# 6

# THE WOODWIND CHOIR (REED AEROPHONES)

> The story of the orchestra resembles an old family chronicle, or more exactly, the story of the rivalry between a large number of families. Eventually, they unite for a common aim and the establishment of regular affairs of state.*

Composed of largely heterogeneous instruments, the woodwind choir is perhaps the most quarrelsome of all the families within the orchestra. It is difficult for wind instruments to tune with one another, and only the finest players can accomplish any kind of balance or blend of their colorful and diverse timbres.

Even the word *woodwinds* does not accurately describe this family. Although all the major instruments in the group, with the exception of the saxophones, were, at one time, actually made of wood, this is no longer the case. Flutes are now made of all kinds of metals, even gold, silver, and platinum; the cheaper clarinets are made of plastic. The saxophones, being a relatively recent invention (nineteenth century), have always been made of brass, but we will classify them under the rubric "woodwinds" since they are related to the group in so many ways. It is interesting to note, however, that a classic text like Cecil Forsyth's *Orchestration* (1914) discusses of the saxophone in the brass instrument chapter.

## CONSTRUCTION

Before delving into the details of construction and categorization of woodwind instruments, we will look very briefly at the principles on which they function.

Without getting too much into acoustical details, one can state that a body of air will vibrate when set in motion because it possesses both elasticity and inertia. The vibrating string communicates only a very small amount of sound. In order to project greater volume, that sound must be amplified by passing through some sort of soundbox. A conical or cylindrical tube does not require this kind of amplification because the vibrating air column within it communicates the sound at a desired amplitude directly through an opening in the tube. It is, therefore, imperative that one know the mode of producing sound for each of the woodwinds—that is, through what kind of tube the air column passes once it is set in motion—in order to understand each instrument's timbre, range, registral strength, amplitude, agility, and articulation possibilities.

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*Paul Bekker, *The Orchestra* (New York: W. W. Norton, 1963), p. 15.

The tube has to have holes, or openings, cut according to exact mathematical requirements in order to produce all the semitones between the fundamental tone and the first overtone (the octave above). However, the holes are too far apart for the hand to cover them. An early primitive mechanism compensated somewhat for this inadequacy, but no real advance in the construction of woodwind instruments was made until the nineteenth century. Theobald Boehm (1794–1881) invented a mechanical system of interlocking keys and levers, readily worked by the fingers, that made it relatively simple to reach all the notes on wind instruments. The Boehm system has been continually perfected; virtually any skips, trills, or tremolos can performed on any woodwind instrument today.

## CLASSIFYING WOODWIND INSTRUMENTS

It is possible to classify the woodwind choir in at least five ways:

1. by families
2. by the kind of reed used (single or double)
3. by the shape of the pipe
4. by the interval the instrument overblows
5. by whether or not the instrument transposes

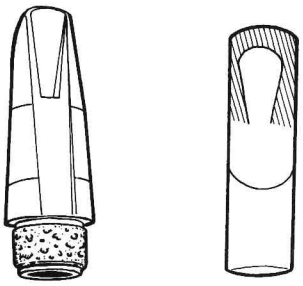
### Classification by Families

1. The flute family*: piccolo, flute, alto flute, bass flute
2. The oboe family: oboe, oboe d'amore, English horn, heckelphone, bassoon, contrabassoon
3. The clarinet family: C, D, E♭, B♭, and A clarinets, alto clarinet (E♭), bass clarinet (generally in B♭, sometimes in E♭), contrabass clarinet (B♭ or E♭), basset horn (F)
4. The saxophone family: sopranino (usually in E♭, transposed up a minor 3rd), soprano (B♭), alto, (E♭), tenor (B♭), baritone (E♭), and bass saxophones (B♭)

### Classification by Reeds

In any discussion of reed or nonreed wind instruments, of prime importance is the *embouchure*, a word that refers to the method of blowing into the instrument to set the air column in motion either directly (flutes) or by the reed mechanism or mouthpiece (all other woodwinds). The pitch variation—or intonation—is dependent on the embouchure, since it is largely controlled by the lips. The pitch can also be slightly modified by manipulating the mouthpiece joint, or at times the other joints, thereby changing the length of the instrument. Pulling

*The recorder consort (called the flageolet family)—sopranino, soprano, alto, tenor, bass—is not used in the modern symphony orchestra.



SINGLE REED: CLARINET MOUTHPIECE AND REED

DOUBLE REED: OBOE

DOUBLE REED: BASSOON

out the mouthpiece (or *head joint* on the flute) slightly lengthens the instrument and therefore lowers the pitch; pushing it in raises the pitch a bit.

1. Nonreed woodwinds: all flutes (plus recorders)
2. Single reeds: all clarinets and saxophones
3. Double reeds: oboe, oboe d'amore, English horn, heckelphone, bassoon, and contrabassoon

## Classification by the Shape of the Pipe

1. Cylindrical tube (essentially, a straight pipe): flutes and clarinets*
   a. Even though the flute is closed at one end, the embouchure hole is so near the closed end that it is called an open cylindrical pipe.
   b. The clarinet is called a closed cylindrical tube because its mouthpiece closes the tube at one end.
2. Conical tubes (the pipe is larger at one end than at the other): oboes, English horns, bassoons, and saxophones

## Classification by Overblowing

*Overblowing* is the woodwind equivalent of touching a node on a string at the halfway mark, producing the first harmonic. On the wind instrument, this is accomplished by blowing with more force, thereby compelling the vibrating air column to split fractionally.

1. All conical pipe instruments and flutes overblow the octave
2. All clarinets overblow the twelfth

*Acousticians quibble about classifying the flute and clarinet as pure cylindrical shapes, for neither really is. The flute is actually a cylindro-conical pipe, but for our purposes, the simpler definition will suffice.

## Classification by Transposition

1. Nontransposing woodwinds: flute, oboe, and bassoon
2. Transposing woodwinds
   a. Instruments that never change their interval of transposition:
      - Piccolo
      - Bass flute
      - Contrabassoon
      - Oboe d'amore in A (transposes like the A clarinet)
      - English horn in F (transposes like the French horn in F)
      - Alto flute in G
      - Alto clarinet in E♭ (transposes like the alto saxophone in E♭)
      - Bass clarinet in B♭
      - Contrabass clarinet in E♭
      - Soprano saxophone in B♭ (transposes like the B♭ clarinet)
      - Alto saxophone in E♭
      - Tenor saxophone in B♭(transposes like the bass clarinet in B♭)
      - Baritone saxophone in E♭ (transposes like the contrabass clarinet in E♭)
      - Bass saxophone in B♭

   b. Instruments that change their interval of transposition:
      - Clarinet
      - Bass clarinet

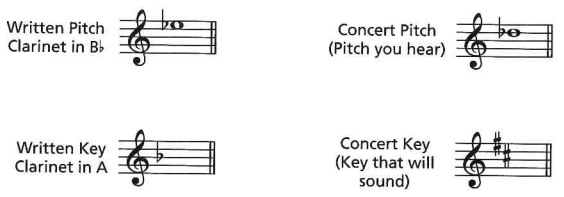
      Since there is more than one variety of these two instruments, the score and part must be clearly marked as to which clarinet or bass clarinet should be used in a particular passage or piece.

## THE PRINCIPLE OF TRANSPOSITION

A transposing instrument produces pitches that sound different from what is notated in the score. It is up to the composer or orchestrator to transpose the part so that the player can simply read it off the page, fingering it naturally on the instrument but producing the pitches that the music demands.

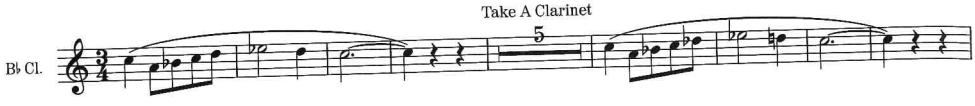
It is therefore important to distinguish between the *written pitch*, the note one sees on a page, and the sounding or *concert pitch*, the resulting pitch emanating from a transposing instrument. (The key in which the entire orchestra is playing is called the *concert key*.) The following example shows the difference between written and sounding pitches on the B♭ and A clarinets.

EXAMPLE 6-1. Written Pitch and Concert Pitch

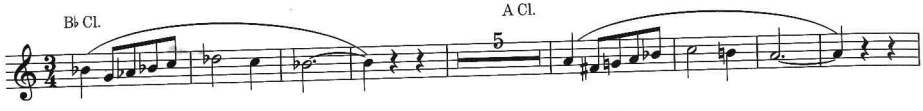


In the melody in Example 6-2, the composer writes the same notes for both the B♭ and A clarinets, realizing that the two phrases will sound at different pitch levels (see Example 6-3) since the two instruments transpose at different intervals. Notice also that the composer has provided a long rest for the clarinetist to change instruments.

**EXAMPLE 6-2.** Written Pitches

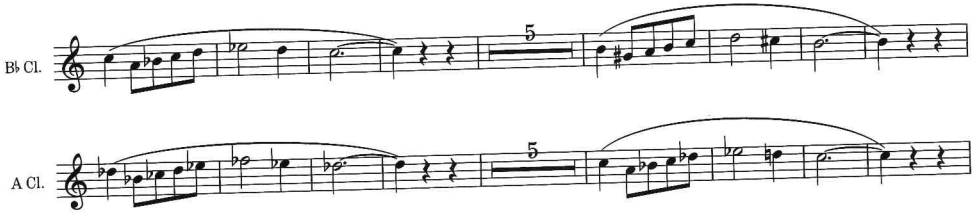



**EXAMPLE 6-3.** Sounding Pitches




If the composer had wanted the clarinetist to play both phrases on the same clarinet, the music would have to be notated as in Example 6-4.

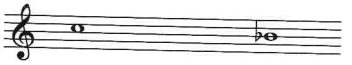
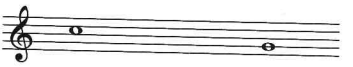
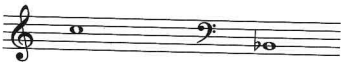
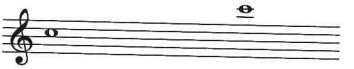
**EXAMPLE 6-4.** Written Part




Before the mechanical systems on these instruments were perfected, instruments at different transpositions were used to avoid the need of playing too many accidentals. Today, switching clarinets, especially within a single work, is quite rare. Copland, however, alternates between the B♭ and A clarinets in *Appalachian Spring*.

The basic rule for all transposing instruments is that the written C will sound the pitch (the fundamental) by which the particular instrument is designated.

TABLE OF TRANSPOSITIONS

| | *Written Pitch* *Sounding Pitch* | |
|---|---|---|
| B♭ Clarinet<br>B♭ Soprano saxophone |  | a major 2nd below the written pitch |
| A Clarinet |  | a minor 3rd below the written pitch |
| E♭ Sopranino saxophone<br>E♭ Clarinet |  | a minor 3rd above the written pitch |
| D Clarinet |  | a major 2nd above the written pitch |
| F English horn<br>F Basset horn |  | a perfect 5th below the written pitch |
| G Alto flute |  | a perfect 4th below the written pitch |
| E♭ Alto clarinet<br>E♭ Alto saxophone |  | a major 6th below the written pitch |
| B♭ Tenor saxophone<br>B♭ Bass clarinet* |  | a major 9th below the written pitch |
| E♭ Baritone saxophone |  | a major 13th below the written pitch |
| B♭ Contrabass clarinet<br>B♭ Bass saxophone |  | two octaves and a major 2nd below the the written pitch |
| Piccolo |  | an octave above the written pitch |
| Contrabassoon |  | an octave below the written pitch |

*If the bass clarinet is written in the bass clef, it sounds only a major 2nd below the notated pitch. If, by chance, one encounters a bass clarinet in A, it is useful to know that it sounds a minor 10th below the notated pitch if written in the treble clef, or a minor 3rd below if written in the bass clef.

In order to *sound* C major, the signature:

for an instrument in B♭ must be D major.
for an instrument in A must be E♭ major.
for an instrument in E♭ must be A major.
for an instrument in D must be B♭ major.
for an instrument in F must be G major.

Almost all non-octave-transposing woodwinds transpose down, the exceptions being the piccolo clarinets in D and E♭ and the sopranino sax in F. In addition, all instruments designated tenor, baritone, or bass automatically add an octave—or two octaves in some cases—to their transposition, if they are notated in the treble clef.

The decision to use a clarinet in A, B♭, D, or E♭ is usually based on the key of the work. Works in flat keys usually call for B♭ clarinets and E♭ piccolo clarinets; those in sharp keys are best served by A clarinets and D piccolo clarinets. Since tonal schemes today are no longer rigid or predictable, this consideration is less important, which frees the composer to use either set of instruments. The larger (A, D) clarinets have a slightly more luscious sound, but the difference is not greatly discernible. Indeed, the irrelevance of the key relationship has existed since the advent of highly chromatic writing in the latter half of the nineteenth century. English horns, saxophones, alto and bass flutes, and piccolos and contrabassoons, always transpose to the same interval.

## PLAYING TECHNIQUES

Intensity and volume vary with each woodwind instrument, depending on the range and particular register in which the passage appears. Intonation, dynamics, and in some instances articulation, trills, and technical versatility are much harder to control in extreme registers than in the middle ranges of all of the instruments; this is truer of the highest register than of the lowest. For example, the flute and piccolo are very weak in volume in their lowest octave, whereas the oboe and bassoon should not be called on to perform *pianissimo* in the lower fifth of their range. On the other hand, the clarinet uniquely possesses the full dynamic spectrum in all its registers, from top to bottom.

### Vibrato

Just as the string tone is enriched by the use of vibrato, so is the woodwind and, for that matter, the brass instrument's tone. On wind instruments, vibrato is produced by starting a rapid pulsation of the air column in one of four different ways: (1) by movement of the lips and jaw (normal for clarinet and saxophone, seldom for oboe and bassoon); (2) by movement of the throat muscles (sometimes for flute); (3) by movement of the abdominal muscles (normal for oboe and bassoon); or (4) by a combination of movements of the throat and abdominal muscles (normal for flute). The first way is the most difficult to achieve effec-

tively, for it may upset the embouchure; therefore, whenever possible the other methods are preferred.

A composer or orchestrator does not have to specify the use of vibrato in a score; a professional wind player will naturally color a pitch with vibrato to make it rich and round. The width of the vibrato is a matter of style and good taste and can be modified by a professional player. If a composer wishes to have no vibrato in a certain passage, he or she must indicate this by marking the score *senza vibrato, non vibrato,* or as Copland does, "white tone." When the player is to return to a normal way of playing (with vibrato), the indication *con vibrato* or "normal" (*normale*) should appear.

Here is a famous "white tone" passage from Copland's *Appalachian Spring*:

EXAMPLE 6-5. Copland, *Appalachian Spring*, mm. 1–4

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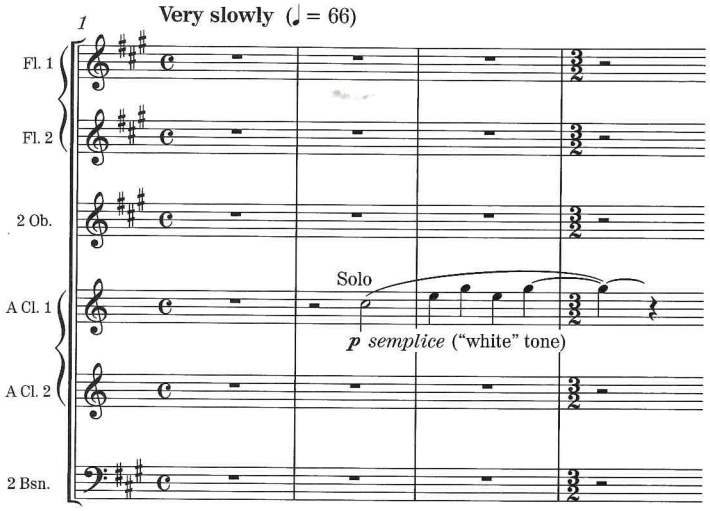


## Articulation, Tonguing, and Phrasing

Articulation on woodwinds is effected by *tonguing*. A tone on a woodwind instrument is initiated when the tongue touches the roof of the mouth and immediately pulls back, as if one were saying the syllable "tuh." (There are instances, depending on the instrument, register, and dynamic, in which the syllable "duh" is used instead.) The tone is stopped, either by returning the tongue to its original position, hitting the side of the reed with it, or by cutting off the supply of breath. When there are no slurs marked in the music, the notes are tongued or articulated separately. When slurs are present, the player performs all the pitches within the slur in one breath—like the string player on one bow—and tongues only the first note. (A wind player is able to play many more notes in one breath than a string player can play on one bow, due to the limitations of bow length.) This in-one-breath articulation is called legato playing, though not all in-one-breath playing on wind instruments is necessarily legato.

Differences in articulation can produce quite different effects. For instance, the legato playing called for by the slurring in Example 6-6b would sound much smoother than the more sprightly, mostly tongued version that Beethoven actually wrote (Example 6-6a).

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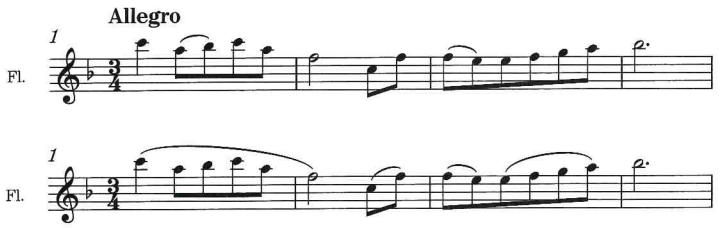
EXAMPLE 6-6. Beethoven, Symphony No. 8, first movement, mm. 1–4




There are several variations in straight tonguing, all of which are notated in a particular way.

### Staccato

When a dot is placed above or below a notehead, the player will articulate a very short, staccato note, with a natural separation between notes.

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EXAMPLE 6-7. Staccato Tonguing


### Soft Tonguing

In some instances, slurs are placed over repeated notes that have dots or dashes, calling for "soft tonguing." With dots over the notes under the slur, the articulation is slightly "harder" than when dashes separate the notes. The effect is similar to slurred staccato and *louré* on strings, played on one bow. Here they are performed in one breath.

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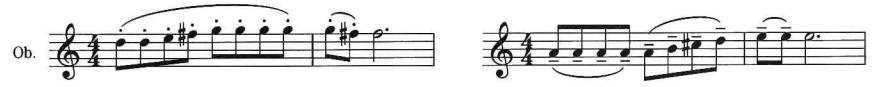
EXAMPLE 6-8. Soft Tonguing




### Double Tonguing

In very fast passages, the player will double tongue and, especially in fast triplet passages, will triple tongue. The syllables that are used to articulate double and triple tonguing are "te" and "ke" in various combinations:

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INDEX 1 / 0:00

EXAMPLE 6-9. Double Tonguing

EXAMPLE 6-10. Mendelssohn, Symphony No. 4, first movement, mm. 1–6 (triple tonguing)

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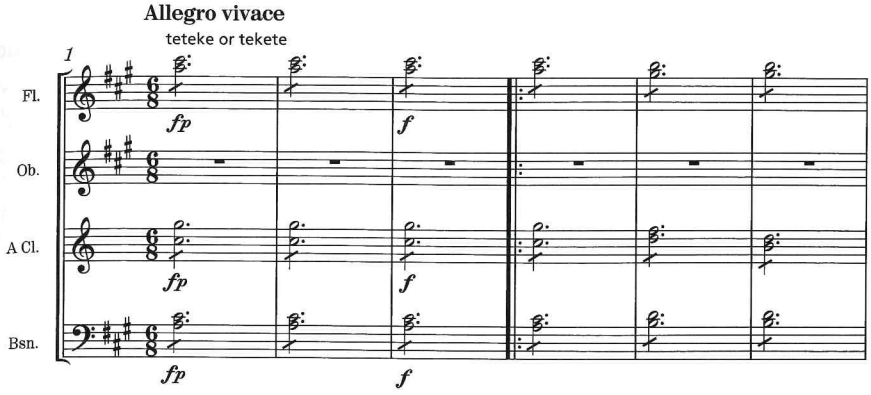


## Dynamic "Envelopes"

The usual way of releasing a tone on a woodwind instrument is to return the tongue to its original position. There is a way of using the tongue to create a special effect that, although not exclusive to the woodwinds, is best for these instruments. It consists of *sfp*, *sf* > *p* < *f*, or vice versa, a strong attack that is immediately decreased in volume and may be increased again.

EXAMPLE 6-11. Beethoven, Symphony No. 1, first movement, mm. 1–4

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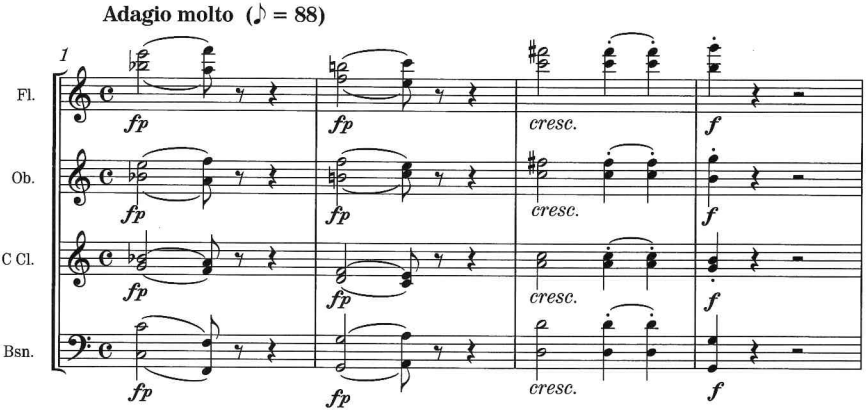


EXAMPLE 6-12. Dynamic "Envelope"

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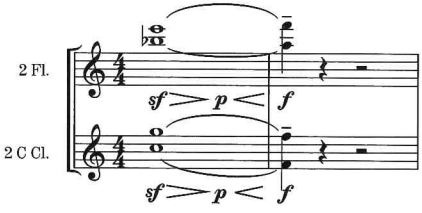

## Flutter Tongue

*Flatterzunge (GER.); Frullato (IT.)*

This special effect is not unlike the unmeasured tremolo for strings in notation and purpose. Of course, the sound is different, more like a whir. Flutter tonguing can be produced either by a rapid roll or fluttering of the tongue, or by a prolonged guttural "r" rolled in the throat. It is relatively easy to execute on all flutes, clarinets, and saxophones, but more difficult on oboes and bassoons, even though it is used in twentieth-century literature quite often. Flutter tonguing may be required on long notes, or an entire passage (fast or slow) may be played with flutter tonguing. The parts must be marked like an unmeasured string tremolo, with three slashes through the stems or above whole notes, or the words "flutter tongue" (abbr. *Flt.*) must be written in the score above the passage. Sometimes both of these markings are used.

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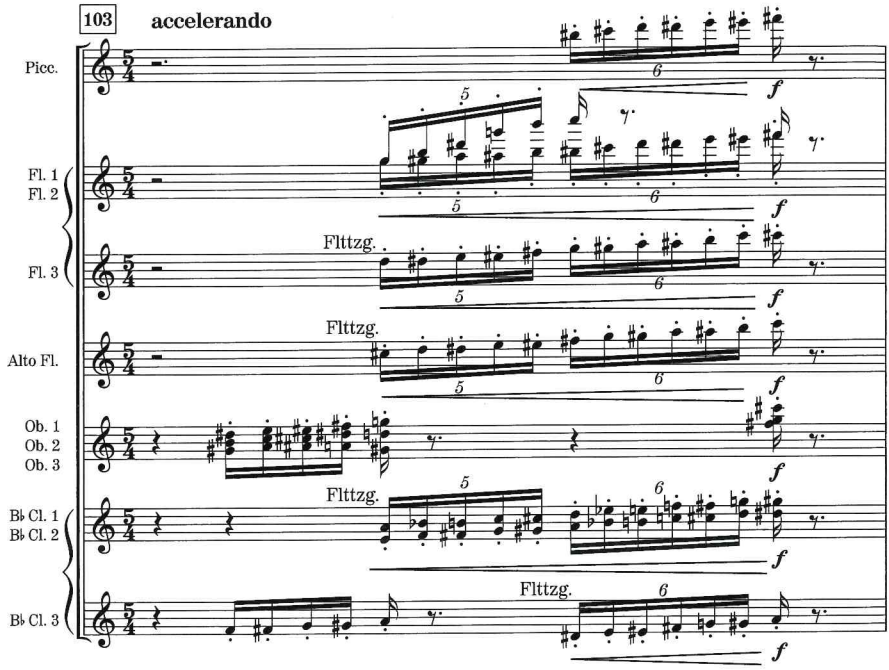
EXAMPLE 6-13. Stravinsky, *Le Sacre du printemps*, Part I, "Cercles mystérieux des adolescentes," at 103




## Muting

None of the woodwind instruments have mutes, yet composers have asked for muted sounds. Wind players usually accommodate by lightly stuffing a cloth or handkerchief into the opening of the instrument, or by covering the open end of the bell with their hands. Obviously, this is not possible to do on the flute.

## Multiphonics and Other Special Effects

### Multiphonics

During the latter part of the twentieth century many special techniques have been developed for woodwind instruments. The most far-reaching is multiphonics, that is, the simultaneous sounding of more than one note. Not everyone can perform these, and some of the "double stops" can be produced only on certain models of instruments. Even though some multiphonics have been called for in newer orchestral and band literature, the greater demand has been in solo and chamber music. Therefore, this technique will be discussed briefly in the sections of Chapter 7 that investigate each instrument.

### Microtones

Another rather recent innovation is the use of microtones and special shadings of a pitch. This is more common for orchestral winds, but, like multiphonics, microtones are very difficult to play. Some players have trick fingerings by which they can produce the desired microtones or pitch shadings. Some examples of these will appear in Chapter 7.

### Glissandi

Glissandi are most successful on the clarinet and saxophone, but only in an upward direction; the downward glissando is effective only between neighboring pitches. Flutes, oboes, and bassoons, as well as clarinets, can depress a pitch or raise it slightly by changing the embouchure; this sounds like a slight glissando, but should not be used between pitches greater than a 2nd.

EXAMPLE 6-14. Gershwin, *Rhapsody in Blue*, opening

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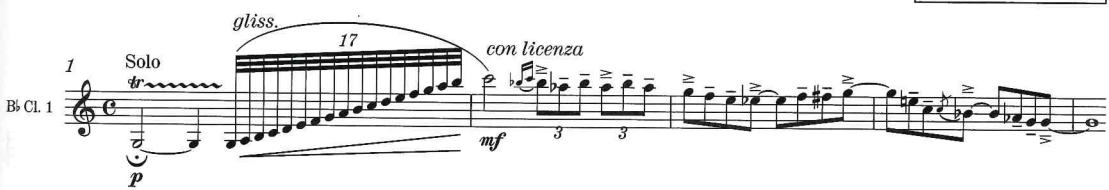


ADDITIONAL PASSAGE FOR STUDY

Crumb, *Echoes of Time and the River*, second movement, mm. 12–13

### Slap Tonguing

Slap tonguing, a special effect taken from jazz, is most effective on clarinets and saxophones, but it is also possible on the flute. It produces a perky, snappy, overarticulated attack.

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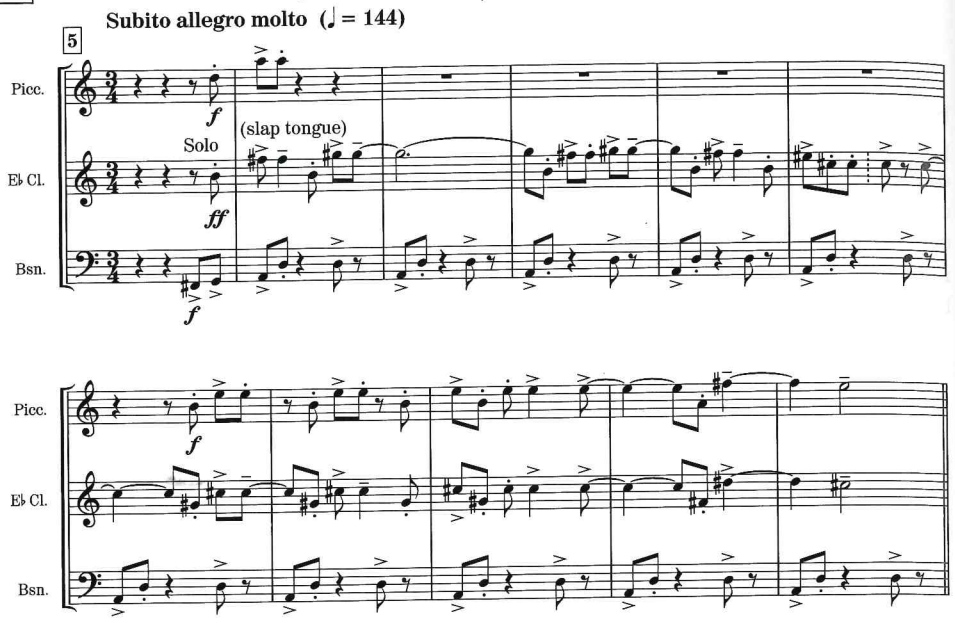
EXAMPLE 6-15. Copland, *Music for the Theater*, 5–6




## Key Clicking

Key clicking has been used quite extensively in the last few decades. It can create simply a percussive, rhythmic effect; slapping down hard without any air blowing through the instrument can produce very faint pitches as well. The effect, particularly on the flute and when the listener is very close to the instrument, is much like that obtained by a string player who puts down his or her fingers hard on the strings without using the bow. Since the resulting sound is so soft, the composer or orchestrator should employ this technique only very discreetly in orchestral music.

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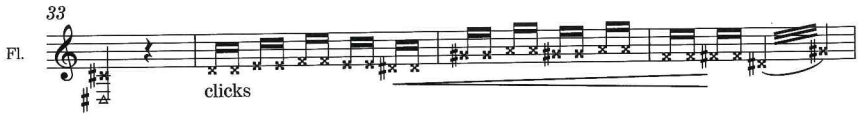
EXAMPLE 6-16. C. Polin, *The Death of Procris*, second movement, mm. 33–36




The opposite technique is also sometimes used. The composer may ask the wind players to blow through the instrument without producing any pitches, which simply gives the sound of air blowing through a pipe.

## Whistle Tones

Flutists are sometimes called on to produce whistle tones. These are produced by turning the instrument slightly away from the face and blowing across instead of into the mouthpiece while fingering the pitches. Doing so can cause a