THE EVOLUTION OF BRASS INSTRUMENTS AND ORCHESTRAL BRASS WRITING FROM THE LATE CLASSICAL PERIOD TO THE END OF THE ROMANTIC PERIOD

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In a 2009 interview, Christoph Eschenbach, conductor of the National Symphony Orchestra, stated that "Mahler is certainly the greatest symphonist ever."[1] Most brass players would be inclined to agree with that statement; the composer's parts for brass are some of the most difficult and rewarding in the repertoire, giving the entire brass section a very large role to play. The brass were not always such an important part of the orchestra, however. Before the high point of Mahler's writing could be reached, musical tastes had to undergo significant change and the instruments themselves changed radically.

Brass instruments during the Classical period were significantly simpler than they are today. The two primary brass instruments used in the orchestra were the horn and the trumpet. Of the two instruments, the horn could be considered the more versatile. There were two type of horn in widespread use during the classical period; the standard orchestral horn, and the *cor solo* or *Inventionshorn.*[2] All horns of the classical period lacked valves, and thus could not naturally play every note of the chromatic scale. They were largely limited to the notes of the overtone series. This series begins with the fundamental pitch, the lowest note the instrument can produce. This determines the key of the instrument; a horn in F produces an F as the fundamental pitch. This fundamental

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[1] Universal Edition. "Christoph Eschenbach on Gustav Mahler." *The new Gustav Mahler Blog by Universal Edition,* July 10, 2009. http://mahler.universaledition.com/christoph-eschenbach-on-mahler/ (accessed December 18, 2011).

[2] John Ericson,"The Natural Horn and its Technique." *The Natural Horn,* n.d. http://www.public.asu.edu/~jqerics/natural_horn.htm (accessed December 17, 2011).

pitch is followed the first overtone, which is an octave above the fundamental pitch. The second overtone is a perfect fifth above the first overtone, and the third overtone is an octave above the first overtone. From this point, the overtone series outlines a dominant-seventh chord in the key of the fundamental pitch. For example, a horn pitched in F would produce an F as the fourth overtone, with the fifth overtone being an A, the sixth a C, and the seventh overtone an E-flat. The eighth overtone is an octave above the fourth overtone. The overtones that follow approximate a major scale in the key of the fundamental pitch, though the eleventh, thirteenth and fourteenth overtones are quite out-of-tune; the eleventh overtone is around a quarter-tone sharp, as is the fourteenth. The thirteenth overtone is about a quarter-tone flat. [3]

The limitations presented by the harmonic series are difficult to surmount. One of the greatest issues with these instruments is that they are constrained to a specific key. As they are only capable of sounding the pitches that outline a dominant-seventh chord and major scale in the key of their fundamental pitch, the instrument ceases to produce useful notes when the music modulates. The two types of horn previously mentioned are differentiated by the method used to solve this issue. The standard orchestral horn, the older of the two Classical period styles, featured what are known as terminal crooks. As the name implies, a terminal crook is a coiled tube inserted into the end of the instrument, where the mouthpiece is normally placed. The mouthpiece is then placed in

[3] Reginald Bain, "Bain: The Harmonic Series (Overtone Series)." *University of South Carolina Music Department,* 2002. http://www.music.sc.edu/fs/bain/atmi02/hs/index-noaudio.html (accessed December 16, 2011).

the other end of the coiled tubing, lowering the fundamental pitch of the instrument. Because of this, orchestral horns were made to be quite short, as high as C alto, a fifth above the modern horn in F. Terminal crooks were supplied for various keys, lowering the fundamental pitch of the instrument with crooks long enough descend to B-flat basso, a fifth below the modern horn.[4] The *cor solo* was a later invention, based off of the German *Inventionshorn*. The *Inventionshorn* appeared around 1750, with the *cor solo* appearing a few decades later. Both instruments differ from the orchestral horn by featuring a fixed leadpipe and mouthpiece receiver. Rather than using the system of terminal crooks already developed, these instruments use a U-shaped style of crook that is inserted in the middle of the instrument, replacing the tuning slide. This allowed for more expedient crook changes and also made them less disruptive for the performer. While the addition of crooks made horn usable in any key, the instrument was still limited, essentially, to the notes of the major scale. This was overcome, however, by the technique of hand-stopping.

Classical hand-stopping technique is somewhat different from the modern style. The modern style of hand-stopping produces sort of piercing, rattling sound, but the technique of the Classical period produced notes that were simply muffled. Through variations of right-hand position within the bell of the horn, players could produce a chromatic scale, albeit with changes in tone color and volume.[5]

The trumpet of the classical period was even more limited than the horn. Also lacking valves, the trumpet was quite long, allowing the useful notes of the overtone

[4] Ericson, "The Natural Horn and its Technique".
[5] Ibid.

series to be produced lower in the range of the instrument compared to modern trumpets. Due to this length however, the technique of hand-stopping was not available to trumpet players. An *Inventionstrompete* was produced that allowed for hand-stopping, but the technique did not carry over to the trumpet particularly well, and was not frequently used.[6]

Because of these drawbacks, both the horn and trumpet were used in a rather limited way by Classical symphonists. Mozart, for example, called for the horn frequently (usually in pairs), but only occasionally used the trumpet. There are a number of possible reasons for these limitations in use. Primary among these is the limitations of the instruments themselves. Brass instruments were poorly equipped to manage the addition of extensive development sections that included frequent modulations. Additionally, as modulation between different movements within a piece became the norm, the constraints on the use of brass instruments became more pronounced. Another issue is the role of brass instruments in daily life during the time period. Brass instruments, particularly trumpets, were associated with the court and nobility, as well as with the military. This may be a reason for the decline in the use of brass, as the symphonic genre was not particularly related to either of these things. When brass instruments were used, they served only to reinforce the harmony, or to provide impact at dramatic points within the music. Mozart's Symphony No. 7 in D Major, K.45, provides a good example of this style. Throughout the work, the horns are treated with much more independence than

[6] Edward Tarr, *The Trumpet,* Chandler, AZ: Hickman Music Editions, 2007, 96

the trumpets, with the first horn having occasional counter melodies with the second horn. The trumpets serve only to provide impact, reinforcing the harmony in tutti sections.[7] They also play almost exclusively with the timpani. At the time, the trumpet was very closely associated with the timpani; in fact the association was so close that the players of both instruments in and around modern-day Germany belonged to the same guild, the Imperial Trumpeters' and Kettledrummers' Guild. The When Mozart modulates to G major in the second movement, the brass are left out completely, returning in the two following movements. Most other composers wrote in a very similar style, with Ludwig van Beethoven being the first composer of note to show meaningful change in style.

One of the most significant changes Beethoven made to orchestral brass writing was the addition of the trombone. Although Mozart famously made use of the trombone in his Requiem, it had yet to be utilized in a symphonic context. A Swedish composer by the name of Joachim Nikolas Eggert included trombones in a symphony premiered on May 14, 1807, but this work had no historical impact.[8] Beethoven's Symphony No.5 in C minor, Op. 67, is the first symphonic work using the trombone to have any historical impact.[9] Beethoven uses a trio of trombones in the finale; an alto trombone, a tenor, and a bass. These instruments added significantly to the brass sound and set a precedent for

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[7] Wolfgang Amadeus Mozart, *Symphony No. 7 in D Major, K.45.* Leipzig: Breitkopf and Hartel, 1879.

[8] Avishai Kallai, "Revert to Eggert." *British Trombone Society.* 2006. http://web.archive.org/web/20060829105547/http://www.trombone-society.org.uk/resources/articles/kallai.php (accessed December 16, 2011).

[9] Ibid.

later composers to follow. Trumpets and horns are also treated in a drastically different fashion from Mozart's style, with the trumpets even leading the melody at brief points during the finale. Beethoven's horn parts frequently burst through the texture with countermelodies, similar to but much more complicated than those in the previously-mentioned example by Mozart.[10] Beethoven continued to write for trombones in his sixth and ninth symphonies.

The Ninth Symphony is notable for a number of reasons, including Beethoven's use of brass. In the end of the final movement, the trumpets lead the way with a restatement of the "Ode to Joy" theme, a recollection of their previous function of triumphant, herald instruments, and the parts for all of the brass instruments are quite integral to the work as compared to earlier composers such as Mozart. Beethoven also has the horn and trumpet players switch tunings on their instruments in the midst of the piece, with the trumpets switching between D and B-flat, and the horns switching between E-flat, D, and B-flat basso. This allows the instruments to deal with the various modulations that occur within the work. There is not much evidence of this occurring prior to the Ninth, but it occurs very frequently in works following it. Beethoven's Ninth Symphony essentially set the tone for much of the orchestral brass writing that came after it. The brass are all integral to the piece as a whole, and play an important role in building tension and leading the melody. However, Beethoven failed to take into account

[10] Ludwig van Beethoven, *Symphony No. 5 in C minor, op. 67.* Leipzig: Breitkopf and Hartel, 1862.

new developments in brass technology that would drastically alter the use of the brass section in orchestral writing.

The most important development in brass instrument technology was the invention of the valve. The most basic form of valve was invented in 1814 by Heinrich Stolzel. The valve system he developed, which bears his name, is a crude type of piston valve. Air enters through the bottom of the last valve in the sequence, where it is either diverted off to an extended loop of tubing similar to a crook, or allowed to pass through the valve body itself and through a port in the valve casing to the top of the next valve. The air then travels down through this valve, where it again may be diverted to an additional tubing loop. The air exits the bottom of the valve, entering through the bottom of the next valve, and from there to the bell of the instrument. These valves were immediately applied to horns as well as trumpets, allowing them to play a chromatic scale through any part of the instrument's range.[11] Experiments continued to take place, with various valves being placed on many different instruments. One of these experiments involved the attachment of Stolzel valves to the common post-horn, resulting in what was known as a cornopean. This instrument quickly evolved to become the cornet, which was the first widely-used high brass instrument with valves. Valves were not the only type of pitch-changing device being experimented with, however. They key system in common use on clarinets, bassoons, and other instruments was also applied to the brass family. This resulted in the keyed trumpet (which Haydn and Hummel famously wrote concerti for) and a large, bass instrument called the ophicleide.

[11] Tarr, 105.

The ophicleide was a modernization of an outdated instrument known as the serpent. The serpent was a large, wooden, conical-bore instrument curved in an S-shape that dated back to the Renaissance. The ophicleide, which roughly translates to "keyed serpent", somewhat resembles a modern baritone saxophone, and features similar keywork. This instrument provided a new and much-needed bass voice to the brass section, and was utilized by Hector Berlioz in his *Symphonie fantastique*.

Berlioz' *Symphonie fantastique* itself is worthy of mention for its use of brass. It is one of the first orchestral compositions to call for cornet, and it also features a part for the ophicleide. As was the case in Beethoven's Ninth Symphony, the brass play an integral role in the composition, with a cornet solo included in the second movement, possibly written for the great cornet virtuoso Jean-Baptiste Arban. The low brass are put to great use in the fourth movement, "Marche au supplice", and the ophicleide sounds the *dies irae* motive in the final movement. Though *Symphonie fantastique* is generally considered an early-Romantic piece, the expanded brass section and the increased role that it plays sets the precedent for later composers, such as Anton Bruckner, Gustav Mahler, and Richard Strauss.

Bruckner, Mahler, and Strauss are all quite well-known for their use of brass in their symphonic compositions, and the time period in which they were writing could is a "golden age" of sorts, in terms of the role of brass in the orchestra. By the time these composers were writing, the orchestral brass landscape had changed significantly. The cornet had gone by the wayside, and had been replaced by the valve trumpet in F, or

occasionally smaller trumpets in B-flat or C. The low-brass retained the use of trombones, but the ophicleide was discarded in favor of the tuba, the largest member of Adolphe Sax's family of brass instruments. The tuba projected significantly better than the ophicleide, and was much more manageable in terms of pitch due to the use of valves and tuning slides on the tuba.

With the addition of the tuba, the power of the low brass was increased significantly, and the brass section for the modern symphony orchestra was essentially complete. Mahler, however, perhaps out of his desire to portray a more grandiose and universal concept within his works, expanded the brass further still. Mahler, in his first symphony, calls for seven horns, four large valve trumpets in F, and the usual complement of three trombones and tuba.[12] In his second symphony, he calls for six trumpets, with four additional trumpets offstage, as well as ten horns, four trombones, and a tuba.[13] In Mahler's works, as well as the compositions of Strauss and Bruckner, the brass tend to dominate the texture, and the parts written for all the instruments are quite difficult. Strauss' *Also Sprach Zarathustra* and *Sinfonia Domestica* are well-known for their difficult trumpet parts, demanding much in terms of range and endurance.[14] Bruckner is notable for his use of different tunings for the trumpet; in his fifth symphony, he requires nine different tunings, with the tuning being altered sixty-two times.[15] This, along with the works of Wagner, created the need for trumpet players to learn sight-

[12] Gustav Mahler, *Symphony No. 1.* Vienna: Universal Edition, 1906.

[13] —, Symphony No. 2. Vienna: Universal Edition, 1910.
[14] Tarr, 112.
[15] Tarr, 109.

transposition, as switching between the various tunings required by changing instruments or crooks is far too cumbersome and time-consuming to be practical. For all brass players, the solos and important soli sections of works by Mahler and Strauss make up a significant portion of standard audition repertoire. As important as the works of Bruckner, Mahler, and Strauss are, theirs is not the only style of brass writing for the time period. The works of Johannes Brahms feature a markedly different kind of writing.

Johannes Brahms, while composing at the same time as Bruckner and Mahler, took a much more conservative approach to music. His work shares much with Beethoven, although his harmonic language is more progressive. Brahms was quite familiar with the brass instruments, having played the natural horn earlier in life, and despised the sound of the valved instruments being developed in his time. He even went so far as to call the valve horn a "tin viola".[16] Because of his views on music and on instruments, Brahms wrote in a very classical style for the brass. Trumpets were used generally in pairs, usually in unisons and octaves, and largely within the limits imposed by the overtone series. In all of his symphonies, Brahms calls for horns in pairs; two in C and two in E in the first symphony, D and E in the second, C and F in the third, and C and E again in the fourth. By the time the fourth was performed in 1885, horns with valves, pitched in either F or E-flat were in wide use, making his style archaic.

With impressionistic music as well as the move away from tonality that occurred in the early twentieth century and the beginnings of serialism, this "golden age" of brass writing came to a relatively abrupt end. Brass continued to play a role, but were poorly

[16] Tarr, 107.

suited to the relaxed and contemplative nature of impressionistic music. With serialism and other related, atonal music, brass instruments are naturally at a serious disadvantage to other members of the orchestra such as the strings and winds. Because all pitch production on brass is essentially regulated by the performers' embouchure and ear, and the fact that any given valve or slide combination can produce multiple notes, the accuracy needed to perform these works is difficult to obtain. In contrast, on string or woodwind instruments, correct finger placement is really all that is necessary to produce the correct pitch, making them much more suited to serial and other atonal works.

The previous examples show that this "golden age" of brass writing occurred due to a combination of changing musical tastes, technological innovation, and the creative energies of a few important composers. Brass instruments played a very small role in the Classical period as a whole, despite the period being a high point of orchestral composition. Beethoven forged new ground with the introduction of the trombone to the orchestra and his increased use of brass overall. Berlioz adopted the newest instrumental technology to add to his *Symphonie fantastique*, and Bruckner, Mahler, and Strauss brought the orchestral brass to unforeseen heights, writing works that continue to challenge and inspire performers to this day.

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