The foundation of trumpet performance technique is the harmonic overtone series. Trumpeters are exposed to this concept the first time they are required to play what are commonly known as “lip slurs,” or passages that involve changing pitches without the use of valves. This is the purest form of trumpet technique; however, the term is misleading. Lip slurs primarily involve variations in air velocity and the shape of the oral cavity to change pitch while the strength of the embouchure (lip vibration) remains more or less constant. The technique is similar to the movement of the tongue inside the mouth while whistling rather than any rapid changes in lip pressure or embouchure formation.

On a twenty-first-century trumpet with valves pitched in B-flat (subsequently referred to as the “modern” B-flat trumpet; figure 2.1), the overtone series is commonly experienced as the “open notes,” or those pitches produced without the aid of valves. The available pitches are rather limited (example 2.1), and even higher notes are obtainable, based on individual ability.

Many trumpeters are familiar with this limited range of pitches from basic bugle calls and fanfares such as “Taps” or “Reveille” or the inspiring sound of “Charge!” at US baseball games. Indeed, the ceremonial nature of natural trumpet fanfares continues to thrive at sporting events, especially the “Call to the Post” at horse races. Even the unceremonious vuvuzelas at the 2010 FIFA World Cup could be considered something like a warlike din of ancient natural trumpets.

The range of the overtone series on the modern B-flat trumpet with valves is limited by the length of the instrument’s tubing, which is four feet, six inches (137.6 cm). On an instrument with longer tubing the range is expanded, and more notes are available in the lower register. For example, a natural trumpet pitched in C (concert pitch) with tubing of eight feet in length (243.8 cm) would produce the full compass of the harmonic overtone series (example 2.2).

The lowest note of the series, the fundamental, is a pedal tone. Depending on the shape of a trumpet’s bell and the dimensions of the mouthpiece, it may be difficult to sound. Because a strong embouchure is required to play pedal tones, the technique is advocated by methods designed to develop high-register playing and flexibility. It must also be emphasized that some notes in the series, most notably the eleventh and thirteenth partials (F5 and A5), are quite out of tune by the standards of equal temperament.
For a natural trumpet to perform in a key other than C, it is necessary to insert extra tubing, or a crook, of appropriate length into the leadpipe to change the overall length of the instrument and obtain the notes of a different overtone series. Shorter pieces of straight pipe, called “bits,” are also used. The shortest slide (the back bow) usually puts the trumpet into the key of D and then successively longer crooks are inserted into the mouthpiece receiver (leadpipe) to change the pitch to lower keys (figure 2.2). Consequently, composers in the Classical era (1750–1825) routinely scored for trumpets pitched in the tonic key of a given piece and often required changes of key (and subsequent changes of crooks for the trumpeters) between movements or modulating sections. Although the nineteenth-century natural trumpet adopted a double-wrap design with a larger bell, the principle of changing crooks was the same as it was in the eighteenth century.

When valves are employed on the modern B-flat trumpet, they are essentially a faster way to change crooks; additional tubing from the valve slides is added to the total length of the instrument, which in turn produces a wider compass.

**Figure 2.1 and Example 2.1.** Notes playable on the modern B-flat trumpet without the use of valves (actual pitches sound a whole step lower).

**Example 2.2.** Notes playable on a natural trumpet pitched in C (actual pitches sound as written).
Figure 2.2. Natural trumpets from two different centuries with crooks and tuning bits. 
of playable pitches to the series of open notes shown in example 2.1 (see also figure 6.4). For example, when the first and third valves are employed, lower notes are available and more notes are accessible in the upper register (example 2.3). Of course, even higher notes are obtainable by advanced players.

This expanded range of pitches demonstrates the purpose of the valve: it allows the trumpet to play chromatic pitches throughout a range of more than three octaves by accessing the overtones produced by seven valve combinations that engage seven different lengths of tubing. In other words, a modern trumpet with three valves is essentially a combination of seven different natural trumpets. This explains why the natural trumpet and its conical cousins, the bugle and the posthorn, play such a vital role in trumpet repertoire and performance technique. Despite the modern trumpet’s chromatic fluency, a large portion of the classical trumpet repertoire is restricted to the notes of the harmonic overtone series because it was composed for the natural trumpet, or with the noble sound of the natural trumpet in mind. For this reason, lip-flexibility studies (lip slurs on the overtone series) remain a vital part of any modern trumpeter’s training in addition to fingering technique, tonguing, and breath control. The trumpet method book published in 1857 by Jean-Baptiste Arban’s teacher at the Paris Conservatoire, François Georges Auguste Dauverné, devotes more than 75 percent of its pages to studies for the natural trumpet and the harmonic series.

When the overtone series of a natural trumpet in C pitched at $A_4 = 440 \text{ Hz}^2$ (eight feet of tubing; 243.8 cm) is compared with the series of playable open notes on a modern C trumpet with valves (four feet of tubing; 121.9 cm), it becomes clear that the series occurs on the modern trumpet an octave higher than it does on the natural trumpet (figure 2.3 and example 2.4). On the natural trumpet, a complete major scale is playable in the second octave (with certain modifications of pitch), whereas the modern trumpet can produce only the notes of a dominant seventh chord.

Not only is the range wider but the sound of the two instruments differs markedly as a result of the internal dimensions of each trumpet’s tubing, mouthpiece, and bell. The twenty-first-century trumpet features a more tapered leadpipe, thicker metal, and more conical tubing than the eighteenth-century trumpet. The modern trumpet’s bell flare is more pronounced, and its mouthpiece is smaller than that of the natural trumpet. All of these elements conspire to produce radically different acoustical properties for each instrument, which listeners perceive

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Figure 2.3 and Example 2.4. The overtone series of a twenty-first-century trumpet (when played without valves) and that of an eighteenth-century natural trumpet. The instruments pictured are a trumpet in C by Vincent Bach (2000) and a reproduction of a natural trumpet in C by Frank Tomes (2001, after Johann Leonard Ehe III, 1746). Both instruments are pitched in C at $A_4 = 440$ Hz.
as the compact, versatile sound of the modern trumpet rather than the noble bark and sweet clarino high register of the eighteenth-century natural trumpet.\textsuperscript{6}

And that is precisely the point. The unique sonic personality of the natural trumpet was what composers had in mind from the Baroque era (approximately 1600–1750) through the Classical and even past the middle of the nineteenth century. Johannes Brahms was still writing for the natural trumpet as late as the 1880s, despite the invention of the valve and the popularity of the great cornet soloists during the same period. Even the phenomenon of the English slide trumpet in the nineteenth century (discussed in chapter 5) was designed to retain the characteristic sound of the natural trumpet.\textsuperscript{7} Faithful imitation of the natural trumpet’s lower register is also a motive behind the efforts of modern orchestral trumpeters to play with the darkest sound possible on the smaller modern trumpet (see example 2.4).

**Benefits of Playing the Natural Trumpet**

Contemporary trumpeters who learn to play the natural trumpet enjoy a host of benefits. They not only develop a new awareness of the trumpet’s regal heritage but also improve their overall musicianship and technique on the modern trumpet. Playing the natural trumpet forces a musician to focus on the basics of sound production and fundamental techniques, such as flexibility, range, note accuracy, articulation, embouchure strength, and breath control.\textsuperscript{8} Perhaps the greatest benefit is the enhancement of a player’s aural skills. Since the natural trumpet requires pinpoint accuracy in the slippery upper reaches of the overtone series, the ability to hear intervals and pitch relationships is paramount. Like the human voice and unfretted string instruments, the natural trumpet is essentially a “blind” instrument that relies on expert ear training for successful performance.

Trumpeters accustomed to performing Baroque music on the piccolo trumpet particularly benefit from learning to play the natural trumpet. They gain invaluable insights into appropriate Baroque phrasing and articulation as well as the unique personalities of the natural trumpet’s registers (the low principale and high clarino registers). Although the somewhat homogenized sound of the piccolo trumpet is unable to reproduce the natural trumpet’s ethereal clarino or the characteristic earthiness of its low register, acquaintance with an authentic sound ideal enriches any musician’s performance.

One of the first steps on the road to playing the natural trumpet is the acquisition of a suitable instrument. This can be a daunting process for the uninformed. Modern builders of period instruments usually model their trumpets after those of historic makers such as the Nuremberg masters Johann Leonard Ehe II and Johann Wilhelm Haas and William Bull from England.\textsuperscript{9} It is important to understand the differences between these models in terms of bore size and bell dimensions. The definitive work on the subject is Robert Barclay’s *Art of the Trumpet-Maker*, which concerns the history of the Nuremberg craftsmen of the
seventeenth and eighteenth centuries and includes step-by-step instructions for building a trumpet. Understanding the basics of historic instrument construction gives the trumpeter a fund of knowledge from which to make an informed purchase (see appendix E).

Most natural trumpets come with sections that may be assembled to render an instrument playable in a number of different keys (figure 2.4). These sections are the corpus (main body of the trumpet with the bell), crooks (curved tuning slides), and yards (pipes with or without vent holes that connect the crook to the corpus). It is important to note that these sections are not soldered together and are freely adjustable to improve intonation and flexibility.

Instruments may also come with leadpipe extensions, called bits, for tuning purposes. Some modern compromise instruments feature an adjustable leadpipe to facilitate tuning. Depending on the maker, natural trumpets are usually available in the keys of D (modern pitch, A₄ = 440 Hz), D-flat (Baroque pitch, A₄ = 415 Hz), C (modern pitch), and C-flat (Baroque pitch). Crooks and yards for other keys, such as B-flat or E-flat, are often available as well.

Before we go one step further, issues of authenticity must be confronted. As mentioned previously, some of the pitches, or partials, of the harmonic overtone series are inherently out of tune (see example 2.2). The most problematic partials are the eleventh (F₅), which is too sharp for F and too flat for F-sharp, and the thirteenth (A₅), which is flat. Trumpet players in the seventeenth and eighteenth centuries corrected these intonation problems by lipping, or note bending. This technique was also applied to occasional nonharmonic tones such as B-natural (by lowering the eighth partial), C-sharp (by lowering the ninth partial), and F-sharp (by raising the notorious eleventh partial). Lipping all of these notes in tune (according to equal temperament) is a daunting challenge. At the time of this writing, Jean-François Madeuf, professor of trumpet at the Schola Cantorum Basiliensis, is the first musician to perform with consistent success on a natural trumpet without vent holes.

![Figure 2.4](image-url)

**Figure 2.4.** A natural trumpet pitched in D (Baroque pitch) by Frank Tomes (2001, after Johann Leonard Ehe III, 1746) dismantled to show how the mouthpiece, corpus, tuning slide (crook), and yard fit together.
Compromise instruments using vent holes to correct the out-of-tune notes were developed in the twentieth century, but they are not genuine natural trumpets. The earliest known trumpet with vent holes was made by the British craftsman William Shaw in 1787. It was discovered in the vaults of St. James Palace in London in 1959. The evolution and performance technique of the modern Baroque trumpet with vent holes are the subject of chapter 3.

Using an appropriate mouthpiece is another consideration. Most players start by using their modern mouthpieces with the natural trumpet, but an adapter is usually needed to fit the shank into the larger leadpipe. Authentic Baroque mouthpieces possess a wider cup diameter, larger and flatter rims, a sharper inside edge, and a longer, thicker shank (figure 2.5). The longer shank encases a tapered backbore that compensates for the lack of taper in the leadpipe. These dimensions affect the sound and facilitate the practice of lipping. A shallower mouthpiece does not necessarily aid high-register playing because of the expanded dimensions of the natural trumpet in comparison to a modern trumpet.

Surviving mouthpieces from the Baroque era are quite large. For example, a mouthpiece by M. Hanlein from the late seventeenth century has a cup diameter of 18 millimeters, a throat diameter of 4.5 millimeters, and a cup depth of 13 millimeters. A mouthpiece by Johann Leonard Ehe II from 1746 has similar measurements: a cup diameter of 18.5 millimeters, a throat diameter of 3.8 millimeters, and a cup depth of 8 millimeters. By way of comparison, a modern Bach 1C trumpet mouthpiece has a cup diameter of 17 millimeters, a standard 27 throat size of 3.6 millimeters, and a cup depth of 12 millimeters.

Tips for Getting Started

When trumpeters approach the natural trumpet for the first time, they often discover that it will not behave! New players can experience a sense of disorientation
caused by the lower fundamental of the natural trumpet’s overtone series (see example 2.4), the unequal temperament of those notes, and the unfamiliar response of a longer, untapered leadpipe. Careful practice with the aid of an electronic tuner helps clarify reference pitches, and with time, the ear, the lungs, and the embouchure “remember” the physical reflexes that accompany specific intervals and patterns. Even the most accomplished modern trumpeter will need to spend some extended time working on basic triadic exercises in the low register to develop an acquaintance with the feel of the natural trumpet.

Most of the initial work will be in the low principale register. It is important for musicians to become familiar with the unique characteristics of the natural trumpet and resist the temptation to “correct” the out-of-tune notes in order to reproduce the artificial realm of equal temperament. Once given the permission to play freely, players will discover that the natural trumpet is far more flexible and resonant when they are not “battling nature,” so to speak. Exploring the natural tendencies of the overtone series yields insights that aid future intonation work, such as the pronounced flatter pitch of the lower register, the relative stability of the tonic triad (C4, E4, and G4), and the relative malleability of the seventh, eleventh, and thirteenth partials (B-flat4, F5, and A5).

Following an honest appraisal of the pitch tendencies of the natural trumpet, the real work begins. Careful practice on long tones, flexibility studies, and “target practice” on isolated pitches builds a strong foundation for a reliable technique. Trumpeters familiar with James Stamp’s note-bending exercises and Carmine Caruso’s endurance routines will find that playing these studies on the modern B-flat trumpet can be useful preparation for developing lipping technique and for building strength and accuracy on the natural trumpet.

While trumpeters may be eager to jump into the deep end of the pool, so to speak, and attempt to play familiar Baroque works by Handel and Bach on the natural trumpet, this is not a wise way to start. Historical methods like Cesare Bendinelli’s Tutta l’arte della trombetta (1614), Girolamo Fantini’s Modo per imparare a sonare di tromba (1638), and Johann Ernst Altenburg’s Trumpeters’ and Kettledrummers’ Art (1795) do not feature suitable rudimentary study material for the novice natural trumpeter. Instead, it is best to focus on triadic studies in the middle and lower registers similar to the principale or third trumpet parts for Bach repertoire. Such exercises may be found in the method book written by François Dauverné in 1857. Dauverné’s method includes a large section of studies for the natural trumpet and the early nineteenth-century valve trumpet.

The first modern method for the natural trumpet, Technical and Musical Studies for the Baroque Trumpet, was published by the Australian trumpeter Paul Plunkett in 1995. In the book’s foreword Plunkett praises Dauverné’s method but points out that “it is limited in its treatment in learning the skills required to play the works of J.S. Bach and other baroque masters in that it neglects extended range exercises as well as technical studies for baroque articulations, trills, and bending notes.”

A few years after Plunkett’s method, Edward Tarr published his three-volume
method, *The Art of Baroque Trumpet Playing*, which provided valuable beginning exercises, historical information, repertoire, and advice for learning to tame the natural trumpet from a twentieth-century perspective. Most recently, John Foster published *The Natural Trumpet*, which features study material as well as historical information and many photographs of period instruments.

Once familiarity with a workable technique is established, the repertoire of Henry Purcell is a good place to start. Purcell’s trumpet writing does not pose the same challenges in terms of endurance and range as that of Bach and Handel and is usually scored for two trumpets. Pieces like the *Ode on St. Cecilia’s Day* and *The Fairy Queen*, with their egalitarian part writing and playful imitative passages, provide rewarding practice material for two natural trumpeters working together.

The Baroque era is often considered the golden age of trumpet music. Never before had trumpeters achieved such rock-star status and inspired such artistic repertoire from leading composers. It’s no wonder that the rise in popularity of classical trumpet soloists in the late twentieth century benefited primarily from the Baroque revival and the development of the piccolo trumpet.