Throughout the classical music world, there is a growing appreciation of the distinctive tone quality of historical percussion. In fact, when performing literature of the 18th and early 19th centuries, many orchestral conductors are now asking for historical timpani (often referred to as “Baroque timpani”) to be incorporated into their ensembles, which otherwise consist only of modern instruments. This past fall, for instance, the Metropolitan Opera (seating capacity close to 4,000) used a set of my historical drums for their production of Gluck’s Iphigénie en Tauride. Everyone involved was satisfied with the results including (importantly) the timpanist himself, Duncan Patton.

In a conversation this past March, conductor James Conlon said to me, “I love the sound of Baroque timpani.” (I had been alerted that he was inquiring about such drums by the timpanist of the Los Angeles Opera, where Conlon is music director.) Over the years I have provided historical timpani to several modern orchestras, including Cincinnati, Philadelphia, St. Paul, and Houston Grand Opera – in each case because the conductor made the request. (This is, of course, in addition to several period orchestras, many of which I perform in myself.) When asked to articulate what it is about the tone of such drums that makes them desirable, the response will usually include expressions like “cleaner articulation,” “more focused sound,” “warmer,” “more satisfactory balance,” or “less boom-y.” More colorfully, Sebastian Virdung described their sound as “a colossal rumbling of barrels” (Musica getutscht und aufgezogen, Basel, 1511).

To the casual observer, the most obvious differences between modern and historical timpani are that the latter are 1) smaller, and 2) have real animal skins for heads, 3) are tuned by hand (no pedal to change the pitch), and 4) are played with relatively hard sticks, usually bare wood.

Although the earliest history of timpani in Europe remains open to conjecture, there appears to be a continuity in its use from the early 16th century onward. Virdung states that timpani (Herpaucken) are “made of copper kettles covered with calf skin and struck with sticks, making a loud and distinct noise,” and that “they are used together with the field trumpets for calling to table [diner], when the prince enters or leaves his dominions, and for entering the field of battle.” For the next three hundred years the trumpet/timpani ensemble had the dual function of being used both in warfare and for heraldry. When the ensemble began to be incorporated into the orchestra, its chief function was to evoke either of these two Affekts. In the 18th and 19th centuries, timpani were increasingly used in the church, either incorporated in the organ case as a “Baroque” ornamentation (such as the cover of this issue – would-be historical timpanists should not consider this an example of authentic performance practice!), part of a functioning organ stop, or possibly standing alone, to be played along with hymns, etc.

During the period from 1600 through the late 19th century, there was, of course, not simply one way of ...
fabricating timpani; nevertheless, there are certain common features, and it is these features that will be discussed.

The craftsmen

There were three different craftsmen involved in the fabrication of timpani. First, there was a coppersmith, who fabricated the kettle. Next, a worker in steel (today, called a machinist) made a hoop onto which the skin would be attached; he also made brackets that were riveted onto the side of the kettle; in addition he fabricated tightening bolts, a tuning key, and storage legs. Finally, a skin-processor, usually a parchment-maker, provided the animal skin that would be wrapped around the hoop and subsequently placed over the opening of the kettle.

For the modern historian, the multiple-craftsman tradition in timpani making creates a serious problem in the dating and provenance of surviving instruments, because very few surviving timpani (there are hundreds of them!) have any indication of makers’ names, dates, or place of manufacture. Neither the coppersmith, machinist, nor parchment-maker felt compelled to place an indication of when, where, or by whom the work was done, for the likely reason that no one felt uniquely responsible for the final product. In addition, the making of timpani would have been a small part of their total trade, so that there was little commercial reason for placing a name on them. The only reason that a handful of instruments from before 1800 can be dated is that an actual date, a family coat of arms, or other indication has been painted or inscribed on a kettle. The timpani used in warfare had fabric banners (“coats of arms”) tied around the exterior of the kettle; there appear to be no surviving timpani that have their original banners.

Timpani construction

First, a caveat: There are literally hundreds of surviving historical timpani, in instrument collections, churches, and private hands. With few exceptions, these instruments have not been thoroughly measured or otherwise studied. There is still much more to be learned about historical timpani: the first step towards better understanding would be a comprehensive inventory of surviving instruments.

As stated above, the three elements of timpani construction are: 1) the kettle, usually made by the coppersmith; 2) accessory metal parts (usually of steel, occasionally brass), made by the machinist; and 3) the skin head, processed by a parchment maker or other specialist in animal hides.

1. The Kettle (Bowl): Although most timpani kettles were made of copper, other materials – brass, silver, and wood – were also used. Brass kettles would probably have been fabricated by the coppersmith (brass is an alloy containing 70-80 percent copper). Silver or wood kettles would have employed different craftsmen.

Silver kettles are rarely encountered and may possibly have been an English specialty. J.A. Altenburg (1795) comments that the English use silver timpani as well as trumpets. The Boston Museum of Fine Arts Silver Collection possesses an exquisite pair of silver timpani made in Hanover, Germany, for George IV, King of England. (In 2006, a similar set was sold at auction for 362,000 Euros, over half a million dollars!) With wooden kettles, the sides
were made of several parallel wood staves and assembled like barrels. The bottom could be one solid wood piece, or could be made of copper nailed to the wooden sides: the Leipzig Universitätssammlung has examples of both types. Wooden kettles are relatively rare.

Measurement of the precise thickness of surviving timpani has not been undertaken. All of the historical drums I have examined have been of surprisingly light weight. The copper is obviously much thinner than what is found on modern timpani – so thin that repair patches are frequently in evidence, covering up rips or holes in the original bowl.

With rare exceptions, the diameter is between 18 and 22 inches, with a few being larger – e.g., up to 24 inches. (Typical modern timpani have diameters of 26 and 29 inches.) The depth of the bowl ranges from 12 to 16 inches. The proportion of diameter to depth is variable. The kettle is round; its overall shape can be said to range between hemispheric and parabolic.

An important feature of the kettle is found at its very top, where the copper meets the skin; it is necessary to create a round surface, or “lip,” over which the skin can be stretched. (Otherwise, the skin would be split as soon as any pressure was put on it.) In modern timpani, the lip is typically created by bending the copper either inwards or outwards, angled slightly downward. In historical drums, the creation of the lip is much more complicated, probably because of the thinness of the copper. First, a round loop of thin (about 1/4 inches in diameter) steel wire is made to fit the exact diameter of the top of the kettle. Next, the top one inch of the kettle wall is crimped inwards. The wire is then placed on top, and the newly-crimped copper is wrapped back around it, creating not only a smooth surface for the skin to be stretched across, but also providing added strength to the bowl so that it can withstand the pressure caused when the skin is tightened. (The steel wire is thus not visible but its presence can be detected by placing a magnet on the lip surface.)

At the bottom center of the kettle is a round hole with a diameter ranging between ¾ and 1 inch. Its function is to allow the air to get out when the skin is hit. Soldered around the inside of the hole and projecting upwards toward the skin is the Schallrichter (see “A big surprise” below).

2. The Accessories: The machinist is responsible for the accessories (the “hardware”). First, a single steel hoop is made, fitting concentrically and quite close to the circumference of the drum. That hoop, around which the skin is tucked, or lapped, is fitted with between six and nine “eyes” or loops, through which an equal number of threaded bolts are placed. These bolts fit into threaded receivers (nuts) that are attached (usually, welded) to brackets riveted to the side of the kettle. The machinist also makes a wrench, or tuning-key, which fits the tops of the bolts, like a harpsichord tuning key. In addition, he attaches legs to the bottom of the drums, riveted at three points.

There are several important points to note. First, there is only one hoop found in an historical drum, never two. A second hoop was first introduced in the 19th century, when machine timpani (see sidebar) required one in order to facilitate the equal tensioning of a skin at the same time all around the kettle. Second, the tuning key was necessary because the tension bolts were always topped with...
“An accomplished timpanist, by utilizing a large variety of techniques and artful beatings, can keep his audience’s attention for quite a length of time. He compensates for the lack of pitches with numerous Schlag-Manieren. These Manieren—played loudly then soft, slow then fast—are typically executed with choreographic figures, turns, and movements of the body.”
— J.E. Altenburg, *Versuch einer Anleitung… Trompeter- und Pauker-Kunst* (1795)

“In earlier times, the art of timpani playing was much more difficult and complicated than it is today. The role of the timpanist was to improvise introductions and interludes…with embellishments such as five-stroke flourishes, cross-sticking, double cross-sticking, rolls on two drums, fantasies, etc. The timpanist who could do these merited the title of virtuoso, and was able to find employment.”
— Georges Kastner, *Méthode de Timbales* (1844)

The above quotations allude to the extensive repertoire of techniques used by timpanists up through the 18th century and even into the 19th. As early as the 16th century, the trumpeters and drummers (timpanists) were part of the cavalry, playing their instruments while riding on horseback into battle, giving signals to their colleagues. Over the course of the next few hundred years, this trumpet/drum ensemble became associated also with royalty, playing for ceremonial entrances, calls to banquets, etc. These musicians had a financial and social status enjoyed by no other performing musicians, and they formed a guild that allowed them to keep their techniques secret, while teaching them only to a limited number of apprentices.

There is much speculation about what these “secret” techniques (German: Schlagmanieren) were, and it was only in the 19th century (after the demise of the guild) that there was any attempt to explain these techniques. From these, it is clear that the Schlagmanieren were comprised both of physical arm movements—in particular, cross-stickings, double cross-stickings, etc.—and musical style. The style involved a) flourishes before a note, b) rolls involving one or both drums in various configurations, c) improvised embellishments to simple rhythmic patterns, and d) an obligatory improvisation on the next-to-last measure of a piece, concluding with e) an extensive flourish into the final note.

“Describing these techniques in a few words is impossible; demonstration in person is much to be preferred.”

The above opinion is found in numerous 18th- and 19th-century sources, and remains valid today (indeed, private instruction has always been the preferred way for learning any musical instrument or style). To that end—and using modern technology—the present writer has made a four-minute video of an *Improvisation on an Eighteenth Century Theme* (printed in Altenburg), which can be viewed at www.harmsperc.com/baroquetimpani.

In the 18th century, trumpets and timpani were used in orchestras with increasing frequency, usually evoking a “heroic” or “ceremonial” affect. My personal experience is that many of these parts can be embellished—of course, always with the advance approval of the conductor. Works by Handel, in particular, lend themselves very nicely to various Schlagmanieren.

By the 19th century, composers began on insisting that the timpanist play only what was written on the printed page. Interestingly, many 19th-century opera composers (notably, Verdi) go to considerable trouble to write out “improvised” flourishes for the timpani.
discouraged by some later writers!

It appears that in the 16th and 17th centuries a snare was sometimes mounted next to the skin, either on top or directly underneath. The drummer in Dürer's woodcut for Maximilian (1508, see woodcut opposite) clearly shows two snares set at an angle. A beautiful pair of timpani found in the Bayerisches Nationalmuseum in Munich and dated ca. 1620 has a snare holder mounted on the side of the kettle. From photos, it appears that several of the 132 timpani from the 17th century preserved in the Trophy Collection of the Swedish Army Museum seem to have provision for a snare. Closer examination will be required to confirm this, though.

It has occasionally been suggested that the processing of animal skins in earlier eras was relatively unsophisticated, that timpani skins would have been thick and of uneven texture, and that therefore the timpani would have been played out of tune, with little possibility of nuance or sensitive playing.

I believe that this suggestion has no merit, and should be disregarded. Nowhere in the commentary of any musical period do we find a statement that says, “Well, as everyone knows, it is impossible to play the timpani in tune.”

Parchment makers were found throughout Europe—it was a common profession. There were different qualities of parchment used for manuscript writing and other purposes (see below) Anyone who has handled a Medieval manuscript can attest to the sophistication of the skin processing.

In terms of the physical characteristics of the timpani themselves: there is such a small gap between the lip of the kettle and the hoop holding the skin that it is impossible to mount a thick skin that will fit. One set of drums I have seen had modern bass drum skins installed several years ago. The resulting thickness of the skin/hoop combination is such that the hoop cannot be satisfactorily attached to the kettle. These timpani are at this time unplayable.

Finally, examination of the famous Zedler Grosses Universal Lexikon (published 1732-1750 in 64 volumes measuring 13.5 inches high) yields interesting data. The article Pergament (parchment) in Volume 27 (1741) begins with the statement that it can be made of skins from sheep, calf, or goat. Its uses are then mentioned, including manuscripts, bookbinding, book covers, lampshades, and field drum and timpani skins. Examination of the Zedler volumes in the Yale University Library shows that they are bound in calf skin—the same material as cited in the Pergament article. Volumes 1, 15, and 53-54 (bound together) have small rips in the binding. (This is obviously the original binding.) Micrometer measurements of these rips show thicknesses of .016, .018, and .021 inches. Although these, on average, are a bit thicker than what I prefer to use on timpani (my preference is .012-.016 inches),

“The timpanist knows how to adorn the music with his playing. Such playing is done with certain movements of the body and hands, which in other contexts would appear laughable.” — J.C. and J.D. Stoessel, Kurzgefaßtes Musikalisches Lexikon, Chemnitz, 1737

19th-Century “Machine Timpani”

The 18th-century orchestra saw increasing use of the trumpet/drum “ensemble,” usually consisting of two trumpets (occasionally three) and a pair of timpani. The inclusion of these instruments meant that more tonal color and increased volume of sound and energy level were available. Trumpets and timpani were most often used in the faster movements—at the beginning, the end, and important cadence points throughout.

The timpani were tuned to the tonic and dominant pitches of the key in which the piece was written. Since it took a relatively long time to change pitches—ideally, all of the tuning bolts around the circumference of the skin had to be adjusted equally—the composer was faced with a problem whenever modulating out of the original key: either have the timpani play their initial pitches (which might or might not be part of the new harmonies) or else have them not play at all, thus reducing the energy level. Neither solution was satisfactory.

Inventors in the 19th century set to work to make faster tuning changes possible. In 1812, the first report of a Maschinenpauken appeared in the journal Allgemeine musikalische Zeitung. The “machine” purported to allow almost instantaneous adjustment of pitch by means of some sort of mechanical device (there are no surviving examples of these drums). The following 70 years saw numerous designs of Maschinenpauken being announced in the musical press, with inventors in Germany, Italy, France, and England coming up with several different designs of varying complexity and success, employing various types of gears, cog-wheels, and levers operated by foot pedals or handles. In 1881, the “Dresden” timpani appeared on the market, utilizing a lever mechanism operated by a combination of foot pedal and master tuning handle. This Dresden design soon became the design of choice for most professional timpanists; it remains so—with certain modifications—down to the present day.

The Maschinenpauken, however, had drawbacks. Many of them weighed so much that two men were required to move one drum. Others had noisy mechanisms. One design required the player to rotate the kettle around a central threaded bolt, which meant that every pitch was played on a different part of the skin (this was not good, because there is typically one location on the skin—usually close to the backbone of the animal—that sounds best). Because of these drawbacks, the traditional “historical” timpani—without a “machine”—was still in common use, except in orchestras that had a relatively permanent seating arrangement.

Diagram for a Cornelius Ward patent, 1837, in the National Music Museum.
they certainly would be in the realm of acceptability – and such a thickness can definitely be played in tune.

A big surprise

In 1982 I was asked to participate in a recording of Bach’s Mass in B Minor, directed by Joshua Rifkin. Mr. Rifkin wanted historical timpani to be used (at that time I was using modern timpani kettles, with the tuning pedals removed), and the recording company had agreed to pay for restoring a set of drums to performing condition – if any suitable instruments could be located. Fortunately, the collector Robert Rosenbaum of Scarsdale, New York, agreed to the loan of timpani he owned, described as “Würzburg, ca. 1730.” The only obvious shortcoming of the instruments was the condition of the heads, which were unplayable.

After getting two new calfskins, I started the process of installing them, the first step of which was to remove the hoops, and with them, the old skins. Upon removing the first hoop, I peered inside and had one of the biggest surprises of my professional life: there was a piece of copper shaped like a trumpet bell, attached to the bottom around the air hole, projecting upwards (see photo on page 31)! Both drums had identical trumpet bells, each measuring approximately 5 inches high, with a diameter at the top of 5 inches, tapering down to 1 inch at the bottom, where they were soldered to the kettle around the air hole.

My interest was piqued, and subsequent research has yielded much fascinating information about these devices. The German word for them is Schalltrichter, or Trichter. They were a common feature in timpani fabricated in Germany for close to 300 years, ca. 1600-1880. In addition to the numerous surviving examples, there are 12 published sources in German that mention them; these sources not only attest to their ubiquity, but also describe them and their function in detail. The earliest, J.P. Eisel’s Musicus autodidactos (1738), states that when the drum is hit, the Schalltrichter vibrates back and forth, helping to create a “resonant reverberance” (saussenden Nachklang). J.G. Vogler, in a lecture delivered in 1800, compares the Schalltrichter to the belly (table) of a stringed instrument, noting that the copper must be “paper-thin.” Georg Fechner, in Die Pauken und Trommeln (1862), gives one of the most complete descriptions, stating that “…the bottom of the kettle has a round hole, and above this is a Trichter the size of a Waldhorn – i.e., the top of the bell is a foot (11.5 inches) wide and the bottom ends at a hole whose diameter is 1.5 inches; the wider end almost reaches the skin. The tone, or sound, made by the instrument is produced by striking the skin with sticks; from this the vibrations spread and are led out the bottom of the instrument by the Trichter… It is clear that the funnel-shaped bell is an extremely important
part of any drum, since it would otherwise make only a dull rumble.” (The Saxon Fuss used by Fechner is slightly smaller than the English foot.) Dimensions similar to Fechner’s appear in Riemann’s *Musiklexikon*, first edition (1882), remaining there through the seventh edition (1929).

I have examined many historical German timpani and have seen photos of numerous others. The vast majority of these drums either have *Schalltrichter* or show evidence of solder marks around the bottom air hole where one was previously. Between the surviving instruments and the contemporaneous published sources, it is safe to say that *Schalltrichter* were present in most – perhaps all – of the timpani produced in Germany over a long period of time. From personal experience, I can add that the process of making and installing them is not simple. It is clear that many makers (and their customers) felt that the drums were enhanced by having a *Schalltrichter* included.

*Schalltrichter* came in many sizes and shapes. The earliest one that can be documented (1620, found in the Bayerische Nationalmuseum) is in the typical trumpet bell shape, measuring only 3 inches high, with a diameter at the top of 4.4 inches. This is the smallest one I have encountered. Most *Schalltrichter* are larger, with the Waldhorn size described in the late 1800s being the largest. It may be, during the more than 250 years of its existence, that the *Schalltrichter* gradually became larger (more research is needed).

Although the typical shape was like the bell of a brass instrument or a funnel, there were other shapes – like a goblet (see opposite) or a saucer on top of a conical base.

The question of how often *Schalltrichter* were included in instruments made in other areas of Europe must remain open at this time. Jeremy Montague says that he has seen no examples in England. As for France, I know of only one set of timpani with *Schalltrichter*, and these are located in the foothills of the Pyrenees Mountains, far from the usual performing centers. The only evidence of *Schalltrichter* in Italy that I have found is in Pietro Pieranzovini’s *Metodo Teorico-Pratico…* (1860), which includes a diagram of *Schalltrichter* with a diameter of 10 inches and a height of 8 inches – similar in size to those described in Fechner and Riemann.

**The sticks or mallets**

For the player, there is one more important craftsman – the furniture maker with skills on a lathe, which enable him to make his sticks.

For the modern researcher, the same problem of documentation exists as with the timpani themselves – none has a maker’s name or date on them. Even if a set of historical drums is located with “old-looking” sticks, there is no way of telling whether those sticks were...
intended to be used with those particular drums when they were first built (they need to be given a certain amount of respect, nevertheless). Fortunately, there is a small amount of published documentation on sticks.

Until the 19th century, all sticks appear to have been made of a single piece of wood. The main questions requiring answers are: what woods were used, what were the dimensions, and when did the bare wooden ends start being covered, and with what? Daniel Speer (1687) provides the first written description for sticks, stating that they are turned (on a lathe) so that there is a small “wheel” (knob) at the end; he adds that a length of string or rope should also be attached to the stick and wrapped around the player’s wrist or fingers to prevent it from falling to the ground (especially important for drummers on horseback).

Several different types of hard wood are mentioned, including boxwood, cherry, maple, ebony, pear, hornbeam, and crabtree. The density, weight, and “feel” of these woods vary, but all seem to work well.

J.A. Hiller, in the Wöchentliche Nachrichten, January 11, 1768, suggests specific measurements for sticks: length – 12-13 Zolls (11.5-12.5 inches), diameter of the wheel at the end 1 1/2 Zolls (ca. 1 3/4 inch).

Volume 16 (1765) of the famous French Encyclopédie (ed. Diderot, et al.) states that timpani sticks (which sound better than field drum sticks) are 8-9 poucer long and have a “petite rosette” at the end. The Chambers Cyclopedia (London, 1781) essentially translates the Encyclopédie article and shows a length of 8-9 inches.

According to J.H. Koch (Musicalische Lexikon, 1802), “When timpani are played in an orchestra, the sticks being used must be covered with a band of felt or similar material that is not so hard, so that this very loud instrument is somewhat muted, and does not overpower the others.”

Recent archival research in Thuringia (Germany) has uncovered several payments to a court furniture maker for bare wooden sticks as well as for “Baucken Knöbdel mit Fültz” – timpani sticks covered with felt. This discovery provides justification for playing Mozart and Haydn with sticks having some sort of covering.

I use two different pairs of sticks. For normal orchestral work I use a pair with 12-inch shanks with a 1 ¼-inch knob at the end (close to the 1768 Hiller measurements). For solos (see sidebar “Historical Tips on Playing Technique”), I use slightly smaller sticks that are copies of sticks I encountered in 1982 (see “The Big Surprise,” above).

On rare occasions (e.g., pianissimo passages in a slow movement), I will wrap a leather or felt covering over the ends of a pair of bare wood sticks.

Ben Harms’s career as a percussionist has ranged from performing Medieval, Renaissance, and Baroque music with a number of early music groups, including Calliope, to premiering works by Steve Reich, Olivier Messiaen, and others, to playing with the Metropolitan Opera Orchestra (since 1968). He is the owner of Harms Historical Percussion.
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