**Classification of brass instruments.** Classification, the systematic grouping of objects or ideas to facilitate their treatment, has been used by authors to arrange material in books, and by museums to arrange displays and catalogues.

Within most general classifications of musical instruments, a class of ‘brass instrument’ accommodates all instruments in which sound is generated by the player applying their lips to the instrument and blowing in such a way that the lips vibrate and admit an intermittent or fluctuating stream of air into the instrument. Anthony Baines introduced the term ‘Labrosone’ which corresponds to this definition of a brass instrument (Baines 1976, p.40). The term ‘lip reed instrument’ is commonly used, though the action of the player’s lip differs somewhat from that of the reeds in woodwind and free-reed instruments. Although brass is the most commonly used material, many labrosones are made of other materials. By analogy with woodwind instruments, the term ‘brasswind’ is often used for brass instruments used in the Western musical traditions.

Brasswind instruments are designed to play a range of notes, typically over one to four octaves, and to allow notes to be played which are intended to be ‘in tune’ with the prevailing conventional framework of pitch standards and temperament. Brasswinds are normally assigned a nominal pitch, i.e., to be in a key such as B♭ (see *Nominal pitch*).

Apart from simple classifications of convenience such as ‘high brass’ and ‘low brass’ or ‘heavy brass’, the most common division of brasswinds is into ‘conical’ and ‘cylindrical’. This is unsatisfactory on several grounds: there is very little purely conical tubing actually used in instrument making, and instruments with sections of cylindrical tubing generally do not have so much that the natural notes approximate to the odd members of a harmonic series (see *Harmonic series*) as they do in the ‘cylindrical’ clarinet as opposed to the ‘conical’ saxophone; for brasswind there is no dividing line between the two. The terms ‘conical’ and ‘cylindrical’ have intuitive meaning but are not clearly defined.
Many authors have devised classifications to organise their own material, or as a suggestion for wider use. A division into three classes by bore profile has been adopted by several present-day writers: typically a euphonium is regarded as a valved bugle, almost entirely conical, B♭ & F double horns are predominantly conical, and trumpets and trombones are cylindrical. It is not obvious where to place some instruments, such as a Wagner tuba or a cornet. A division into five families has been outlined by Edward Tarr (1984) based on subtler distinctions between bore profiles and bore diameters: wide conical bore, narrow mainly cylindrical bore, narrow half conical half cylindrical bore, narrow to wide conical bore, and very narrow, slightly conical bore. A more detailed and useful scheme was proposed by Adam Carse (1939). This includes mouthpiece profile as a principle of division. Carse’s highest level division is into: no mechanism, finger-hole or key-hole (shortening mechanism), valve (lengthening mechanism), slide (lengthening mechanism); subsequent divisions are by bore profile and width.

Carl Schafhautl (1854) introduced the concepts of ‘whole-tube’ and ‘half-tube’ brass instruments, the former being able to sound the pedal notes (see Pedal note) and the latter only the octave of the pedal note and higher members of the series of natural notes. This criterion depends, however, to a large extent on the abilities of individual players, and is not strictly related to musical practice.

Nicholas Bessaraboff in his 1941 catalogue of instruments in the Boston Museum of Fine Arts gave considerable attention to the taxonomic problems of brasswinds. Bessaraboff, an engineer by training, realised the limitations of the ‘whole-tube’ and ‘half-tube’ concepts, but retained them as a tertiary principle of division. A further failure of the ‘whole-tube’ and ‘half-tube’ division which he recognised is that a French horn crooked in 12-ft F or lower cannot readily sound the pedal but a French horn crooked in 11-ft G or higher can, so this principle of division can place a single instrument in two classes. In Bessaraboff’s classification, the primary principle of division is into conical and cylindrical instruments; his secondary principle is into ‘two-octave’, ‘three-octave’ and
‘four-octave’ instruments, depending on the highest in the series of natural notes available to the
player (this also depends on individual playing abilities).

Herbert Heyde (1975, 1987) proposed a classification of brass instruments following Linnean
taxonomy. His scheme uses successive division into Komplex, Abteilung, Stamm, Bereich,
Ordnung, Gruppe, Familie,Gattungskries, Gattung, and Art; these levels being subdivided or
omitted as necessary. His principles of division were: lengthening, shortening or no mechanism;
overall bore profile; bell shape; degree of cylindricality; and type of mechanism. Heyde in his later
work designated the relative lengths of the conical, cylindrical and flaring sections of an instrument
the Anteilverhältnis, and in his catalogues gave this as two or three fractions whose sum is unity.
This approach breaks down, however, with instruments in which the tubing changes profile so
gradually that the position is indeterminate. Heyde also used as a parameter the ratio of $D_3$ (the
diameter in the bell at a depth of one bell diameter) to $d$ (the minimum bore in the mouthpipe, a
measure of the increase in diameter over the tube length up to the start of the final flare.

The best-known musical instrument classification is that of Hornbostel and Sachs (1914, translation
into English 1961). The primary purpose of the scheme is to allow curators to arrange objects even
when they know nothing about the music or culture of origin. Its treatment of brasswinds is
superficial with a primary division into natural and chromatic, then divided morphologically
(natural instruments) or by mechanism (chromatic instruments). These are the easiest attributes to
be recognised by someone with no specialist knowledge of species of brass instrument. For valve
instruments (only) there is a simple categorization by bore profile. The original Hornbostel-Sachs
classification failed to divide the common brasswind species into classes which correspond to how
the instruments are treated by makers, musicians, and composers. Although musicians readily
recognise $B_b$ trumpets, $B_b$ cornets and $B_b$ flugelhorns as types each with significant museum
populations, this distinction was not accommodated. Also, with other types of brasswind (such as
baritone saxhorns and euphoniums) one accepted species of instrument can merge into another
without a clearly defined boundary. In 2011 the Hornbostel-Sachs classification was revised by the MIMO (Musical Instrument Museums Online) Consortium and is now available on the CIMCIM (Comité International des Musées et Collections d’Instruments et de Musique) website. The primary division (with or without extra devices to alter the pitch while playing) was retained, and at the secondary level the ‘chromatic’ labrosones were divided into those with toneholes, those with slides and those with valves. Below this came a more rigorous treatment of the acoustically important features of tube shape and bore size; tube length was also introduced as a criterion. It is generally recognised that the timbre (see Timbre) of a brass instrument depends largely on its bore profile. Parameters can be defined which reflect the acoustical reasons for this dependence. One important acoustical phenomenon is the non-linear propagation of sound waves passing through a tube, which is more pronounced in relatively narrow tubing. This accounts for the brighter timbre of instruments with more near-cylindrical tubing such as trombones when compared with instruments with more expanding tubing such as euphoniums. A measure of this aspect of bore profile is the ‘Brassiness Potential’ parameter which can be derived from the geometry of an instrument (Myers et al 2012). By giving numerical values instead of a loose conical/cylindrical division this allows a detailed brasswind classification related to timbre, the disadvantage being that time needs to be allowed for measuring and calculation.

Kartomi (1990), Myers (1998)

Arnold Myers

References


