Verlag. Used by arrangement with Belwin-Mills
Publishing Corp.

be a gently "whooshing" sound, or, if enough friction is
developed (an easy matter), a sqeaking noise. Penderecki's
directions need to be more clear about the result desired,
so that the proper technique can be applied. The following
effect is akin to the percussive sounds: Penderecki's
directions are "strike string with open hand or fingers";
the symbol is the headless stem:[9]

Example 6-3
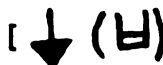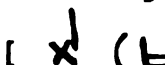
Percussive effects produced with the bow include the
tapping of the stand (desk) with the bow, striking the
table or back with the frog or screw, striking the saddle,
and striking "wood" (unspecified location). Penderecki
notates striking the stand with the symbol [ ].[10]
He uses a similar symbol for striking "the upper sounding
board [table] with the nut [screw] or heel [frog]":[11]
[ ]. Gardner Read lists an additional symbol:[12]

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[9]Ibid.

[10]Ibid.

[11]Ibid.

[12]G. Read, Music Notation, pg. 407.

[ ]. Penderecki's symbol is inadequate because the slashes through the stems have long carried the meaning "sixteenth-notes"; the performer will automatically think that, whatever the stems mean. For striking the saddle with the bow, Reck uses the symbol[13] [ ]. This symbol resembles his own quarter-tone notation (cf. Example 1-20) too closely for clarity in Blues and Screamer, and resembles Penderecki's notation for "lowest tone" too greatly for use elsewhere. For striking unspecified "wood", Reck uses the symbol:[14] [ ]. The x-note-head has already been discussed and has been recommended only for use in the semi-determinate notation for pitch (cf. pages 128-129).

Read lists five symbols for tapping the "frame (side, back, etc.)" i.e., the body of the instrument with the fingers:[15]

Example 6-4

---

[13]D. Reck, Blues and Screamer.

[14]Ibid.

[15]G. Read, loc. cit.

The following example, from Ligeti's Apparitions, is explained in a footnote: "strike the case [sic] of the instrument with the finger":[16]

Example 6-5
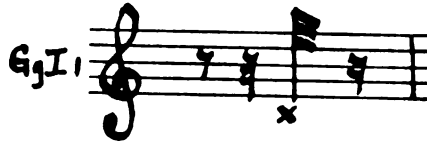
This is the same symbol that the composer has used in the same work to signify "indefinite pitch" (cf. Example 5-33); only the explanatory footnotes allow the players to differentiate between the uses of this sign. The third and fifth of the symbols in Example 6-5 resemble cluster notations too greatly for clarity. The fourth symbol has been used by Penderecki for tapping the table with parts of the bow (cf. page 149); this creates ambiguity beyond that mentioned in regard to the slashes in the stems.

Penderecki uses the symbol [⅄] for "knock on the bridge with the finger".[17] Harold Budd, in III for double ensemble, uses x-note-heads for "knock on body of bass".[18] The objections to overuse of this notation have already

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[16]G. Ligeti, op.cit., pg. 7. Used by permission of Universal Edition A. G., Vienna.

[17]K. Penderecki, Capriccio per Siegfried Palm.

[18]Harold Budd, III, for double ensemble.

been discussed. Jere Hutcheson, in <u>Transitions</u>, uses
headless stems for knocking with the knuckles on the table
of the instrument.[19]

It is clear from the foregoing survey that many
confusions and duplications exist in the notation of the
noise and percussive sounds. A complete notation for these
sounds, avoiding duplication and ambiguity, must be the
result of careful balance between verbal instructions and
abstract symbols. The percussive sounds have little or no
sustaining power; only the noise effects require a notation
capable of indicating variable durations. Therefore, it is
recommended that the following symbols be retained with
their original meanings:[20]

Example 6-6

bowing the side of the bridge

bowing the tailpiece
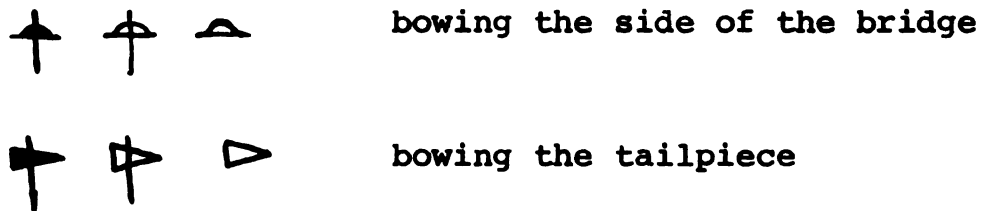
Other noise effects are to be notated with square note-
heads placed on the center line of the staff (when a staff
is present); in cases of divisi, two parts may be written

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[19]J. Hutcheson, <u>Transitions</u>.

[20]The symbols are the inventions of Krzysztof
Penderecki.

on a single staff with the note-heads placed on the second and fourth lines.[21]

Example 6-7a

These notations must be accompanied by verbal instructions specifying the technique involved or the result desired. These directions would be placed above the staff, except in divided passages, when directions would be required above and below the staff. Divisi into more than two parts would require additional staves. As in conventional string-playing, it will be assumed that the bow will be used unless some other indication is given. The following verbal instructions are recommended for accompanying the square-note notation:[22]

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[21]These symbols resemble the lunga and maxima note-values used during the Renaissance and in earlier music. These note-values are used only extremely rarely today. Context and the presence or absence of verbal noise-effect instructions will readily determine whether the shapes are being used in the Renaissance sense or in the manner suggested here for the notation of noise effects.

[22]Italian equivalents are included and strongly recommended in the interest of promoting common understanding on the subject (cf. pp. 4-5). Mr. Franco Gulli of Indiana University and Mr. Leonard Falcone of Michigan State University have been of invaluable assistance in formulating Italian equivalents for these directions.

Example 6-7b

Bowing the edge (of table, back)	edge (of table)	sul orlo (della piano armonica)
Bowing the scroll:	scroll	sul riccio
Bowing the peg(s):	peg(s)	sul pirolo, sui piroli

Following are illustrations of the recommended notations for the bowed noise effects:

Example 6-8

For the non-bowed noise effects, the square-note notation is recommended to show rhythm or duration. Penderecki's symbol for rubbing the table or back may be substituted for verbal directions. The whistling sound produced by lightly rubbing the strings lengthwise is indicated by the direction "fréga le corde (leggiero)"; an individual string may be specified: "fréga leggermente la

II^a corda". Recommended notations for the non-bowed noise effects follow:[23]

Example 6-9

a.
(preferred)

b.

c.

Percussive effects, having no appreciable or controllable duration, can best be notated with headless stems, accompanied by a verbal direction specifying what is to be struck and, in most cases, what implement is to be used. For slapping the strings against the fingerboard, the direction "schiaffo le corde (contr' il tasto)" is sufficient, as the direction "slap" (schiaffo) indicates the open hand as the implement. For tapping various parts of the instrument with the fingers, the direction "con

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[23]The use of the hand rather than the bow is implicit in the verb "to rub" (fregáre). When, because of circumstance, this might not be clear to the performer, the use of the hand might be specified (the Italian is "il mano"); use of any other implement must be specified. Caution must be exercised, however, in choosing an implement other than the hand, as damage can result from some of these techniques (cf. pp. 157-158).

dita" (with the fingers) will, with the headless stems,
clearly indicate a tapping technique. The Italian verb for
tapping, "battere leggermente" may be used with the previous
direction. For knocking on various parts of the instrument
with the knuckles, the Italian verb "picchiare" (knock) is
sufficient. Use of the fingernails is indicated with the
word "unghia" (fingernail - plural is "unghie"). Parts of
the bow are indicated in like manner (cf. Figure 6-1).
The stick may be indicated by "l'arco" or, more specifically,
by "la bacchetta". The frog is "la tallone", and the screw
is "la vite". Following is a list of recommended notations
for the percussive effects:[24]

Example 6-10

a.

b.

c.

---

[24]Many of the Italian phrases used here have been
suggested by Mr. Leonard Falcone.

Example 6-10 (Cont'd)

d.

e.

Although this list is by no means exhaustive, it does illustrate formulae which can help to clarify the notation of the percussive effects. Certainly, composers will want to explore this area further, and will indubitably experiment with target-implement combinations which have not been mentioned here. There are, however, certain limitations which must be considered. Knocking or tapping the body of a stringed instrument, if not violent, will cause no damage; it is, in fact, one means of checking the seams for openings. Tapping the bridge, on the other hand, is a very delicate matter. Such tapping with anything other than the fingers is to be considered risky, and treated accordingly. Bowing the edges will cause no structural damage, but will implant rosin in the varnish, which will mar the appearance of the instrument; further-more, the condition of the varnish may affect the tone of the instrument. Tapping the body of the instrument with hard objects such as the bow, the screw (cf. page 149) or the fingernails can also mar the appearance; heavy beatings

can cause cracks, or such internal damage as loosened
linings or displaced soundposts. Ligeti's advice that
string players equip themselves with old or inexpensive
bows for certain particularly violent <u>col</u> <u>legno</u> passages
in his <u>Requiem</u>[25] is a recognition of the punishment that
certain modern playing techniques can deal to stringed
instruments.

Miscellaneous effects, such as rattling a pencil
between the strings,[26] which have not become widespread,
will not be discussed at length or given a suggested
notation. Composers using such devices should provide
clear verbal instructions limited to the Italian, French,
German, or English languages; a translation into at least
one more of these (preferably Italian) is strongly
advised. Any new symbol which may be invented should con-
form to the system of notating noises and percussive
sounds presented in this chapter, so as to avoid duplica-
tions of and conflicts with other areas of notation. A
careful balance between verbiage and abstract symbology
must be maintained; the current trend is to invent a new
symbol for each new effect, only to find that several new

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[25]G. Ligeti, <u>Requiem</u>, introductory remarks. The
passage referred to is in the third movement.

[26]Barney Childs, <u>Jack's</u> <u>New</u> <u>Bag</u>. The score is nearly
entirely verbal. The directions call for the violist to
rattle a pencil between the strings behind the bridge.

symbols will be invented for the same effect. The system proposed here, which symbolizes categories of sound (noisy and percussive effects) and specifies techniques verbally, is designed to avoid duplication and confusion while leaving room for growth.

CHAPTER SEVEN

ORCHESTRAL WRITING

"Four violins alone . . . the remainder of the violins divided into four equal groups."

Richard Wagner

Prelude to Lohengrin (1849)

In orchestral writing, a composer can use the body of strings as a whole, or in any division or subdivision he chooses. The division of the violins into two sections has long been an established convention, and Wagner, among others, exploited the possibilities of subdividing all of the conventional string sections into yet smaller groups.

The strings are grouped by genre: the violins (usually in two sections), the violas, the 'cellos, and the basses. Subdivision of a section is accomplished by writing two or more lines for that section, along with the direction "divisi" (Italian for "divided"). The number of subdivisions may be indicated in the direction, e.g., "divisi a 3", "divisi a 6". This is especially useful when the number of subdivisions is not readily apparent in the parts, as, for example, when one or more of the subdivisions is to play double-stops. In general, not more than two divisions can be clearly written on one staff, divisi into more than two groups most often requiring additional staves. In homorhythmic passages, however, it is sometimes possible to write more than two parts on a staff, using chord notation much like that found in piano music (cf. Example 5-14). It is, neverthe-less, clearer to use additional staves. When artificial harmonics or chords are involved, or if the parts cross,

separate staves should be employed for each subdivision (cf. Example 2-21b). (Parts can be separated by stem direction, but this is more confusing than the use of multiple staves, and should be avoided except for very brief intervals.) Divisi passages are terminated by the direction "tutti" or "Tutte", or by directions indicating a different number of divisions.[1]

A solo player is indicated by the direction "solo". If the other members of the section are also to be playing at the time, their part (or parts) should be written on a separate staff (or separate staves), and marked "gli altri" (the others). "More than one soloist" is designated with the number of players desired, e.g., "due soli" (two soloists).[2] When a solo passage has ended and the soloist is to rejoin the section, the directions "Tutte" or "cogli altri" are used.[3]

Use of two modes of articulation with respect to one line is notated as a kind of divisi, using double-stemmed note-heads. An example, combining legato bowing with tremolo, follows:[4]

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[1]K. Kennan, The Technique of Orchestration, pp. 34-35. G. Read, A Thesaurus of Orchestral Devices, pp. 455-531. G. Read, Music Notation, pp. 373-374.

[2]Ibid.; cf. G. Verdi, La Traviata (last scene) and R. Wagner, Lohengrin.

[3]Ibid.

[4]G. Read, op.cit., pp. 385, 391-392.

Example 7-1

A section may be reduced by half with the direction "metà" (half); this is cancelled by the direction "tutti".

Pointillistic orchestration has led to two interesting notational devices. In Berg's Lyric Suite and Violinkonzert, slurs and phrasing marks frequently pass from one part to another in the scores. In Benvenuti's Canoni Enigmatici, notes from the first and second violin parts are beamed together in the score:[5]

Example 7-2a

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[5]A. Benvenuti, Canoni Enigmatici, mm. 1-2. Copyright 1959 by Aldo Bruzzichelli. Used by arrangement with Associated Music Publishers.

The question raised by such practices is one concerning the writing of individual parts. It is not practical to have each player read a full orchestral score, if for no other reason than the too-frequent page turns involved. (There is a tendency in that direction, however; cf. pg. 168.) Written cues in the parts are possible only when the number of parts to be cued is small; if the number of parts slurred or beamed together were to be greater than two, written cues would so clutter the staff that the purpose would be defeated. Therefore, it is recommended that parts be written independently of each other, since each player in fact plays only his own part. Earlier composers have succeeded in dividing lines among several instruments without finding it necessary to draw visual connections in their scores.[6] Thus, Benvenuti's idea should have been written (and copied for individual parts) in this manner:

Example 7-2b

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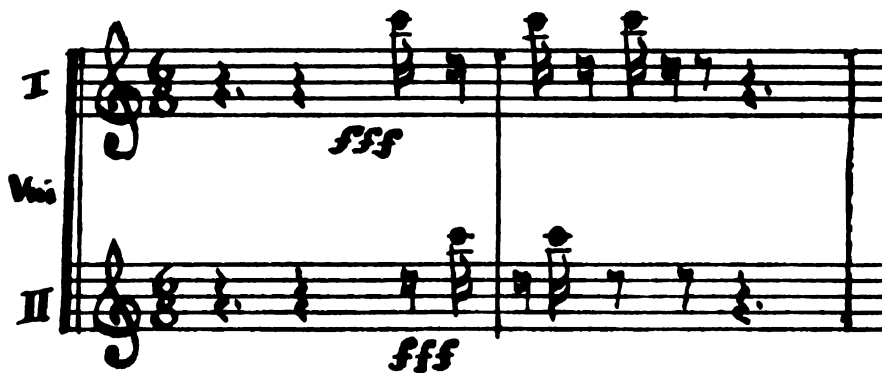
[6]Cf. Mahler, Berlioz, Rimski-Korsakoff, and Webern's orchestration of J. S. Bach's six-voiced Ricercar.

A problem related to multiple divise is that of tone-cluster notation. Lutoslawski writes tone clusters as multiple divise, even up to thirty individual violin parts.[7] Penderecki uses black blocks covering the area of the staff involved; a "solution" is given on a short section of staff below the main staff, and the players find their pitches by matching their assigned numbers to the numbered pitches in the solution. This example is from Threnody:[8]

Example 7-3
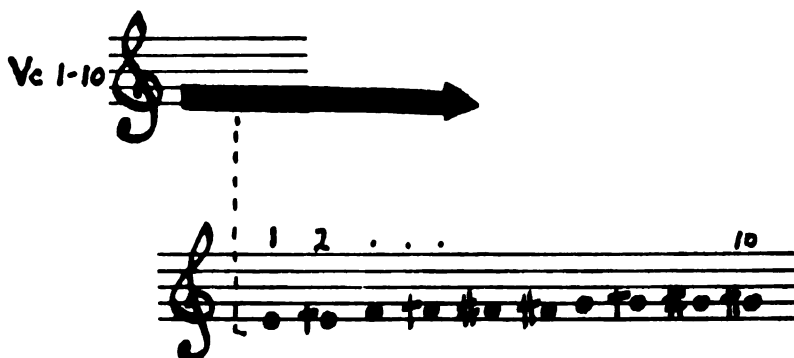
This type of notation is clumsy when the cluster extends far above or below the staff. Furthermore, the players must look in two places to find what ordinary notation would tell them in one location, namely, pitch (from the solution) and duration (from the black block).

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[7] W. Lutoslawski, Second Symphony, pp. 17-18.

[8] K. Penderecki, Threnody, pg. 10. Copyright 1961 by PWP, Warsaw. Used by arrangement with Belwin-Mills Publishing Corp.

This problem is even more acute in places where any motion occurs. The following example, which contains parallel and contrary motion by portamento, is from Penderecki's Polymorphia:[9]

Example 7-4a
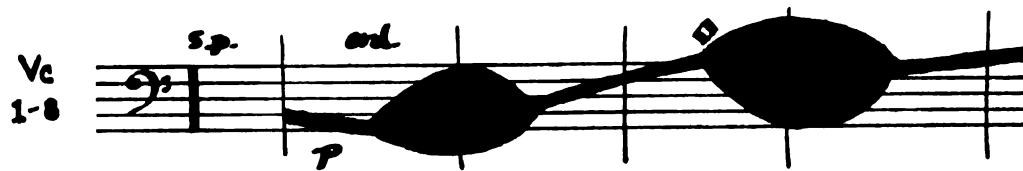
The solution, in this case, gives only the outer voices:[10]

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[9]K. Penderecki, Polymorphia, pg. 21. C 1963 Hermann Moeck Verlag. Used by arrangement with Belwin-Mills Publishing Corp.

[10]Ibid. Note that accidentals are missing from some of the diamond-shaped heads. Cf. also pp. 38-40.

Example 7-4b
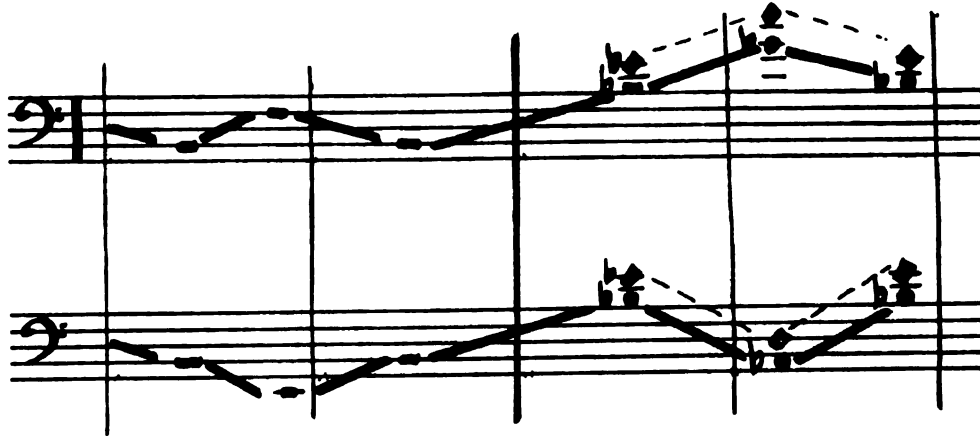
The remaining six 'cellists, then, are left to determine
their own parts by trial and error, by guesswork, or by
working out a logical solution and writing it down for
themselves. This last suggestion is an infringement upon
the composer's special prerogatives; performers should not
be obliged to finish a composer's work without instruction
or leave to do so.[11] Trial-and-error and guesswork are
hardly favored methods of score-reading—they are the
result of inadequate notation.

A similar problem occurs with this notational
shorthand in Flourescences:[12]

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[11]In former years, cadenzas were often left to per-
formers, and many performers still write their own cadenzas
where style permits; Baroque composers frequently left the
details of harmony to the performers in the form of a
figures bass. This instance, however, does not fall into
either category, having neither instructions (as a figured
bass) nor traditional practices to guide the performers.

[12]K. Penderecki, Flourescences, pg. 29. C 1962 Hermann
Moeck Verlag. Used by arrangement with Belwin-Mills Pub-
lishing Corp.

Example 7-5
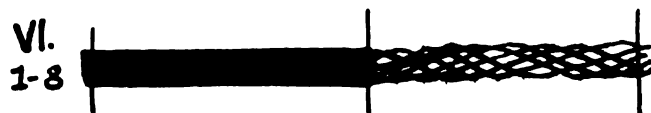
Certainly, each player must be able to distinguish his own part from the others if he is to be able to maintain the correct relationship with the others. The solution to these problems lies in the general rule, stated previously, that not more than two parts can be written on a single staff with assurance of clarity. This means that, for multiple divise, one staff should be used for every two parts. In works where fine divisions of the ususal sections occur often, parts should be copied for each pair (desk) of players. This will save considerable space, reduce the number of page turns, and facilitate reading by eliminating the problem of following one's own line in the midst of many.[13] This can be done, of course, only if the exact number of players is known. Penderecki specifies the precise composition of the orchestra in many cases, as do Lutoslawski (Second Symphony) and Ligeti (Apparitions and Requiem). In fact, all of the orchestral works which

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[13]All the players in Penderecki's Threnody (and, presumably, in many other works of his) read from the full score. This fact was determined by examining the parts of the Warsaw Philharmonic Orchestra following a performance of the Threnody.

have been discussed in this treatise are amenable to this scoring and copying procedure.

With regard to tone clusters in particular, one further refinement is to be recommended. When the notes of the cluster are assigned player by player, the two notes assigned to a desk of players should be chosen from separated points in the cluster rather than adjacent ones. For example, consider this cluster from Threnody:[14]

Example 7-6a
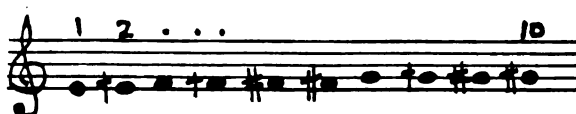
Penderecki has assigned the pitches to the 'cellists in order of ascending quarter-tones; copied in desks, each pair of performers would be reading altered unisons. Instead, let us assign these pitches in pairs of the largest possible interval, a tone and one quarter:

Example 7-6b

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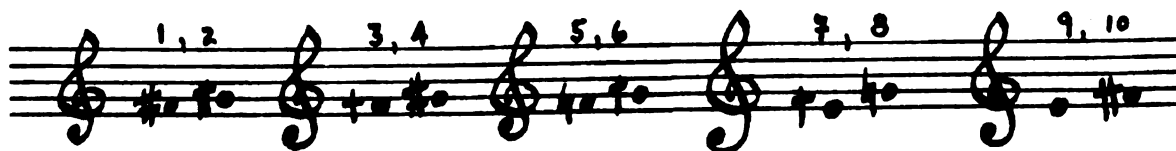
[14]K. Penderecki, Threnody, pg. 10. Copyright 1961 by PWP, Warsaw. Used by arrangement with Belwin-Mills Publishing Corp.

Copied by desk as five separate parts, this procedure would
both clarify the parts (seconds and thirds being more
easily read than altered unisons) and make them as compact
as possible. This method of cluster-realization and part
preparation has been used successfully by William Penn in
Spectrums, Confusions, and Sometime-Moments Beyond the
Order of Destiny.[15]

Another recent innovation is "box notation". This
frequently results in a kind of ostinato; it always pro-
duces great freedom in the relationships among parts.
Lutoslawski has made much use of it, notably in Jeux
Venitiens and in his String Quartet. The difficulty of
this type of notation specific to strings is that, when a
box is given to a section of the orchestra, there is often
doubt as to whether the players of the section should
play together as a section (independently of the other
sections of the orchestra) or should play independently of
each other, as well as independently of the rest of the
orchestra. To circumvent confusion, it is recommended that
each box be labeled with one of these directions:

"name of section insieme" when the section is to stay
                                        together, or

"each instrumentalist indipendamente" when the players
                                        are not to stay together.

_____

[15]Determined by examining score and parts in composer's
MS.

E.g.: "violini primi insieme" (first violins together);

"ogni violista indipendamente" (each violist
independently).

These directions could be applied to combinations of sections or to subdivisions of sections. When all of the boxes in a movement are to be played in the same way, the appropriate direction need not be placed in every box, but simply at the beginning of the movement, with the additional direction "sempre" (always). Consistent application of these procedures will eliminate much of the confusion surrounding box notation.

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