A Instruments of the Orchestra

INTRODUCTION

The symphony orchestra has been a fixture of Western concert music since the early 18th century. It grew in size over the course of the 19th century as composers added new instruments and increased the number of players. Today, a professional orchestra is likely to contain about a hundred musicians. These are divided into sections of various sizes based on the instruments they play.

Orchestras include four different types, or families, of instruments. These are known as the **strings**, **woodwinds**, **brass**, and **percussion**. The instruments contained in each family share a means of sound production, but they come in different sizes and might be made of different materials. As a result, they play in different ranges and with different timbres. Each instrument of the orchestra also has different strengths and weaknesses. Some can play with great agility, while others are better suited to sustained pitches. Some are loud and piercing, suited to prominent solo lines, while others are more subtle. Composers who write for the orchestra must carefully consider the characteristics of each instrument. When the symphony orchestra is used well, however, it is capable of producing an extraordinary variety of sounds.

To hear each of the instruments in the orchestra and see a demonstration of its capabilities, please visit this webpage maintained by the London-based Philharmonia Orchestra: https://www.philharmonia.co.uk/explore/instruments.

THE STRING FAMILY

All orchestral string instruments produce sound when a vibrating string causes a hollow wooden body to reverberate. On all instruments except the harp, the strings are usually set into motion with a bow, although they can also be plucked. Modern bows are strung with horsehair, while the strings themselves are made out of various metals. Because string instruments are not very loud, there are usually a lot of them in an orchestra.

Violin

The violin is the smallest modern string instrument. It has four strings and plays in a high range. In an orchestra, there are two sections of violin players: the first violins and the second violins. The first violins often have the melody, while the second violins are more likely to play harmony in a lower ranger.

Viola

The viola looks nearly identical to the violin, but it is somewhat larger. Although it also has four strings, they sound at a lower pitch. As a result, the viola plays in a lower range and produces a richer timbre.

Cello

The cello sounds one octave lower than the viola. It is also much bigger, and is held vertically between the knees instead of on the shoulder. It is supported by a metal rod called an endpin.

Bass

The bass is the largest member of the string family, and it sounds in the lowest range. Although it looks somewhat like a large cello, the shape is different: notice how the upper part of the body slopes into the neck. The bass is also tuned differently. It is the least agile of the string instruments and seldom gets time in the spotlight, although a virtuoso performer can do amazing things with it.

Harp

The harp is only distantly related to the other string instruments. Each of its 40+ strings is tuned to a different pitch, and they are plucked to produce sound. The harp is inaudible when the rest of the orchestra is playing, but it is often assigned important solo passages.

THE WOODWIND FAMILY

All woodwind instruments produce sound when the player blows into the instrument, thereby causing the column of air to vibrate. All woodwinds were at one point in history made of wood, except for the saxophone, which has always been made of metal. However, this is not why they are classified together as a group. The reason for this is their similar construction, which constitutes a tube with holes. The more holes that are covered by fingers or keys, the lower the pitch, while the fewer holes that are covered, the higher the pitch. Additionally, the shape of the tube will influence the timbre: cylindrical instruments produce clear and brilliant timbres, while conical instruments produce round, vocal-like timbres. The inner dimensions of the flute and clarinet exhibit cylindrical bores (the tubing

is of a consistent diameter) and the oboe, bassoon, and saxophone exhibit conical bores (the tubing gradually expands in diameter throughout the length of the instrument).

In many woodwinds, the use of a single or double reed further modifies the timbre. Over time, orchestral composers came to prefer a system of paired woodwinds—2 flutes, 2 clarinets, 2 oboes, 2 bassoons—as the standard woodwind section, adding other instruments as they desired for color.

Flute

Flutes can be made of various metals, although most professionals prefer solid silver. The player produces sound by blowing across an open hole near the closed end of the tube, and controls pitches both by depressing keys and increasing or decreasing wind pressure.

Flutes come in many sizes. It is typical for orchestral music to contain parts for the standard flute and a small, high-pitched flute called a piccolo. However, there are also larger flutes, including the alto, bass, and rare contra-bass flutes.

Clarinet

Clarinets are typically made of wood with metal keys. The player creates sound by blowing air into a mouthpiece with a piece of cane (a **single reed**) attached, which causes the reed to vibrate.

Like flutes, clarinets come in various sizes. Orchestras typically include a soprano clarinet (also called a B-flat clarinet) and a bass clarinet, which is twice as large (pitched one octave lower). Composers also write for other sizes, including the alto clarinet (which falls between the standard and bass clarinets) and the high-pitched E-flat sopranino clarinet.

Saxophone

The saxophone uses a single-reed mouthpiece similar to that of the clarinet, and the body of the instrument is made out of brass. Most sizes feature an upturned bell. The instrument's unusual name comes from its inventor, Adolphe Sax, who in the 1840s was seeking to create an instrument to blend the agility of the woodwind family with the large dynamic range of the brass family.

The saxophone is seldom found as a permanent member of the woodwind section in the orchestra, often appearing only as a soloist. However, it has become increasingly prominent in art music of the 20th and 21st centuries. It is best known for its use in jazz and popular music.

Oboe

The oboe is similar to the clarinet in construction and appearance, but in place of a mouthpiece containing a single reed it utilizes a pair of reeds protruding

from one end. The player blows through these reeds, causing them to vibrate and produce the distinctive nasal timbre of the oboe. All instruments that utilize this method of sound production are referred to as **double reeds**.

The English horn is a related double-reed instrument. It is somewhat larger than the oboe and produces a lower, richer sound.

Bassoon

The bassoon is the largest double-reed instrument. It gets its own entry here because, unlike the English horn, it is one of the core instruments of the orchestra and is used in almost every piece of music. The bassoon has a distinctive appearance: Its long resonating column rises considerably above the head of the player. Although the bassoon produces pitches in a very low range, composers sometimes employ an even lower-pitched version, the contra-bassoon.

THE BRASS FAMILY

All instruments in the brass family feature a cup-shaped metal mouthpiece into which the player blows air in a way that causes their lips to vibrate. As the family name suggests, the instruments are typically made of brass, and, although they come in many shapes and sizes, each essentially constitutes a long tube with a bell at the end. Brass instruments vary in terms of range (which is determined in part by the length of the tube) and the method by which the player controls the pitch. They also vary in the brightness of their timbre, which depends on whether the instrument is cylindrical bore (the tubing is of a consistent diameter until it opens into the bell) or conical bore (the tubing gradually expands in diameter throughout the length of the instrument).

Trumpet

The trumpet is the smallest—and therefore highest-pitched—member of the brass family. As a cylindrical-bore instrument, it has a brilliant, piercing sound. The performer controls pitch by depressing valves that open and close, which changes the length of the tubing, and by buzzing their lips faster or slower.

French Horn

The French horn plays in a range that is similar to that of the trumpet, but it sounds quite different. This is due in part to the fact that it is conical bore and in part to the fact that the length of tubing is much greater. A horn player holds the instrument with one hand in the bell, which allows them to additionally control pitch and timbre.

Trombone

Like the trumpet, the trombone is a cylindrical-bore instrument with a bright sound. Its greater size and length mean that it produces lower pitches. The most striking difference between the two instruments, however, has to do with the method by which the player controls the pitch. While all other brass instruments have valves that allow or prevent air from passing through lengths of tubing, a trombone player manually extends or shortens the length of their instruments by moving a large slide.

Euphonium

The euphonium is a conical bore brass instrument that fills the middle-low register of the brass section. It is similar in construction to a tuba, sounding one octave higher. It is not a standard member of the orchestral brass section, but it plays an important role in American and British wind bands.

Tuba

The tuba is the largest instrument in the brass family and plays the lowest notes. The tuba was introduced into the modern orchestra in the mid-19h century and is therefore one of the newest members of the brass family. Although it is operated much like a trumpet, the fact that it is conical bore and features an upward facing bell contributes to its more muted timbre.

THE PERCUSSION FAMILY

All percussion instruments create sound when a resonating body is set into motion following an impact. If this description seems vague, it is because percussion instruments employ an extraordinary variety of methods to produce sound. The simplest percussion instrument is a pair of clapping hands, while the most complex require extensive mechanical workings.

In general, percussion instruments can be grouped into pitched and unpitched classes. Pitched percussion instruments sounds specific pitches and are therefore able to play melodies and harmonies, while unpitched are used only to sound rhythms.

PITCHED

Piano

The piano is the most common percussion instrument. Indeed, it is usually classed by itself, for—unlike other percussion instruments—it is played by specialists who perform an enormous repertoire of solo music that has been created for the piano over the past three hundred years. What identifies the piano as a percussion instrument is its method of producing sound. When a player depresses a key on the

piano, it causes a hammer to strike a metal string, the vibrations of which produce sound within the wooden body of the instrument. The keyboard is laid out in a way that gives the player access to every pitch of the chromatic scale, while the mechanical action allows performers to control the dynamic level and sustain of each note.

The piano is closely related to other keyboard instruments that are discussed in this book, including the harpsichord and organ. These are described in the context of specific examples.

Mallet Percussion

Most of the pitched percussion instruments are laid out like a piano keyboard, but produce sound when the player strikes a key with a mallet. This in turn causes a metal tube positioned below the key to vibrate and produce sound. The marimba has wooden keys and a large range. Its timbre is mellow and resonant. The xylophone looks similar to the marimba, but it has a smaller range and produces a more articulated and piercing sound. The glockenspiel is smaller still and has metal keys that produce a bell-like sound.

Timpani

The timpani have a long history in the orchestra, and they are arguably the most important instrument in the percussion section. The timpani constitute a set of three to five drums with large copper bowls and taut resonating heads. Each drum is tuned to sound a specific pitch. Although the timpanist seldom plays melodies, the drums are often used to reinforce the harmonic structure of the music.

Unpitched

The list of unpitched percussion instruments is nearly endless. One of the most common is the snare drum, which has two taut resonating heads, the lower of which is strung with metal beads that produce a rattling sound. The player uses two sticks to perform rhythms on the upper head. Also common is the bass drum, which likewise has two heads and is played with a large, soft mallet. Various gongs and cymbals are made out of metal and either struck with a mallet or crashed together.