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PREFACE

The Missouri Journal of Research in Music Education, published as a Bulletin of the State Department of Education, is devoted to the needs and interests of the school and college music teachers of Missouri and the nation. This issue, Volume II, Number 3, is the eighth to appear in as many years.

The members of the Editorial Committee are grateful to those readers who have written suggestions concerning the content of past issues and request that criticisms and suggestions, always welcome and never unheeded, again be sent to the Editor concerning the content of this issue. We strive for a reasonable balance between music theory, history, philosophy or aesthetics, and pedagogy. It is difficult to judge how successful we are without reader response.

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— The Editor

WIND INSTRUMENTS IN THE SEVENTEENTH CENTURY

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INTRODUCTION

Relatively little information exists in documental form regarding the history of wind instruments in the seventeenth century. One author states that until recently the arts of that century were "dismissed with contempt"[1] while another notes that historians of the nineteenth century labeled the period as "transitional" and avoided writing about it.[2] Research reveals that a radical revolution broke out at the opening of the century. A new appeal to the emotions began which developed throughout the Baroque era. This new style started in vocal music and was soon adapted to instruments.[3] The artistic ideal changed from dignity and rigid majesty to emotion and the "genuine language of the heart."[4]

For the first time, instrumental music rivals music for voices. The polyphonic style which had restricted instruments to a compass of a tenth to avoid interfering with neighboring parts, was being replaced by monophonic writing.[5] Praetorius, in the preface to *De organographia* from his *Syntagma musicum* (1618), observed "a growing emphasis on the spectacular and colorful and . . . a striving towards more direct expressiveness and greater overt emotional effect."[6]

One historian has categorized the causes of instrumental change during the century as follows:

1. The amazing development of instrumental technic, which went hand in hand with the perfecting of the instruments themselves.
2. The increasing differentiation between nationalities of musical needs and taste.
3. The vitality of the polyphonic method as it applied to instrumental music.
4. The new monophonic conceptions of musical materials.[7]

Two sources which offer the best contemporary insight into the instrumental practices of the early portion of the period are the well-known works by Mersenne, *Harmonie universelle* (1636), and Praetorius, *Syntagma musicum* (1619). Of greatest value in the publication by Praetorius are the descriptions of instruments found in the second volume and the woodcuts showing those in use at the outset of the century. The *Harmonie universelle* also contains valuable descriptions of the instruments and their use.

Consorts

An extraordinary number of diverse types of wind instruments existed in the early seventeenth century, nearly all of which were built in sets or consorts with one uniform tonal color from soprano to bass.[8] Little or no standardization of instrumentation was followed in ensemble music as to specified instruments. The instruments were selected which had a wide range and dynamic flexibility from loud to soft.[9] Those of similar tessitura and agility were regarded as more or less interchangeable. It was common for a musical household to have sets of various instruments.[10]

During the fifteenth and sixteenth centuries, musicians had played together in small groups of allied instruments. This tradition of wind consorts continued into the early seventeenth century. Normal wind consorts consisted of double-reeded shawms and bombards (or recorders). Trumpets and drums were relegated to military usage while the combination of sackbuts and cornetts continued in church music.[11] No new instruments were invented, however, and they all began to be subjected to a period of selectivity and refinement. Music at the time of Praetorius was a "mixture of ancient heritage and recent innovation."[12] Before the era concluded, it eventually became characteristic to write for specific instruments[13] but until that time the winds were used to double existing string or voice parts. Notes not playable were either transposed an octave or changed to other notes in the same harmony.[14] The doubling was not continuous and instructions were not always clear. The practice of Italian musicians is noted by Thomas Coryat who wrote in 1611 that in Venice he heard sixteen to twenty men sing together "and when they sung, the instrumental musicians played also." At times "sixteen played together upon their instruments, ten sagbuts, foure cornetts and two violdegambaes of an extraordinary greatness."[15]

The majority of the wind instruments such as flutes, shawms, and krumhorns, were constructed to tunings a fifth apart so they could be used in sets of three's.[16] An entire set of instruments ranging from deepest and largest to highest and smallest was called an *accord*. *Sorts* refers to groups of a single type of instrument.[17] A collection consisting of instruments of the same family was called a *whole consort* while those including various types were designated as a *broken consort*.[18] Consorts consisted of from four to twelve instruments; the principal wind instruments utilized were recorders, shawms, krumhorns, cornetts, trumpets, and trombones.[19]

In Italy, musicans capable of playing all instruments were classified as *universal musicians*. Many Italian musicians, however, emigrated to England carrying the tradition with them. Such players were seldom found in Germany where musicians attempted to master only one or two instruments.[20]

Waits

Wind players were often employed by a king, nobleman, or later, a city government, to serve as watchmen or sentinels in camps, castles, and towns. Their duties included the sounding of an alarm or signal on some kind of horn. In England, these watchmen-musicians were known as *waits.*[21] The instrument most commonly used by the waits was the shawm, constructed in various sizes so as to form a complete consort. The probability that the waits became relatively good performers is indicated by the fact that Thomas Morley dedicated his *Consort Lessons* to them.[22] Orlando Gibbons was the son of a Cambridge wait and his brother, Ferdinando, served as a wait at Lincoln.[23]

The waits' duties as watchmen gradually declined. A report in 1669 which states that "according to the ancient custom [they] shall play through this town every Thursday in the evening" suggests an emphasis on music rather than on patrolling.[24] The tunes used were relatively simple for they had to be memorized and often were played with cold fingers.[25] Some of these melodies are preserved in John Playford's *Dancing Master* published in 1665.[26]

Gradually the waits lost their importance and became known in later times as itinerant musicians who played in the streets at Christmas time.

Stadtpfeifer

In Germany the counterpart of the waits was known as *stadtpfeifer.* The major distinction existed in their use of different instruments. *Turmsonate,* or tower music, developed from the practice of sounding the hours of the day from church or municipal towers.[27] The usual ensemble was from four to eight players with trumpets, cornetts, and trombones as the principal instruments. One of the most prolific composers for this medium was Johann Pezel (1639-1694). His many compositions — in modern editions — are widely used today, primarily for pedagogical purposes. The stadtpfeifer raised the level of the brass ensemble to a peak unsurpassed until later centuries.

Church Guilds

In Italy the *canzonas* and *sonatas* of Giovanni Gabrieli (*ca.* 1154-1612) represented the final step away from the principles of mediaeval style.[28] His music for brass consort was written for performance in the resonant cathedral of St. Mark's. The *Sonata pian'e forte,* often noted as one of the first instrumental ensemble pieces printed which designates the specific instruments to be used, is essentially a Venetian double-chorus motet for instruments.[29] The work of Gabrieli and his followers became a dominant influence on the music of the seventeenth century.

The church was the greatest employer of musicians, often utilizing huge choirs. The mass written by Benevoli for the dedication of the Salzburg Cathedral (1628), used two eight-part choirs, two string ensembles, one group of woodwind instruments, and three of brass.[30]

Oboe Bands

Early in the sixteen-hundreds, bands of hautboys replaced the drums and fifes for military service in England.[31] Their use continued throughout the century. An example of their music, *The Queen's Farewell* (1694), composed for oboe band by Paisible for Queen Mary's funeral, has been reprinted by Anthony Baines in Woodwind Instruments and their History.[32] In France, Lully undertook the organization of the military bands in his time. He composed or arranged marches for oboes of different sizes.[33] This familiarity with the instrument may have been an influencing factor in his use of them in his operatic scores. Parts for the oboe bands during the reign of Louis XIV were divided three ways, the third part often calling for a tenor oboe (taille) or bassoon. Marches and salutes for the instrumentation are preserved in the Philidor manuscripts in Paris.[34]

King's Musick

English kings maintained a compliment of musicians known as *King's Musick*. Among their duties was the assignment to perform at dinner, usually on cornetts or hautboys and flutes or recorders. Sackbuts were added to the ensemble on Sundays and holidays.[35] An account of the company in 1635 lists nine hautboys and sackbuts, seven flutes, three to five recorders, and eight cornetts among the musicians. Many played more than one instrument.[36]

Members of the guilds tried to confine knowledge of their skills to members and apprentices. The town musicians in Germany and Italy were all in guilds and were thus insured a monopoly on teaching. The prestige of wind playing had, in most locations, started a decline by the middle of the century. The Italian conservatories which had their beginnings in the early seventeenth century, provided instruction which eventually contributed to a more widespread rise of instrumental music, the decline of the guilds, and made possible the development of the virtuoso performer.[37] These conservatories, generally supported by the church, often used their students' musical skill as a means of profit by hiring out groups for performances.[38]

THE RISE OF THE ORCHESTRA

Monteverdi (1567-1643) has often been credited with establishing the foundation of the modern orchestra when he used approximately forty instruments to accompany the opera *Orfeo* (1607). Included in his orchestra at the first performance at Mantua were parts for four trombones, two cornetts, one small flute, one trumpet, and three muted trumpets.[39] Twenty-six orchestral numbers were interspersed within the opera. Contrary to previous practices, the composer specified in many places exactly which instruments were to play. The large orchestra was not an innovation but an attempt to organize the traditional large performing groups of the old mystery plays and *intermedi*.[40] Unfortunately, his use of instruments was not readily accepted and it remained for the composers at the middle of the century to develop his lead.

Heinrich Schütz (1585-1672), a student of Giovanni Gabrieli, was perhaps the greatest German composer of the middle seventeenth century. As far as it is known, he wrote no independent instrumental music,[41] however, some of his works are of importance in the development of the orchestra. His *Symphonie sacrae* (1629) includes parts for cornett, violin, recorder, flute, trumpet, trombone, and bassoon.

All woodwind instruments of the modern orchestra with the exception of the clarinet, were actually represented in the latter Middle Ages. By refinement, the shawms and bombards became the oboes and bassoons and simple pipes developed into the transverse flute.[42]

Shawms (or oboes) did not begin to be regularly associated with strings in works of the better class of composers until after the middle of the century. The first mention of the oboe appears in Jean-Baptiste Lully's score to the ballet *Les plaisirs de L'Isle Enchantée* (1664) which contains a *March de Hautbois pour le Dieu Pan et sa Suite.*[43]

Lully (1632-1687) became the organizer of the orchestra. The tentative grouping of the ensemble into sections of strings, woodwinds, and brasses may be found in his scores. The woodwinds and trumpets are used in conjunction with strings and not, as was the case earlier, in place of strings.[44] Flutes and oboes are given parts in all of his operas. Usually they play in only six or seven scenes— dances, marches, and sometimes in *ritornelli* — and are generally omitted from the fuller ensembles and finales.[45] Episodes for a trio of solo wind instruments were inserted in some of the dances of Lully's operas.[46] The alliance of flutes, oboes, and bassoons in a family relationship is also evident in his works. The bassoons, however, appear irregularly. Trumpets — usually in pairs — are reserved for special scenes.[47] The trumpets were the first brass instruments to be admitted to the orchestra and were ordinarily inseparably associated with timpani.[48]

Marc' Antonio Cesti (1623-1669) used the standard group of ecclesiastical wind instruments in his opera, *Il Pomo d'Oro* (1667): two cornetts, three trombones, and a bassoon.[49] Parts for the cornett may be found in later scores by Bach, Handel, Gluck, and other eighteenth-century composers but basically it was an instrument which belonged to the pre-orchestral era.[50]

No known concerts devoted exclusively to the performance of instrumental music existed in France before about 1675. Instruments still retained their role of supporting voices, although in a more complex manner.[51] In the last quarter of the century, the orchestra was employed chiefly in churches and theatres in addition to concerts in private chambers of rulers and princes.[52]

Near the close of the century, string instruments were beginning to reach their peak of perfection due to the work of the craftsmen in Cremona. Woodwinds, although having assumed the form of modern instruments, were yet to be highly mechanized. The only woodwinds which were able to become a solid part of the orchestra were the double-reeds (oboes and bassoons). Nearly

every orchestra had two oboes and one or more bassoons which helped the cellos and doubles-basses.[53] The newly-developed oboe was capable of playing — with a good reed — "as easie and as soft as the [recorder]."[54] A pair of flutes, either recorders or transverse flutes, sometimes was substituted for the oboes. As a rule, the players doubled. It should be noted that in the music of Henry Purcell (*ca.* 1659-1695), flute meant recorder, *hoboy* signified the newly-developed baroque oboe, and *taille,* the tenor oboe (not cor anglais). Purcell also intended that the bassoon be used as a bass instrument although he does not always designate it as such.[55]

Adam Carse has aptly described the development of the orchestra during the century.

> From the uncertainty and chaos of "all instruments," a string orchestra, the basis of a woodwind band and the merest shadow of a brass band have emerged, all still strung together by the incongruous medium of lutes and keyboard instruments.[56]

The orchestra which was to be available to the young Bach and Handel was comprised of a four-part string orchestra with keyboard or chordal instrument, two oboes (or flutes) with bassoons as their bass, and two trumpets and drums.[57]

THE PARISIAN WOODWIND CRAFTSMEN AND THE NUREMBERG TRUMPET MAKERS

A wide variance in pitch existed throughout the century. Praetorius reports that because of this variance, it was not the practice to play all kinds of instruments together in ensemble, and that wind instruments were built differently; some were tuned high, others low. Ordinarily the cornett and shawm sounded better when constructed to a higher pitch whereas trombones, bassoons, bassanelli, and bombards sounded more "grave and splendid" when pitched lower.[58] The variance in pitch was often as much as a fifth with a different standard used for *chamber pitch* and *choral pitch.* The latter was lower.

The tuning of instruments varied greatly. Wind instruments were tuned a minor third lower in England than in Germany.[59] It was not until the succeeding century that pitch reached a very high degree of standardization. The tuning fork invented in 1711,[60] was a strong contributing factor.

String instruments, by the very nature of their construction, were able to adjust to variances in pitch. Before the flutes, oboes, and bassoons could be admitted to the orchestra, several improvements were necessary. First, it was essential to make them in two or more pieces so the pitch could be regulated. The bore needed to be improved to produce a smoother tone, and the cut of the reed had to be adapted to the new conditions, although we do not know exactly in what way this was accomplished.[61]

Jean Hotteterre

Jean Hotteterre (?-1678) was the leader of a group of French craftsmen who developed the recorder (as we know it today), the conical flute, the oboe, and the true bassoon as opposed to the old *curtal*.[62] A bagpipe maker, he redesigned the recorder into sections, making it possible for exact boring of each part of the tube, which improved the intonation of cross-fingered notes.[63] Plate 127 in *European Musical Instruments* shows recorders built by Jean Hotteterre.[64]

Hotteterre and Michel Philidor (?-1679) redesigned the shawm into a three-jointed instrument known outside France as the French oboe or in England as the French *hoboy*. The newly-designed bore assumed more narrow proportions and the finger-holes are smaller. The reed is more narrow and is completely lip-controlled. Good cross-fingerings exist on the new instrument. It was first played by the inventor in Lully's ballet, *L'Amour malade* (1657).[65] Reports indicate that the newly-designed instrument could be played nearly as loud as the trumpet and as soft as the recorder.[66]

Hotteterre and his wind-instrument-makers probably made the four-jointed bassoon known in England as the French *basson* and a three-jointed conical flute which eventually won out in acceptance from the recorder.[67] From 1653 forward, Lully used two oboes and a bassoon in his operas. The range of dynamics and tonal expressiveness was judged as fully equal with those of the violin.[68] All of Hotteterre's instruments were made with multiple joints, making it possible to give the bore a broken profile, and with characteristic ornamentation at the joints.[69] With the work of the Parisian craftsmen, France became a leader in woodwind instrument design which it has maintained into the twentieth century.[70]

Nuremberg Brass-Instrument Industry

In Germany, a brass-instrument industry flourished which was possibly influenced by the stadtpfeifer tradition. The central location was Nuremberg. Isaac Ehe was one of the principal makers of trumpets. Five generations of the family remained in business during the years from 1612-1794. Records indicated that twenty trumpets were sold to the Bavarian Court and thirty-six silver trumpets to the Brandenburg Court.

Prior to the Ehe dynasty, Hans Schnitzer sold twenty-four silver-gilt trumpets to the King of Poland (1604). Records in Leipzig list the purchase in 1607 of three trombones and two cornetts by the city.[71]

Flute

The beginnings of the transverse flute have been falsely placed at the time of Purcell and Handel. Its history is traceable to Eastern influence. Portrayals of it exist in ivory carvings and manuscripts of the tenth century.[72]

The transverse flute and end-blown flute (recorder) were competitors throughout most of the seventeenth century. There is evidence, however, that as early as the middle of the sixteenth century the French preferred the transverse flute to the recorder. The recorder was regarded as best for playing *chants rustiques*.[73]

The importance of the instrument in England is revealed by the report that Nicholas Lanier, who was "musician for the flute" under Queen Elizabeth, was charged with keeping two boys to teach them to play "Lez flutes et cornetts."[74]

The bore of the earliest transverse flutes was cylindrical. Towards the end of the century the head joint remained the same and the remainder of the tube assumed conical proportions (smaller at the open end).[75] After the development by Hotteterre, the resulting tone was much more veiled and colorful.[76] Lully is credited with introducing this improved transverse flute into the opera orchestra. By the end of the century, it was described as a "rival" of the violin.[77]

Recorder

The recorder existed under many names. Among those most encountered are: English flute, common flute, direct flute, echo flute, beak flute, flûte douce, and blockflöte. It has been described as a near relative of the *flageolet* and a low relative of the *penny whistle*.[78]

Praetorius wrote that it was difficult to set up a flute ensemble because it was seldom that flutes were available which were correctly in tune with one another. He observed that they were easily affected by heat and cold; the pitch became lower in winter and higher in summer. Praetorius suggested that it would be advisable to have two full sets of wind instruments—one set built a semitone below the other. Another method he proposed for coping with the pitch problem was to make the instrument with what amounted to a tunable head joint,[79] a feature which had to wait until much later in the century for development.

It was the practice to bore duplicate holes for the little finger in early flutes and oboes so the player could use either hand for the lower part of the instrument. The hole not used was filled with wax. When a key was used for the lowest hole, it was fitted with two finger plates for the same purpose.[80]

The tone of the recorder in the early seventeenth century was comparatively full but uncolored; it was well-suited to the consort music for which it was chiefly used.[81] Parts were sometimes distinguished from those for transverse flute by being written in the French violin clef.[82]

The larger models of the instrument in bass and contrabass forms, were fitted with four keys for the lowest notes. Two of the keys were sometimes operated by pedals.[83]

The decline of the recorder was not as rapid as many believe for in the records of the King's Musick, six recorders are listed in 1628; as late as 1764, four are still included.[84]

After Hotteterre's developments, the tone became less open and more reedy. The volume of sound capable of being produced on the instrument was insufficient for full orchestral settings.[85] This, along with its lack of flexibility to satisfy the growing demand for expression—dynamic and tonal contrast—caused the instrument to gradually lose favor.[86]

Flageolets and Pipes

The flageolet is a French variant of the recorder. It is said to have been invented by Juvingny in Paris in the late-sixteenth century.[87] Most commonly, it was considered as an instrument for amateurs.[88] The French flageolet had four finger-holes and two thumb-holes while the English version had seven finger-holes and one thumb-hole. The *quadrille* is a Boehm system flageolet.[89]

Fifes and drums took part in the English dramatic productions of the sixteenth century. In the seventeenth century, they used to attract a crowd. An implication that the performances were of poor quality is suggested by a warrant issued in 1671 by Charles II for the "apprehension of all persons beating Drums, or playing Fifes at dumb shows or models without the license of his Majesty's Sergeant Trumpeter."[90]

The use of the pipe and tabor was extremely common in Herefordshire and the Marshes of Whales. They were used by beggars and for peasants' dancing.[91]

Oboe

In the early part of the century, the term oboe, hautbois, and shawm were interchangeable. *Hautbois* has often been translated as "high wind," but doubtless meant "loud wood" according to the old French contrast between *instruments hauts et bas*.[92]

Two kinds of oboes were described by Mersenne as being in use in France; the *poitou* and the *hautbois*. The shape of the instruments was similar to the large block flutes. He describes them as being suitable for the large ensemble, capable of making "great noise." Their tone is called "the strongest and most violent tone of all the other instruments, except for the trumpet."[93] Hardly any other wind instrument was more frequently employed.

The earliest form of the modern oboe dates from about 1660 with the work of Hotteterre. It had a slim conical bore. The diameter at the lower end was twice the size of the diameter of the upper end.[94] By decreasing the taper and making the flare more narrow, the strident tone quality was reduced. The oboe then began an independent career as the first treble woodwind to become standard in the orchestra.[95]

The oboe served as the nucleus of the wind-bands of the seventeenth century, much as the clarinets do in present-day bands. The

new importance given to the instruments is again noted in an English Register, that of the Edinburgh Town Council of 1696.

> The Cornetts of the Town Waits were superceded by the 'French hautboye and double curtle, instruments far more proper than the instruments they now have to play upon.'[96]

Shawm

The shawm, like the recorder, existed under many names. In England it was called wait, wayte, waight, or haboy. In France the common name was hautbois. Other names used were schalmey, shalmuse, shalmele, and pommer (bombard or bombart for the lower-pitched versions). The shawm at the beginning of the century had no keys. Its tone has been described as:

> . . . fiery, penetrating and reedy almost beyond belief (even more so than a Highland bagpipe), and the instrument was used only for bands, not in chamber music or refined orchestras.[97]

Shawms were seldom heard alone. Most often they were used with cornetts and trombones.

An excellent description of a bass bombard, including dimensions, construction details, playing characteristics, and probable uses may be found in an article by Oromszegi which appeared in *The Galpin Society Journal.*[98]

Bassoon

The bassoon (fagott or curtal) family in the late Renaissance included all sizes from discant fagott, a treble bassoon, to *subkontrafagott,* a sub-double-bass bassoon.[99]

Mersenne illustrates three types of bassoons, a *fagott, courtaux,* and *cervelat.* The *cervelat* is a very small block approximately five inches in length which is drilled with eight holes, making the tubing forty inches long.[100] The tube doubled on itself, serves as a distinguishing characteristic between the bassoon and the old bass varieties of oboe such as the *pommer* or *bombard.*[101]

Gabrieli and Schütz are very likely the earliest composers whose bassoon parts have survived. The instrument is first named in Lully score in 1674, although it could have been in use ten or more years prior.[102]

The first contra-bassoon was made in 1620 by Hans Schreiber in Berlin. Its size made it awkward and the intonation was deficient. It failed to gain great importance in practical usage.[103]

The bass shawn or pommer (not the bassoon) is the true bass of the oboe family but the bassoon served so efficiently as such that it gained acceptance over the other forms.[104]

Crumhorn

The crumhorn (krumhorn, cromorne) is a double-reed instrument with a cylindrical bore which does not overblow. The range is limited to nine notes. Its double-reed is enclosed in a chamber. Consorts of the instruments were used in a similar manner to recorders, playing vocal polyphony and dance tunes in parts.[105] The rigid double-reed instrument in which the reed was enclosed, was ultimately rejected because of its limited range.[106]

Chalumeau

The chalumeau is best-known as the instrument which J. C. Denner (1655-1707) of Nuremberg developed into the clarinet. Its significance is of little relevance to the seventeenth century and the history of the clarinet fits more clearly into that of the eighteenth century.

Cornett

The cornett or *zink* was commonly used in two forms. The first was a straight instrument of conical bore, pierced with finger holes and played with a cupped mouthpiece. The second form was called *cornetti muti* or in Germany, *stille-zinken*. The muted form was slightly curved with the mouthpiece and body in one piece.[107] This instrument had a less emphatic tone.

No alterations occurred in the instrument's construction in the seventeenth century. It was used as the treble voice of the trombone choir, chiefly because the lower-pitched members of the cornett family and the higher-pitched members of the trombone family were relatively unsuccessful.[108]

Cornetts were often used to double voices. Their pure tone has been described as "silvery" with the clarity of the trumpet without the excessive brilliance and volume.[109]

Mersenne describes the instrument as being capable of playing so softly that it can be heard no further than a flute. He reports that a Mr. Sourin of Avignon could so control the tone and his breath that he could play one-hundred measures without breathing.[110]

Cornetts were employed at Westminster Abbey, York, Durham, and probably in most cathedrals in conjunction with the organ and trombones as a support to the singers.[111] Parts rarely appear for them in seventeenth-century opera scores. They were carried into the eighteenth century in their original capacity in ecclesiastical music.[112]

Serpent

The serpent is the true bass of the cornetts, having a wider bore and thinner walls. It lacks a thumb-hole at the back. Designed primarily to accompany plain-chant in churches and cathedrals, there is no actual evidence that it was ever used for other purposes until the last of the eighteenth century.[113] There was no technical change in the instrument in the seventeenth cenury.

The serpent was described as being capable of supporting twenty very strong voices and being so easy to play that a child of fifteen could attain the volume of a man twice his age. It could also be played softly enough to accompany the quiet voices of chamber music.[114]

Trumpet

The trumpet underwent little change until the addition of valves in the nineteenth century. Their use in the early part of the seventeenth century was primarily to serve public celebrations and in time of war. Military trumpet-calls of the day are preserved by Mersenne.[115]

The military use of the trumpet in Scotland is recorded by Dalyell. "By the Articles of War in 1641, signals for the Scotish army should be made by trumpet and drum."[116]

The trumpet maintained its inherited pride in the Guilds and when it was used elsewhere, it always played the leading part. It was employed in opera scores when dramtic warlike or festive situations occurred in the music.[117]

The favored instrument of the century was the long "D" trumpet—about seven feet in length. The art of the trumpeter reached a very high level. Players specialized in either high parts as *clarino-players* or in low parts, known as *principal trumpeter*.[118]

> The clarion player had, by assiduous practice, acquired perfect mastery over his instrument, combined with a marvellous command of compass and execution, its small tubing enabling him to reach the extreme harmonic notes. It is for this reason that composers like Bach and Handel were able to find players who could reach the high f'''.[119]

A contemporary account by Roberts in his *Philosophical transactions* (1692) is critical of the instrument.

> The trumpet so famous in all ages for its use in the art of war, the loudness and nobleness of its sound peculiarly suiting it to that purpose, is nevertheless one of the most imperfect musical instruments. For, though it has a large compass, the greater part of the intermediate notes are wanting and some of them imperfect.[120]

The range and technical difficulty of most English trumpet parts was conservative compared with Italian and German music. Henry Purcell was one of the few English composers to extend the range from the *principale* register to the *clarino*.[121]

The slide trumpet or *tromba da tirarsi,* was constructed with the throat of the mouthpiece so long that by gradually pulling it out, all notes in the scale can be played. The mouthpiece was held against the lips with the fingers of the left hand, the right hand moving the instrument in and out like the slide of a trombone. The instrument was later used briefly by J. S. Bach.[122]

French Horn

The French horn developed from short to long tube, wide to narrow bore, narrow bell to widely expanding bell, cup-shaped mouthpiece to funnel-shaped mouthpiece, from a range up to the eighth partial to a range to the sixteenth partial, from the timbre of a bugle to the tone of a trumpet, and eventually, in the following century, to the mellow timbre of the present French horn.[123] One source in England relates it was called a French horn because it was transformed in France from the hunting horn. Another source claims it was rare in France, being admitted at a late date and called *cor allemand*.[124]

The date of the transformation from the hunter's horn into an art instrument is not actually known although it occurred in the second half of the century. The Bohemian Count Sporck is said to have introduced it into Germany.[125]

Parts for horn occasionally appear in the works of Cavalli and Lully.

The trombone, or *sackbut*, is unique among wind instruments in that it has not been basically altered from its original fifteenth-century form. Trombones were built in five sizes and were used most frequently to double voices.

The sizes, with voice doublings, were:

Discant trombone-soprana voice
Alto trombone-alto voice
Tenor trombone-tenor voice
Bass trombone-bass voice
Contrabass trombone

The discant was normally played on cornett or slide trumpet and the contrabass was seldom used.[126]

The earliest English music which included a part for the true discant was the *March and Canzona* for the funeral of Queen Mary (1695) by Purcell.[127]

In outdoor bands, the trombones appeared with shawms and in chamber consorts with cornetts. It was rarely used in opera scores but remained throughout the century as a frequent member of church orchestras.[128]

FOOTNOTES

1. Warren Dwight Allen, *Philosophies of Music History* (New York: Dover Publications, 1939, 1962), 3.
2. Thurston Dart, *The Interpretation of Music* (London: Hutchinson University Library, 1954), 103.
3. Curt Sachs, *The History of Musical Instruments* (New York: Norton, 1940), 352.
4. Karl Geiringer, *Musical Instruments*, 2nd ed., trans. by Bernard Miall, ed. by W. F. H. Blandford (New York: Oxford University Press, 1945), 147.
5. *Ibid.*, 351.
6. Michael Praetorius, *Syntagma musicum: Vol. II, De organographia*, 1st and 2nd parts trans. by Harold Blumenfeld (USA: Harold Blumenfeld, 1949), ii.
7. Theodore M. Finney, *A History of Music* (New York: Harcourt, Brace & Co., 1947), 290.
8. Donald Jay Grout, *A History of Western Music* (New York: Norton, 1960), 200.
9. Sachs, *op. cit.*, 352.
10. Dart, *op. cit.*, 127.
11. Adam Carse, *The Orchestra* (London: Max Parrish & Co., 1949), 14.
12. Allen, *op. cit.*, 12.
13. Grout, *op. cit.*, 270.
14. Robert Donington, *The Interpretation of Early Music* (London: Faber & Faber, 1963), 519.
15. Dart, *op. cit.*, 105.
16. Praetorius, *op. cit.*, 37.
17. *Ibid.*, 12.
18. *Harvard Dictionary of Music*, Willi Apel, ed. (Cambridge, Mass.: Harvard University Press, 1944), 182.

19. Grout, *op. cit.*, 200.

20. Praetorius, *op. cit.*, 11.

21. Walter L. Woodfill, *Musicians in English Society from Elizabeth to Charles I* (Princeton, N. J.: Princeton University Press, 1953), 33.

22. Joseph C. Bridge, "Town Waits and Their Tunes," *Proceedings of the Musical Association* LIV (1928), 69.

23. *Ibid.*, 69.

24. Woodfill, *op. cit.*, 76.

25. Bridge, *op. cit.*, 69.

26. John Playford, *Playford's English Dancing Master* (1651), a facsimile reprint with an intro., bib., and notes by Margaret Dean-Smith (London: Schott & Co., 1957), 90 pp.

27. Grout, *op. cit.*, 361.

28. Ernst H. Meyer, "Form in the Instrumental Music of the Seventeenth Century," *Proceedings of the Musical Association* LXV (1938), 49.

29. Grout, *op. cit.*, 263.

30. Frank L. Harrison and Joan Rimmer, *European Musical Instruments* (London: Studio Vista, 1964), 37.

31. Francis W. Galpin, *Old English Instruments of Music*, 4th ed., rev., with suppl. notes by Thurston Dart (London: Methuen & Co., 1965), 123.

32. Anthony Baines, *Woodwind Instruments and their History*, rev. ed. (New York: Norton, 1963), 284.

33. Adam Carse, *The History of Orchestration* (New York: Dover Publications, 1964), 67.

34. Baines, *op. cit.*, 283.

35. Woodfill, *op. cit.*, 187.

36. *Ibid.*, 185.

37. Allen, *op. cit.*, 72.

38. *Ibid.*, 73.

39. Carse, *History of Orchestration*, 39.

41. *Ibid.*, 294.

42. Carse, *The Orchestra*, 46.

43. Harrison, *op. cit.*, 34.

44. Carse, *History of Orchestration*, 77.

45. *Ibid.*, 70.

46. Grout, *op. cit.*, 363.

47. Carse, *History of Orchestration*, 71.

48. Carse, *The Orchestra*, 16.

49. Carse, *History of Orchestration*, 66.

50. Adam Carse, *Musical Wind Instruments* (New York: Da Capo Press, 1965), 267.

51. Albert Cohen, "A Study of Instrumental Ensemble Practice in Seventeenth-Century France," *The Galpin Society Journal* XV (Mar. 1962), 8.

52. Carse, *The Orchestra*, 37.

53. *Ibid.*, 16.

55. *Ibid.*, 123.

56. Carse, *History of Orchestration*, 83.

57. Carse, *The Orchestra*, 16.

58. Praetorius, *op cit.*, 14.

59. *Ibid.*, 16.

60. Dart, *op. cit.*, 56.

61. Sachs, *op. cit.*, 380.

62. Baines, *op. cit.*, 276.

63. Harrison, *op. cit.*, 33.

64. *Ibid.*, Plate 127.

65. *Ibid.*, 34.

66. Baines, *op. cit.*, 278.

67. Harrison, *op. cit.*, 35.

68. *Ibid.*, 34.

69. Baines, *op. cit.*, 276.

70. Harrison, *op. cit.*, 38.

71. *Ibid.*, 36.

72. Galpin, *Old English Instruments*, 113.

73. Cohen, *op. cit.*, 4.

74. Galpin, *Old English Instruments*, 114.

75. *Ibid.*, 115.

76. Donington, *Interpretation of Music*, 487.

77. Cohen, *op. cit.*, 5.

78. Robert Donington, *The Instruments of Music*. 3rd. ed., rev. (London: Methuen & Co., 1962), 96.

79. Praetorius, *op. cit.*, 34.

80. Carse, *History of Orchestration*, 15.

81. Donington, *Interpretation of Music*, 488.

82. *Ibid.*, 489.

83. Geiringer, *op. cit.*, 175.

84. Galpin, *Old English Instruments*, 107.

85. Donington, *Interpretation of Music*, 488.

86. Geiringer, *op. cit.*, 176.

87. *Ibid.*, 176.

88. Dart, *op. cit.*, 123.

89. Donington, *Instruments of Music*, 98.

90. Galpin, *Old English Instruments*, 116.

91. John Graham Dalyell, *Musical Memoirs of Scotland with Historical Annotations* (Edinburgh: Thomas G. Stevenson, 1849), 153.

92. Sachs, *op. cit.*, 382.

93. Marin Mersenne, *Harmonie Universelle*, trans. by Roger E. Chapman (Hague: Martinus Nijhoff, 1957), 378.

94. Sachs, *loc. cit.*

95. Donington, *The Instruments*, 100.

96. Galpin, *Old English Instruments*, 143.

97. Donington, *Interpretation of Music*, 491.

98. Otto Oromszegi, "The Bass Bombard of 'Master CK' of Sopron," *The Galpin Society Journal* XX (Mar. 1967), 3-8.

99. Donington, *The Instruments*, 102.

100. Mersenne, *op. cit.*, 272.

101. Carse, *History of Orchestration*, 16.

102. Baines, *op. cit.*, 286.

103. Geiringer, *op. cit.*, 173.

104. Donington, *Interpretation of Music*, 493.

105. *Ibid.*, 494.

106. Sachs, *op. cit.*, 352.

107. Carse, *History of Orchestration*, 17.

108. Donington, *Interpretation of Music*, 495.

109. *Ibid.*, 496.

110. Mersenne, *op. cit.*, 346.

111. Galpin, *Old English Instruments*, 142.

112. Carse, *History of Orchestration*, 17.

113. Donington, *Interpretation of Music*, 496.

114. Mersenne, *op. cit.*, 352.

115. *Ibid.*, 334-35.

116. Dalyell, *op. cit.*, 175.

117. Carse, *History of Orchestration*, 19.

118. Geiringer, *op. cit.*, 184.

119. Galpin, *Old English Instruments*, 151.

120. Dalyell, *op. cit.*, 179.

121. Don Smithers, "Seventeenth-Century English Trumpet Music," *Music & Letters*, Vol. 48/4 (Oct. 1967), 361.

122. Sachs, *op. cit.*, 385.

123. Sachs, *op. cit.*, 384.

124. *Ibid.*, 384.

125. Geiringer, *op. cit.*, 187.

126. *Ibid.*, 186.

127. Francis W. Galpin, "The Sackbut, Its Evolution and History," *Proceedings of the Musical Association* XXXIII (1907), 12.

128. Carse, *History of Orchestration*, 18.

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THE EMERGENCE OF THE PUBLIC CONCERT

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The Public Concert Appears First In England

The public concert, defined as being a musical entertainment open to a public audience on payment for admission, has a history of less than 300 years. Prior to and during most of the seventeenth and early eighteenth centuries, secular music was performed almost exclusively in the courts of the nobility, in private circles (such as academies[1] or *collegia musica*[2]), or in taverns. According to Robert Elkin, the "tavern is, in fact, the first ancestor of the modern concerthall, the connection between music and drinking being of respectable antiquity."[3]

The earliest developments in the history of the public concert seem to have occurred in England. During his short reign, Oliver Cromwell introduced, for the first time in English history, regular State concerts into court life; it was apparently the invention of Cromwell to "invite an audience especially to hear formal performances by skilled musicians."[4] This practice of assembling an audience to *listen* (not to participate) was immediately imitated elsewhere. Performances in London taverns seem to have been especially frequent.

In London, "the first small development in the evolution of the concert-room was the 'music-house,' this being a tavern in which a room was specially set aside for music."[5] The earliest records of such establishments appear in the middle of the seventeenth century, possibly the most famous of which was *The Mitre* in London House Yard near St. Paul's Cathedral. In *The Mitre* the players, on a rudimentary concert platform, were separated from the audience. There was apparently no admission fee, "the patrons being expected to tip the musicians at their discretion."[6]

It is generally agreed that the first public concert (to which the audience was admitted by payment) was given by John Banister in London in 1672, fifty years before any similar enterprise was heard of in Germany. The following announcement appeared in the *London Gazette* of December 30, 1672:

> These are to give Notice, that at Mr. *John Banister's* House, now called the Musick-school, over against the *George* Tavern in White Fryers, this present Monday, will be Musick performed by Excellent Masters, beginning precisely at four of the Clock in the afternoon, and every afternoon for the future, precisely at the same hour.[7]

Banister, having lost his position as violinist at Court, hired the large room in Whitefriars, made a raised box for the performers, and furnished the rest of the room with small tables and chairs for the audience. Both vocal and instrumental music were performed, and the charge for admission was one shilling. Having launched the first establishment of regular concerts outside a tavern, Banister

continued his enterprise until 1678, "with a program daily in the afternoon."[8]

During the last year of Banister's concerts, 1678, Thomas Britton,[9] a coal merchant with an interest in music, started a new series of concerts which lasted until 1714. In the upper story of his warehouse in Clerkenwell in London, Britton established weekly concerts which were at first open to the public and later required an annual subscription of ten shillings.[10] The Britton concerts gradually attained considerable fame, attracting—besides eminent musicians such as Handel and Dr. Pepusch—famous poets, painters, and many members of the nobility.

About 1680 a number of professional musicians opened a concert room in London on Villiers Street. The concerts there, usually referred to as the "Musick-Meeting (or Consort) in York-Buildings"[11] concerts, became known especially for fashionable performances which took place in this room (until the building was torn down in the middle of the eighteenth century). The concerts at Villiers Street in the earlier years of its existence seem to have been badly organized, if one accepts the account of Roger North, who wrote in his *Memoirs*:

> . . . All the Quallity and *beau mond* repaired to [the Musick-Meeting] . . . But the plan of this project was not so well layd as ought to have bin, for the time of their beginning was inconsistent with the park and the the playhouses, which had a stronger attraction. And what was worse, the masters undertakers were a rope of sand, not under the rule or order of any person, and every one foreward to advance his owne talents, and spightfull to each other, and out of emulation substracting their skill in performing, all which together scandalized the company, and poysoned the enterteinement. Besides the whole was without designe or order; for one master brings a consort with fuges, another shews his guifts in a solo upon the violin, another sings, and then a famous lutinist comes forward, and in this manner changes followed each other, with a full cessation of the musick between every one, and a gable and bustle while they changed places; whereas all enterteinements of this kind ought to be projected as a drama, so as all the members shall uninterruptedly follow in order, and having a true connexion, set off each other. It is no wonder that the playhouses got ground, and as they ordered the matter, soon routed this musick meeting.[12]

"Clearly the art of programme-building was still in its infancy."[13]

A culmination in fashionable performances at the Villiers Street concert room came in the celebration of St. Cecilia's Day, November 22, 1683. (The annual St. Cecilia concerts, managed by the Musical Society, were given from 1684 until 1703 at Stationers' Hall; for each concert a distinguished poet wrote an ode in praise of music

and a distinguished composer set the ode to music.)

In 1713[14] Hickford's Room, one of the first important public concert rooms in London, was first used for public performances of music. The first Hickford's Room, in James Street, Haymarket, was closed in 1739 when Thomas Hickford removed his concert establishment to Brewer Street, Golden Square, where he maintained the room until 1779. A fashionable concert room of the first part of the eighteenth century, Hickford's Room concerts after 1739 were on an even larger scale than those in the older room in James Street. In addition to the usual concerts of "Vocal and Instrumental musick"[15] given by soloists, oratorios, anthems, and other similar compositions were performed. Subscription concerts became even more successful in the new Hickford's Room, and many famous performers appeared in concerts there, among which were the violinist-composers Francesco Geminiani, Pietro Castrucci, and Francesco Veracini. A concert worthy of special notice took place in Hickford's Room on May 13, 1765, when the nine-year-old Mozart and his sister gave their last public concrt before leaving England. The *Public Advertiser* announced this event on March 11, 1765, as follows:

> BY DESIRE
>
> For the Benefit of Master MOZART, of eight years [who was actually nine], and Miss MOZART, of twelve years of Age, prodigies of Nature, before their Departure from England, which will be in six weeks Time. THERE will be performed at the End of this Month, or the Beginning of April next, a Concert of
>
> Vocal and Instrumental MUSIC.
>
> Tickets at Half a Guinea each
>
> To be had of Mr. Mozart, at Mr. Williamson's in Thrift-street [now Fifth Street] Soho, where those Ladies and Gentlemen, who will honour him with their Company from Twelve to Three in the Afternoon, any Day in the Week, except Tuesday and Friday, may, by taking each a Ticket, gratify their Curiosity, and not only hear this young Music Master and his Sister perform in private; but likewise try his surprising Musical Capacity, by giving him any Thing to play at Sight, or any Music without Bass, which he will write upon the Spot, without returning to his Harpsichord. The Day and Place of the Concert will be advertised in the Public Advertiser eight Days before.[16]

Hickford's Room and the Hanover Square Rooms were the most important concert halls in London in the eighteenth century. The latter contains the most famous concert halls of London. Originally Giovanni Andrea Gallini owned half the property, and Johann Christian Bach and Charles Frederick Abel each had a quarter share, but within a short time Gallini bought out Bach and Abel and became the sole owner. The Hanover Square Rooms opened in 1775 and concerts were held there until 1874. The first concert at

the Hanover Square Rooms was one of the Bach-Abel subscription concerts (which they had established in 1763).

With the concerts offered by J. C. Bach and C. F. Abel in the 1760's,

> ... the fashionable potential of concerts became higher, as did the price of admission: at first, half a guinea each; then five guineas for the series of six. These concerts luxuriated in high-society patronage. The music given was doubtless of fine quality, yet we imagine the audience was largely interested in itself and came to see and be seen. The events must have been regarded as very honorific, for they had to be increased in number to satisfy some of the demand for tickets; but for the season of 1768, Mr. Bach blew up their snob value even further by announcing that the subscriptions would be limited to four hundred.[17]

In the same year (1768), on June 2, J. C. Bach played the first pianoforte solo ever heard in an English concert. Bach and Abel moved their enterprise to the Hanover Square Rooms in 1775, where they remained until shortly before Bach died in 1782.

In 1783[18] some musicians established a concert organization which they first called the "Hanover Square Great Concerts" and later the "Professional Concerts." These concerts lasted until 1793. This organization—

> ... constituted, substantially, what we would now call a symphony orchestra series. Nobility shone in abundance on the subscription list. The price was relatively moderate—six guineas for twelve concerts—but the number of subscribers was limited to five hundred.[19]

In 1786 Johann Peter Salmon, a German violinist who had left the organization of the Professional Concerts, set up a rival series of concerts, the most important of which were those given in 1791-92 and 1794-95 when Joseph Haydn directed the performances of his twelve "London" Symphonies. The decade 1790-1800 in London "witnessed an unprecedented number of public performances."[20]

Among the numerous concert organizations which came into existence in London in the eighteenth century, at least one more deserves mention — the Concerts of Ancient Music, which were primarily devoted to performing the works of Handel. The Ancient Concerts (also later known as "The King's Concerts") existed from 1776 to 1848. No music composed within the previous twenty years was to be performed at these concerts. At the time of the establishment of these concerts, the orchestra numbered 43 players, and in 1848 there were 56.

> The choral trebles at first consisted entirely of boys selected chiefly from the Chapel Royal and Westminster Abbey, but they afterwards gave place to ladies. The earlier programmes included an overture (usually by Handel), two or three concertos by Handel, Martini, Corelli, Avison or Geminiani,

several choruses and solos from Handel's oratorios and an anthem, glee or madrigal; but occasionally an entire work, such as the Dettingen Te Deum, was given as the first part of the concert. For many years the programmes were almost exclusively Handelian, varied by songs from Gluck, Bach, Purcell, Hasse and others. After 1826 there was greater variety in the schemes, and Mozart's "Jupiter" Symphony, his Symphonies in D and B-flat, the overture to the 'Zauberfloete' and a selection from his Requiem were included in the programmes for 1826. From that date an orchestral work by Mozart was performed at nearly every concert, although Handel still maintained his supremacy. In 1834 we find Haydn's "Surprise" Symphony and in 1835 a selection from 'The Creation' and 'The Seasons' in the programmes. In the latter year Beethoven was represented by his 'Prometheus' overture, and during the last ten years of the concerts his second symphony, overtures to 'Fidelio' and 'Egmont', a chorus from 'King Stephen' and other works were given. In 1847, at a concert directed by Prince Albert, Mendelssohn was solo organist and played Bach's Prelude and Fugue on the name of B.A.C.H.

In 1785 the royal family began to attend the concerts regularly, and then it was that they were styled "The King's Concerts." As a mark of his interest in the performances George III personally wrote out the programmes. Up to 1795 the concerts were held in the new rooms, Tottenham Street, afterwards known as the Queen's or West London Theatre, but in that year they were removed to the concert-room in the Opera-House, and in 1804 to the Hanover Square Rooms. In addition to the twelve concerts given every year, a thirteenth was added when 'Messiah' was performed in aid of the "Fund for the support of Decayed Musicians and their Families." The last concert took place on 7 June 1848.[21]

Not all of the London concerts of the eighteenth century were of high artistic merit. Arthur Loesser indicates that —

> Often they were mere stunts in the guise of music. For instance, we have a report that in the year 1789 an Italian came to London and gave a concert with eleven cats. The animals were well trained: each one had its own particular timbre and range; each one made correct entrances upon a given signal and also kept pretty good time. So it was said.[22]

Early Concert Institutions in Continental Europe

About 1700, concerts began to be propagated by the *collegia musica* in Germany, Sweden, and Switzerland, but the first im-

portant continental institution in the history of the public concert was the *Concert Spirituel*, which was founded in 1725 in Paris by A. Philidor, and which served as the model for other organizations for concert-giving. At first a musical institution for the production of sacred vocal works, the scope of the *Concert Spirituel* was soon enlarged to include secular instrumental works, especially symphonies and concertos. The organization lasted until 1791; it was replaced by others of a similar nature.

A new musical group was organized in 1743 when a group of persons gathered at a private home in Leipzig for the first performance of what was at first called the "Great Concert"; the orchestra on this occasion consisted of 16 performers. The merchants who formed the group each contributed 20 thalers a year to the organization, paid the musicians, invited guests, and solicited new members. The atmosphere of the "Great Concerts" was different from that of the older *collegia,* for the meetings of the former "were less like collegiate stag parties and more like polite family parties: women were welcomed; and when they came with the men of their households, admission was free to them."[23] Although the concerts were interrupted by the Seven Years' War, they resumed in 1763, under the direction of J. A. Hiller, who gave the concerts the title of *"Liebhaberkonzerte"* (1763-78). The orchestra was increased to 30, and regular performances were held until Easter, 1778. After a pause of three years, the concerts were resumed in the *Alte Gewandhaus* (which was replaced, almost a century later, in 1884 by the *Neue Gewandhaus*). Again under the direction of J. A. Hiller, the *Gewandhaus* concerts opened a subscription list for 24 concerts, and the first regular subscription concert was given on November 25, 1781. The *Gewandhaus* concerts became Leipzig's most important musical institution, and also one of the most celebrated and persistent musical organizations in the world.[24]

In the eighteenth century many pleasure gardens were to be found in most of the capital cities of Europe, and one of them, the *Augarten* in Vienna, is especially important, for it was the place of the first performance of many a masterpiece. Dedicated to the public by the Emperor Joseph II, the *Augarten* was opened in 1775. Although at first it seems to have been merely a garden, in 1782 a concert room was opened, and summer morning concerts were started that year in the *Augarten* by Philipp Jakob Martin in association with Wolfgang Amadeus Mozart. From 1782 onward Mozart and his works were frequently heard, as were the symphonies of Beethoven later. Among great artists who performed in the *Augarten* were Czerny, Stein, Clement, Moscheles, and Linke. The concerts were given at seven-thirty in the morning; "the early walk or drive, the semi-open-air conditions of performance, and the fresh and rural atmosphere clearly appealed to a large number of the residents of Vienna's old and crowded streets."[25]

One debut in the *Augarten* deserves special mention. On a Thursday morning in May 1803 a first performance was given of a violin sonata. The violinist was a mulatto named Bridgetower, "a fine player, but so extravagant in his manner that people laughed

while they listened. The pianist was Beethoven, and together they played from a manuscript hardly dry. That manuscript was the 'Kreutzer' Sonata."[26]

The concerts in the *Augarten* eventually had to suffer the inevitable fate of all similar institutions which aim over the heads of those whom they wish to attract; by 1830 eminent performers had ceased to appear there.

Early Concert Life In The United States

Concert life in the American colonial cities commenced in the 18th century. According to newspaper announcements, the first concert of record was held in Boston in 1731; the second in Charleston, South Carolina, in 1732; the third in New York, 1736; and the fourth in Philadelphia, 1757. From these dates on, each of these cities enjoyed an increasing number of concerts, at which the programs were similar in content to those abroad, particularly in London, from which city the latest published music was sent regularly to America.[27]

The announcement of the first concert of record in the United States appeared in December 1731 in the *Boston News Letters*:

> On Thursday the 30th of this instant December, there will be performed a *Concert of Music* on sundry Instruments at Mr. Pelham's great Room, being the House of the late Dr. Noyes near the Sun Tavern.
>
> Tickets to be delivered at the place of performance at *Five shillings* each. The Concert to begin exactly at Six o'clock, and no tickets will be delivered after Five the day of performance.
>
> N.B. There will be no admittance after Six.[28]

By 1754 the city of Boston had a Concert Hall where concerts of "Vocal and instrumental Musick to consist of Select Pieces by the Masters"[29] were given. Regular subscription concerts, definitely established by 1766, may have been inaugurated in the late 1750's.

William Selby was largely responsible for the rapid progress of music in Boston during the years after about 1770. Although he seemed mainly concerned with instrumental music when he first came to Boston, gradually Selby's interest seemed to center in choral music. One of his concerts of 1773 shows the type of music he presented. Handel was represented in three works: "an overture, the *Hallelujah* chorus, and the *Grand Coronation Anthem in 22 Parts*. In addition to songs, an organ concerto, and a sinfonia, by unnamed composers, there was a *Glee in three parts, composed in the year* 1600."[30]

Charleston, South Carolina ran a close second to Boston in fostering the first public concert in the United States, and this Southern city also founded, in 1762, the first musical society formed in the United States, the St. Cecilia Society, which remained in existence until 1912. In October of 1732 in Charleston, there was advertised a ball after a concert; colonial concerts seem to have

often been social gatherings with dancing to follow. "This does not reflect unfavorably on the taste in the choice of programs, which compared well in quality with those of concerts in England."[31] Concert performers were usually local teachers, some of whom included dancing and fencing with music in their list of offered services. Competent amateurs also supplemented the concert programs. "Charleston was perhaps America's most musically minded city during the later middle eighteenth century."[32]

The third American city to inaugurate public concerts was New York. The first concerts were given there in 1736, one of which was advertised as being a "*Consort* of Musick, Vocal and Instrumental for the benefit of Mr. Pachelbel, the Harpsichord Part performed by himself. The songs, Violins and German Flutes by private Hands."[33] Increasingly frequent concerts were offered for the artists' own benefit and for charity in New York after 1736. New York's first series of subscription concerts lasted from 1760 until 1767. The first open air summer concerts in the city were established in Ranalagh Gardens in 1765. In 1774 French and Italian virtuosi performed for the first time in New York; on one concert appeared a Mr. Caze, whose program was as follows:

1st Act

A grand Orchestry's Symphony
A French Ariette will be sung accompanied with the guitar and violin.
Mr. Caze will play his own composed music, on the violin with Mr. Zedtwitz.
A Concert on the Flute
A Sonada on the Spanish Guitar
The first Act to end with a March

2nd Act

A Grand Orchestry's Symphonie [sic]
A French Ariette accompany'd with the Mandolin and Violin
A Solo on the Violin
A Duo on Mandoline [sic] and Violin
A Sonada of the Salterio; and d'Exaudet's Minuet with echoes.
The Concert to finish with a March of the grand Orchestry
After the Concert there will be a ball.[34]

Music lovers in New York in the eighteenth century were often troubled by disturbing elements at concerts. One protest appeared in New York *Weekly Post Boy* (1764) and was signed "X.Y.Z.":

> It is a very just observation that a gentleman is to be known by his politeness — this qualification, wherever it is to be found, convinces us that it's [sic] possessor has seen the world and has had his manners formed by a good education . . .
>
> I am led into this short reflection by a circumstance, I can scarcely think of without indigna-

tion. What I mean is the strange behaviour at the Concert, of a certain set of males and females to whom . . . I will give the soft appelation [sic] of gentlemen and ladies. I am a dear lover of music and can't bear to be disturbed in my enjoyment of an entertainment so polite and agreeable. How great then is my disappointment and vexation, when instead of a modest and becoming silence nothing is heard during the whole performance, but laughing and talking very loud, squawling [sic], overturning the benches, etc. Behaviour more suited to *broglio* than a musical entertainment.

What is meant by so ill-timed an interruption I know not: for . . . I cannot conceive that either the audience or the gentlemen performers are under any obligations to bear these impertinences — and I have authority to assure those offenders against decency that . . . the managers and performers will be forced . . . to the disagreeable necessity of insisting on their absenting themselves from a place where they do nothing but give offence or . . . of hiring the adjacent room for the convenience of such whose conduct will not bear the eye of the public . . . [35]

In 1793 a series of six subscription concerts was given in New York. The programs of this series are interesting, for not only did they offer the vocal talents of singers of the Old American Company and works by Pleyel and Stamitz, but "they also included works of Vanhall and Haydn played from manuscript. On the program of the fifth concert (March 25th), America probably heard its first performance of what was termed Haydn's *Passion of our Saviour,* identical with the famous *Seven Words,* composed for the Cathedral of Cadiz in 1785, and later performed in London as the *Passione Instrumentale.*" [36]

By the 1850s New York was as much the professional music center of the United States as it is today. Mixed instrumental and vocal concerts were usual, featuring one principal, with a number of assistants. Although many of the concerts involved piano playing in a prominent way, before 1870 there were hardly any piano recitals in New York. Even the renowned virtuosos at that time felt the need of being relieved several times in the course of a concert in order to make fresh entrances.

Although the first public concert in Philadelphia of which there is record took place in 1757, the first really ambitious concert in the United States was given somewhat later in this city, according to Louis C. Elson (May 4, 1786). In the Philadelphia correspondence of the *Salem Gazette* an account of this concert appeared:

On Thursday, the 4th of May, at the Reformed German Church, in Race Street, was performed a Grand Concert of vocal and instrumental

musick, in the presence of a numerous and polite audience. The whole band consisted of 230 vocal and 50 instrumental performers, which, we are fully justified in pronouncing, was the most complete, both with respect to number and accuracy of execution, ever, on any occasion, combined in this city, perhaps, throughout America . . .

Nearly one thousand thickets were sold at two-thirds of a dollar each, and the net proceeds, after deducting for necessary expenses [sic], have been delivered to the managers of the Pennsylvania Hospital, Philadelphia Dispensary, and overseers of the Poor, to be applied by them for the use of said institutions and unprovided poor.[37]

The influence of European composers, especially Handel, began to be noticed in concert programs in the United States in the late eighteenth century, and by the beginning of the nineteenth century, programs were presented which consisted primarily of English music with a few German works occasionally interspersed.

The taste of many American concert-goers was not particularly elevated, however. At a public concert in the early nineteenth century in New York, an orchestra began to play a Haydn work when the audience broke into protest and someone cried, "Aw, quit that; give us 'Bonyparte Crossing the Rhine.' "[38]

SUMMATION: The Public Concert Emerges

The first public concert halls were hardly larger than a spacious drawing room, and the first public audiences were of a select social class (often nobility, or guests of nobility). A high price of subscription, a small group of performers, and an audience comprised of persons who were for the most part mutually acquainted – these were frequently prerequisites for giving a public concert in the eighteenth century. The essential difference between the earliest public concerts and those of the courts was that there was an admission fee charged for the public concerts (and not, of course, for court concerts).

Programs in early public concerts might have included solos, duets, trios, concertos, choruses, and symphonies, presented often in a casual order. The orchestra was often comprised of members from the theater group, and the chorus came from a church or cathedral. The atmosphere was intimate and personal, what one might today call a "chamber music" atmosphere. The standard of performance, from present viewpoints, was roughly prepared. The scores of the composers (including those of Bach and Handel) admitted wide variations of instruments. The music was almost entirely contemporary, much of it having been written for the particular occasion by the performer-composers. There were few printed works, so parts had to be copied for many performances.

In the performance of music, passages were usually either loud or soft; "there was little detailed variation or careful balance of tone."[39] Solo playing was expressive, but for the mass of players the usual effects were those of strong contrasts.

The audience was convinced of [illegible] though it did not come to concerts to be educated. The desire of the audience was to be pleased, and surprise and delight were the most popular emotions — "surprise at a new dexterity, delight in a warm tone or in a taking phrase."[40] The age of the virtuosi, narrow in emotional range, was emerging. The technical skill of instrumentalists was not as specialized as that of the singers, but the former were quickly improving. Although virtuoso concerts were considered in the eighteenth century to be on a lower level than concerts given by local musical organizations, "this gradual development of technical skill was the foundation of the concert music which was eventually to occupy so paramount a place in the progress of pure music."[41]

> Thus, during the latter half of the eighteenth century ,middle-class townspeople became thoroughly familiar with the habit of attending public musical performances in return for an admission fee. The older words *"collegium musicum"* and *"academy"* went out of use, and such events were generally called concerts," as they have been ever since.
>
> Concerts were clearly a middle-class institution. In former days a burgher might possibly have been able to hear skilled execution of complex music either in church or — if he were so exceptionally lucky — as a nobleman's invited guest. Now he was free to buy himself entrance to a more or less professional concert for a moderate sum of money, just as he could buy a bolt of ribbon at a dry-goods store. Despite the "idealists," music became, to a considerable extent, an article of commerce. Here aagin we see the formation of an anonymous "public."
>
> . . . In the latter half of the century, in a few localities, "enlightenment" and "humanity" had begun to round off a few of the sharpest edges of orthodox class segregation; for in commercial Leipzig, at least, noble individuals did occasionally come to the public meetings of the citizenry.[42]
>
> While the private patronage of music by princes and nobles remained the chief source of livelihood to the musician, the progress of public concert institutions was impeded. The breakdown of the system of patronage and the change of tone and temper which the Napoleonic wars brought to the Europe of the 19th century stimulated the increase of concerts . . . Improved transport by road and sea, particularly by steam power, facilitated the careers of travelling virtuosi, and in the 19th century concert-giving became an international industry.[43]

FOOTNOTES

[1]"Academies," in this context, were not teaching institutions, but what we would now call learned societies.

[2]Eric Blom defines a *collegium musicum* as "An association for the performance of chamber and chamber-orchestral music in various German towns, especially Hamburg and Leipzig, during the first half of the 18th century . . . These institutions were mainly connected with universities — hence no doubt their Latin name — and they have remained a feature of German universities to the present day."

Eric Blom, "Collegium Musicum," *Grove's Dictionary of Music and Musicians*, 5th ed., ed. Eric Blom (London: Macmillan and Company, Ltd., 1954), II, 375-76.

[3]Robert Elkin, *The Old Concert Rooms of London* (London: Edward Arnold, Ltd., 1955), p. 13.

[4]Henry Davey, *History of English Music* (2d ed.; London: J. Curwen and Sons, Ltd., 1921), p.256.

[5]Elkin, *op. cit.*, p. 14.

[6]*Ibid.*, p. 17.

[7]As quoted in: *Ibid.*, pp. 18-19.

[8]Willi Apel, "Concert", *Harvard Dictionary of Music* (Cambridge, Massachusetts: Harvard University Press, 1960), p. 170.

[9]"Britton was, despite his lowly avocation . . . a collector of musical instruments, ancient and modern, and of books, manuscripts, prints and drawings connected with subjects such as mystic divinity, the philosopher's stone, chemistry, astrology and magic; and he was . . . a keen amateur of music . . ."
Elkin, *op. cit.*, p. 23.

[10]Ernest Walker, *A History of Music in England*, 3d ed., rev. J. A. Westrup (London: Oxford University Press, 1952), p. 178.

[11]Elkin, *op. cit.*, p. 29.

[12]*Roger North on Music: Being a Selection from His Essays Written During the Years c. 1695-1728*, ed. John Wilson (London: Novello and Company, Ltd., 1959), p. 353.

[13]Elkin, *op. cit.*, p. 30.

[14]The correct date of the establishment of the Hickford's Room concerts is given by two historians:
J. A. Fuller-Maitland, "Concert", *Grove's Dictionary of Music and Musicians*, 5th ed., ed. Eric Blom (London: Macmillan and Company, Ltd., 1954), II,391.
Mrs. Robert Harrison, "Hickford's Room," *Grove's Dictionary of Music and Musicians*, 5th ed., ed. Eric Blom (London: Macmillan and Company, Ltd., 1954), IV, 273.

In another article, the date 1714 is offered for the opening of Hickford's Room (which could be due to the calendar change—about 1750 in England, the legal year's beginning changed from March 25 to January 1):
Kathleen Dale, "London: Public Concerts, 17th and 18th Centuries," *Grove's Dictionary of Music and Musicians*, 5th ed., ed. Eric Blom (London: Macmillan and Company, Ltd., 1954), V, 375.

[15]Mrs. Robert Harrison, *op. cit.*, p. 275.

[16]As quoted from the original source in: Elkin, *op. cit.*, p. 47.

[17]Arthur Loesser, *Men, Women and Pianos: A Social History* (New York: Simon and Schuster, 1954), p. 236.

[18]The correct date of 1783 is given in two sources:
William H. Husk, "Hanover Square Rooms," *Grove's Dictionary of Music and Musicians*, 5th ed., ed. Eric Blom (London: Macmillan and Company, Ltd., 1954), IV, 65.
Dale, *op. cit*, p. 376.

But, the incorrect date of 1785 is given for the establishment of the Professional Concerts in:

J. A. Fuller-Maitland, *op. cit.*, p. 391.

[19]Loesser, *op. cit.*, p. 236.

[20]*Ibid.*, p.238.

[21]Charles Mackeson, "Ancient Concerts," *Grove's Dictionary of Music and Musicians*, 5th ed., ed. Eric Blom (London: Macmillan and Company, Ltd., 1954), I, 144.

[22]Loesser, *op. cit.*, p. 242.

[23]*Ibid.*, p. 91.

[24]Famous conductors of the *Gewandhaus* concerts have included Mendelssohn, under whom the concerts first gained international recognition, Furtwaengler, and Bruno Walter.

[25]George Dyson, *The Progress of Music* (London: Oxford University Press, 1932), p. 160.

[26]*Ibid.*

[27]John Tasker Howard, "American Music," *Harvard Dictionary of Music* (Cambridge, Massachusetts: Harvard University Press, 1960), p. 30.

[28]As quoted in: John Tasker Howard, *Our American Music: Three Hundred Years of It* (New York: Thomas Y. Crowell Company, 1931), p. 18.

[29]*Ibid.*

[30]*Ibid.*, p. 65.

[31]Loesser, *op. cit.*, p. 436.

[32]*Ibid.*, p. 437.

[33]As quoted in: Howard, *Our American Music*, *op. cit.*, pp. 27-28.

[34]As quoted in: *Ibid.*, pp. 29-30.

[35]As quoted in: *Ibid.*, p. 30.

[36]*Ibid.*, p. 34.

[37]As quoted from the original source in: Louis C. Elson, *The History of American Music*, rev. Arthur Elson ("The History of American Art," No. 2; New York: The Macmillan Company, 1925), p. 24.

[38]Helen A. Dickinson and Clarence Dickinson, *Excursions in Musical History* (New York: The H. W. Gray Company, sole agents for Novello and Company, Ltd., 1917), p. 157.

[39]Dyson, *op. cit.*, p. 154.

[40]*Ibid.*, p. 155.

[41]*Ibid.*, p. 158.

[42]Loesser, *op. cit.*, pp. 94-95.

[43]J. A. Fuller-Maitland, *op. cit.*, p. 391.

A STUDY OF THE RELATION BETWEEN OBJECTIVE AND SUBJECTIVE MEASUREMENT OF THE QUANTITATIVE DIFFERENCES IN TONE QUALITY AMONG VARIOUS MAKES OF CLARINETS

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Introduction

Music instrument manufacturers continually seek improvements in the quality of their products. This is motivated by consumer demands and sustained by economic necessity of survival in the competitive business world. As a result, the introduction and promotion of a new model within a line of instruments takes on a dimension somewhat similar to the fanfare accorded the yearly model changes in the automobile industry. Many claims are made as to the superiority of instrument design, construction, materials, intonation, consistency of register, and *tone quality*. The latter, tone quality, is probably the most controversial and least understood aspect of any of the above-mentioned characteristics.

Excluding the consideration of tone quality for the moment, differences among various makes and models of clarinets are readily perceivable. Beside the obvious, namely design, construction, and material, professional players purport differences in the "feel" of individual instruments with respect to blowing resistance, evenness of register, and intonation. Less conclusive are those claims which maintain that unique differences in tone quality also exist in a direct, perceptible way.

Purpose of Study

It was this concern as related to my interest in the clarinet which prompted me to design an experimental study which would attempt to (1) objectively measure the quantitive differences in tone quality among various makes and qualities of clarinets to find some pattern in their tonal spectra which might serve to distinguish one make or model from another; (2) to construct a listening test from the recorded tone samples to determine if listeners could judge the comparisons of instruments to be "same" or "different" at a level of significance. Through further statistical analysis, I also sought to determine the effect that the register had on the listener's ability to make tone quality judgments — whether there was any significant difference between the "professional" line instruments and the "student" line instruments; i.e., could listeners discriminate between the two, and to determine if listeners possess different abilities in being able to judge clarinet tones!!

List of Related Studies

Past studies of timbre (tone quality) as related to the clarinet have been conducted mostly in the area of objective quantitative analysis of the general tone spectra for the entire range of the

clarinet. My review of the following experiments was particularly healpful:

Fletcher, Harvey, "Loudness, Pitch, and the Timbre of Musical Tones and their Relation to the Intensity, the Frequency, and the Overtone Structure." *J. Acoust. Soc. Amer.*, VI, 2 (1934)

Ghosh, R. N., "Theory of the Clarinet," J. Acoust. Soc. Amer., IX, — (1938)

Lehman, Paul R., "The Harmonic Structure of the Tone of the Bassoon," Seattle, Washington: Berdon, Inc. (1965)

McGinnis, C. S., Hawkins, H., and Sher, N., "An Experimental Study of the Boehm Clarinet," J. Acoust. Soc. Amer., XIV, 4 (1943)

Parker, Sam, "Analysis of the Tones of Wooden and Metal Clarinets," J. Acoust. Soc. Amer., XIX, 3 (1947)

Saunders, F. A., "Analysis of the Tones of a Few Wind Instruments,'" J. Acoust. Soc. Amer., XVIII, 2 (1946)

The findings of the above studies generally agree on a basic tone spectrum produced by the clarinet:

1) The clarinet behaves like a closed pipe in the chalameau register having a tone spectrum consisting of strong odd-numbered harmonics (1, 3, 5, 7, 9). Even numbered harmonics (2, 4, 6, etc.) become more prominent in the clarion and altissimo register.
2) The greatest abundance of harmonics are generated in the chalameau register. The tone spectrum becomes simpler in harmonic content as you ascend into the clarion and altissimo register.
3) An increase in the intensity of air produces stronger and more numerous harmonics in the total tone spectrum.

Though the studies of Saunders, McGinnis, and Parker revealed many common likenesses found in all clarinets regardless of quality, make, or player variables, there were differences in detail as to the relative strengths of the harmonies. It has since been a matter of concern to identify those variables which cause differences in harmonic content.

Parker utilized a mechanical blowing device of different sizes, shapes, and materials and came to the conclusion that the following variables seem to affect the tone spectra and resulting timbres of clarinets:

1) The placement and pressure of the player's embouchure on the reed,
2) The blowing pressure intensity (FF to PP),
3) The position of the tone in the registers.

In analyzing the tonal spectra of wooden and metal clarinets, Parker found that there was no appreciable difference between the harmonic content of these instruments.

Experiments in the subjective measurement of tone quality ave been conducted more with string instruments than with winds. tudies conducted by, and reported by, F. A. Saunders reveal that ıost listeners could not discriminate the difference between sounds roduced by a Stradivarius violin and another violin when played y the same performer. He observes that very few listeners pos- ess a highly discriminating enough ear to detect differences of ıis kind.

Procedure for Recording Sample Tones

Tone samples were taken from six clarinets of varying ıakes and qualities. The six instruments were secured from a local ıusic dealer and were shop-adjusted prior to the test. The makes nd models are as follows:

Instrument A ..... Buffet Crampon (Professional)
Instrument B ..... Selmer Series 9 (Professional)
Instrument C ..... Leblanc Classic (Professional)
Instrument D ..... Selmer Bundy (student line resonite)
Instrument E ..... Leblanc Vito (student line resonite)
Instrument F ..... Conn 16N (student line resonite)

My first concern in securing the tone samples was to control ıose variables which might prejudice the results of the experiment. s previously observed in Parker's studies, differences in tone spec- a on a single instrument appear to be caused by variables unique) individual clarinet players. Since I did not have access to an rtficial blowing device to generate tone samples on the respective ıstruments, I secured the services of a professional clarinet player. he player used his own reed and mouthpiece for the recording of l the tone samples.

Recording conditions and procedure were judged to be variables hich needed to be rigidly controlled. I used a modified recording rocedure as described by Lehman in his dissertation, "The Har- ıonic Structure of the Tone of the Bassoon," and was fortunate ıough to have the full use of the recording facilities at the Central ıstitute for the Deaf in St. Louis.

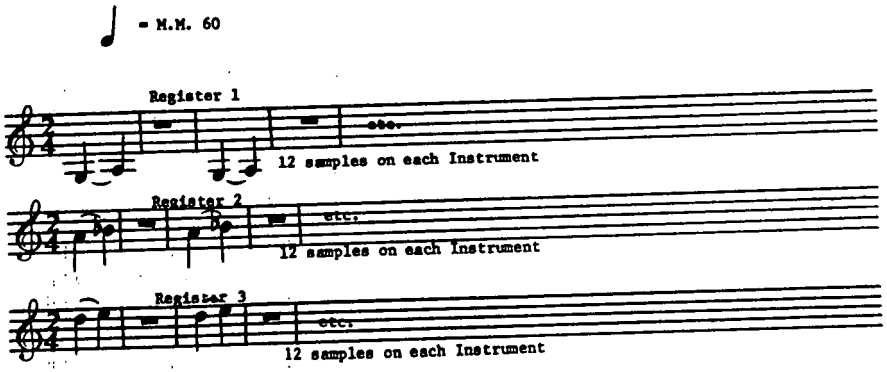
The facilities at the Institute included an anachoic chamber, ı Altec, model 633A microphone, an Ampex model 401A full track ıpe recorder, a sound pressure DB meter, a VU meter positioned ı front of the player, and a two-way communication system be- veen the player in the chamber and the recording technician out- de of the chamber. Full technical assistance was given by mem- ers of the Institute staff.

The recording session took two hours and was conducted as)llows. The microphone was positioned on a boom approximately ıuidistant from all the tone holes of the clarinet on a plane with

the clarinet. The player performed all tone samples in a standing position and was placed so his instrument was 24 inches away from the microphone. Measurements were taken before each test series to maintain this uniform distance.

All instruments were tuned prior to the recording session and re-adjusted preceding the recording of each register. A Conn Strobotuner was used to establish the pitch level.

Each tone sample consisted of a 2-note slurred pattern taken in three registers of the clarinet. The three registers included the chalameau, (g3-a4), throat (upper chalameau) (a5-Bb5), and the clarion (d5-e5). (see Figure 1)



Twelve tone samples were recorded in each of the three registers for each of the six clarinets. This represents a total of 216 tone samples which were later analyzed on a sonograph and then spliced into combinations of exercises for subjective measurement by listeners.

Tone samples from Register 1 were recorded first. These samples were recorded at a 83 DB level with 2 DB attenuation. A DB meter was used to check the sound pressure level at the microphone and a VU meter was calibrated to produce a nearly zero reading at maximum intensity. The meter was placed directly in front of the player so he could view it as he played.

The player was instructed to blow a firm tone at dynamic level he could maintain throughout the session. We found that though we heard little or no change in intensity level from one pitch to the next, the VU meter registered a significant fluctuation ranging from 1 to 3 decibels. After several trial runs, the player quickly adapted to the level changes and was consistently able to produce approximately the same intensity levels for all samples in each register.

The recording of the 2nd register and 3rd register required re-adjustment of the recording level in that these pitches produced successively higher intensity levels than in register 1. The 2nd register was recorded at 85 DB with 8 DB attenuation and the 3rd register was recorded at 88 DB level with 12 DB attenuation.

Objective Measurement of Tone Spectra and Results

Several tone samples representing each instrument in each register were randomly selected and analyzed on the sonograph. The sonograph converts and analyzes the steady state tone into a graphic display of amplitude as a function frequency in a point of time. The sonograph has a maximum intensity band width of 30 DB. Therefore, the frequency-amplitude displays represent only relative harmonic strengths, not actual one-to-one relationships.

An ordinary ruler in millimeter units was used to measure the individual harmonic strengths. The means and standard deviations were computed for selected tone samples in such a way as to compare: (1) the degree of variance found in the harmonic structure among the six instruments in each of the three registers, (tables 1, 2, & 3), (2) the degree of variance in harmonic structure of tone samples produced by the same instrument, (table 4), and (3) the degree of variance in the harmonic structure of a single tone sample taken at three points in time to determine the phase relationship found within the sample, (table 4).

The limited analysis of tone spectra suggests that: (a) there is a greater variance in tone spectra among different instruments than that found between tone samples produced by the same instrument. (b) The tone spectra pattern of professional instruments do not vary significantly from the tone spectra pattern of student line instruments. This invalidates the assumption that professional brands possess a tone spectra markedly different from that produced by student line brands. In fact, student line instruments in several comparisons seem to match professional line instruments better than professional line instruments match themselves. (c) The phase relationship within a steady state tone produced variances in the spectrum which were very small, nearly the same as variances found between tone samples produced by the same instrument. This suggests that the professional player demonstrated a consistency of tone production throughout the recording session.

Construction and Administration of the Listening Test

The design of the listening test required the splicing of 216 tone samples into 108 listening exercises which paired tone samples in combinations of their being "same" or "different." A six by six matrix was used in pairing the combination of tone samples for each register. Each register contained 36 exercises of which 6 were "same" pairings and 30 exercises were "different" pairings. The composite total for the 3 registers included 18 "same" exercises and 90 "different" samples. The exercises were randomly assigned an order in the test. In the actual splicing procedure, several samples were found not to be usable and therefore the test consisted of 105 exercises.

The lecture room at the Central Institute for the Deaf was used for the listening test. Loudspeakers were suspended directly over the listeners. The tape was played on the same Ampex recorder which was used in the recording of the tone samples.

It was the desire of this author to secure an equal number of "professional" and "non-professional" clarinet players and to compare their scores. However, I was only able to recruit five "professional" clarinet players and one "non-professional."

The listeners were given test sheets with written instructions which were augmented by verbal instruction. They were to judge each exercise as being "same" or "different." If possible, listeners were instructed to use their own terminology to describe the differences they noted within the exercises judged to be "different." If value judgments were to be made, a "W" was to be used to indicate "worse," a "B" was to be used to indicate "better."

For purposes of validation, it would have been desirable to give five replications of the test. However, due to time considerations and the faitgue expressed by the listeners after the third replication, it was decided not to continue another replication. Each replication of the test took 27 minutes and a 10 minute break was given in between each replication.

Interpretation of the Listening Test Results

The results of the listening test appear in table 5. The average score of correct responses for the six listeners was 68%. The range of individual scores for each replication varied from a low of +52% to a high of +80%. It is interesting to note that Listener C, the non-professional clarinet player, consistently scored higher on each replication of the test.

The average percent of correct responses to "different" exercises was +68.5% and to the "same" exercises was +65.3%.

A chi square test was run to determine if there was a difference between theoretical expectancy and test results beyond what might reasonably be expected to occur by chance. The results of X2 = 188.31 is highly significant at less than the .01 level of significance. The null hypothesis is thereby rejected clearly indicating that listeners can detect differences of tone quality.

An analysis of variance was run to determine if an interaction was occuring within the sub-groups (registers, combinations of professional and student line instruments, and subjects) other than what could be expected on the basis of chance sampling. F test results indicate that: (a) Listeners as a group did not significantly score any better in one register than in another. (b) were not able to judge tone quality differences between professional and student line instruments any better than what would be expected by chance. (c) There was a significant difference at less than .01 level among listeners in their ability to discriminate tone quality differences.

I believe it is important to note that the above statistical involving chi square and analysis of variance were undertaken with some modification of raw score results. It was observed that seven "different" exercises had a 100% correct response. In checking, I found that all exercises included the F2 instrument tone samples (F instrument, 2nd register). I further proceeded to trace the other exercises having an F2 instrument tone sample and found three more "different" exercises which had a 94% correct response.

Using a strobotuner, the pitch of the F2 sample was compared with the pitch of the sample with which it was matched and found there was a difference of 20 to 30 cents. These ten exercises involving the F2 instrument were viewed as being invalid on the basis that decisions were influenced by the pitch discrepancy rather than by the tone quality. Adjustments in the statistical analysis were therefore made to compensate for the obvious effect that they would have toward biasing the statistical data. The mean of the total correct responses to "different" exercises was taken and this value was assigned all exercises involving the F2 "different" exercises.

It is worth reporting that twelve other "different" exercises were judged correctly 94% of the time by the listeners. I also checked their pitch with the strobotuner and found there to be no significant pitch difference; therefore, other factors must explain this degree of consistency of judgment.

One final observation has to do with the listeners' verbal descriptions of perceived differences and their reaction to the test. Most listeners elected to describe differences as being "better" or "worse". A lack of time did not make it possible to analyze the results of these responses. Some listeners did indicate that several variables other than tone quality were affecting their judgment. Several of the variables mentioned were: (1) changes of tempo found between tone samples within an exercise, (2) onset and decay properties of tone camples (attack and release), (3) listeners felt tired, (4) intensity changes within exercises, and (5) influenced by the writing of other listeners.

Conclusions

The above listener comments suggest that judgments of tone quality are strongly influenced by other variables which may need to be controlled more rigidly than was the case with this test. Analysis of the test results and spectra of various sample tones, however, suggest that the very elements which the listener claims affect his decision-making are often contrary to his actual response.

Whatever other variables were present in the "different" samples which may have prejudiced the listener to judge "different" exercises correctly as being "different" has not been fully explored and determined. The only evidence to date which has been quantitatively documented is the tuning of the F2 instrument. It can be assumed with a great deal of certainty that these ten exercises involving F2 instrument contain an intonation variable which has strongly influenced the decisions of the listeners.

In order to resolve the questionable validity of the listening test, a more detailed analysis of all tone samples seems to be in order to either confirm or deny the presence of other variables which significantly influence the listener's judgment of tone quality.

I believe it is highly significant to note that objective and subjectve measurement of clarinet tones concur on several points. (1) There seems to be no evidence to suggest that professional

quality instruments have tone qualities significantly different from those of student line instruments. (2) There is a greater degree of variance of tone spectra among different instruments than that produced by a single instrument. Listeners are able to perceive these differences or samenesess at a less than .01 level of significance. Further interpretation of the listening test results indicate that listeners possess different and varied abilities in judging tone quality. Again this is statistically signficantly at less than the .01 level.

Finally, there seems to be no evidence which suggests that listeners are able to judge tone quality any better in one register than another.

In conclusion, it would appear that this experiment requires more replications of the listening test to be given to a broader population of professional and non-professional clarinet players, further analysis of instrument tone spectra, and further statistical analysis which would enable the researcher to state with a greater degree of confidence the confirmation or rejection of the findings to date.

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TONE SPECTRA OF SIX INSTRUMENTS
REGISTER 1

Instruments, Pitch g3								
Partial	A	B	C	D	E	F	ME	SD
1	28	28	28	26	26	26	27	1.1
2	—	—	—	—	—	—	—	—
3	24	24	24	22	23	23	23	.9
4	5	7	5	3	4	2	4	1.8
5	24	24	25	23	22	23	23	.9
6	13	19	15	15	13	15	15	2.2
7	25	17	26	15	24	21	21	4.5
8	7	—	5	—	1	5	3	2.4
9	7	12	9	11	9	6	9	2.3
10	—	—	5	—	—	2	1	2.5
11	8	11	13	9	8	12	10	2.1
12	3	10	10	6	8	10	8	2.8
13	10	11	14	12	12	10	11	1.6
14	6	8	11	7	7	9	8	1.8
15	5	10	7	7	4	8	7	2.1
16	11	11	13	5	10	13	10	3.0
17	11	12	9	6	8	9	9	2.1
18	11	11	5	—	3	7	6	4.4
19	8	11	9	7	2	4	7	3.3
20	3	6	—	—	1	3	2	2.3
21	4	7	6	1	4	3	4	2.1
22	2	4	2	1	1	2	2	1.1
23	—	—	5	—	1	—	1	2.0
24	—	—	5	—	—	4	1	2.4
25	—	—	5	—	3	1	1	2.1
26	—	—	1	—	—	—	—	.8
27	—	—	—	—	2	—	—	.6
Average Standard Deviation								2.0

Instruments, Pitch a4								
Partial	A	B	C	D	E	F	ME	SD
1	28	28	28	27	27	28	28	.6
2	5	3	4	—	2	1	2	2.0
3	26	25	25	25	25	26	25	.6
4	10	10	12	7	10	12	10	1.8
5	25	25	25	24	24	26	25	.8
6	20	10	19	7	19	8	14	6.1
7	3	12	9	12	10	5	8	3.8
8	2	3	6	7	—	—	3	3.0
9	11	10	12	9	11	16	11	2.5
10	—	5	3	7	7	10	5	3.5
11	12	12	16	16	9	16	12	3.0
12	4	7	10	9	12	13	9	3.3
13	5	6	8	1	6	6	5	2.4
14	1	6	6	2	6	8	5	2.7
15	8	11	11	5	8	12	9	2.6
16	8	14	14	5	8	10	10	3.6
17	11	9	11	7	12	11	10	1.8
18	15	10	12	5	13	13	11	3.5
19	5	5	10	4	11	9	7	9.2
20	5	—	7	—	4	2	3	2.8
21	—	—	—	—	—	—	—	—
22	Average Standard Deviation							2.9
23								
24								
25								
26								
27								

Table 2
TONE SPECTRA OF SIX INSTRUMENTS
REGISTER 2

Instruments, Pitch a5								
Partial	A	B	C	D	E	F	ME	SD
1	27	27	27	28	27	28	27	.6
2	9	8	5	7	10	11	8	1.8
3	25	23	24	26	24	25	24	1.2
4	22	17	17	19	20	20	19	1.9
5	18	21	21	23	17	20	20	2.2
6	11	5	—	8	—	16	6	6.3
7	19	22	19	21	22	23	21	1.7
8	—	11	11	—	17	12	8	7.0
9	—	—	3	—	2	—	1	1.3
10	—	—	2	—	2	—	1	1.1
11	6	—	—	0	—	5	3	3.6
12	—	—	—	—	2	—	0	.8
13	—	—	—	3	—	—	0	1.3
14								
15								
16								

Instruments, Pitch Bb5								
Partial	A	B	C	D	E	F	ME	S
1	28	27	27	27	27	28	27	
2	8	9	5	8	7	11	8	1
3	22	22	21	22	22	22	22	
4	16	17	17	20	17	15	17	1
5	11	16	11	14	15	14	13	
6	12	14	9	12	13	19	14	
7	2	7	—	7	7	10	5	
8	5	—	—	—	—	—	1	
9	**	—	—	—	6	2	1	
10	—	7	6	—	—	—	2	
11								
12								
13								
14								
15								
16								

Table 3

TONE SPECTRA OF SIX INSTRUMENTS
REGISTER 3

Instrument, Pitch d5								
Partial	A	B	C	D	E	F	ME	SD
1	28	28	28	28	28	28	28	—
2	19	24	20	21	18	22	21	2.2
3	6	14	11	10	13	9	10	2.9
4	—	7	8	3	—	9	4	4.1
5	14	15	17	11	18	17	15	2.6
6	18	19	17	13	22	19	18	3.0
7	7	6	13	7	12	6	8	3.2
8	6	9	15	5	11	9	9	3.6
9	2	—	2	—	4	3	2	1.6
10								
11								

Instrument, Pitch e5								
Partial	A	B	C	D	E	F	ME	SD
1	30	30	30	30	30	30	30	—
2	25	15	23	17	25	17	20	4.5
3	18	19	18	17	13	23	18	3.2
4	12	15	19	16	20	16	16	2.9
5	17	22	18	18	18	18	19	2.0
6	22	22	19	20	23	19	21	1.7
7	—	—	17	—	15	15	8	8.6
8	1	7	13	—	12	11	7	5.7
9								
10								
11								

TABLE 4

MULTIPLE SPECTRA OF TWO TONE SAMPLES
INSTRUMENT D1

	Pitch g3												Pitch a4											
	Spectra, Sample 1					Spectra, Sample 2					ME	SD	Spectra, Sample 1					Spectra, Sample 2					ME	SD
Partial	1	2	3	ME	SD	1	2	3	ME	SD			1	2	3	ME	SD	1	2	3	ME	SD		
1	27	27	27	27	—	26	27	27	27	.7	27	.4	28	28	27	28	.7	28	27	27	27	.7	27	.8
2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	24	24	24	24	—	24	25	25	25	.7	24	.6	25	26	26	26	.7	26	25	25	25	.7	25	.8
4	7	6	3	5	2.1	4	4	—	3	2.3	4	2.4	8	9	7	8	1.0	8	7	8	8	.7	8	.8
5	24	25	25	25	.7	24	25	25	25	.7	25	.4	25	25	27	26	1.2	26	25	26	26	.7	26	.9
6	20	19	17	19	1.6	23	18	15	19	4.1	19	2.7	10	11	9	10	1.0	11	10	10	10	.7	10	.8
7	18	20	21	20	1.6	25	21	21	22	2.3	21	2.3	14	14	13	14	.7	15	13	14	14	1.0	14	.8
8	—	—	—	—	—	—	—	—	—	—	—	—	8	9	7	8	1.0	6	7	7	7	.7	7	1.1
9	11	12	13	12	1.0	12	13	14	13	1.0	12	1.2	10	10	11	10	.7	13	11	11	12	1.2	11	1.1
10	2	1	1	1	.7	—	—	—	—	—	1	.9	9	9	10	9	.7	9	8	6	8	1.6	8	1.5
11	11	12	13	12	1.0	12	12	15	13	1.7	12	1.5	12	12	13	12	.7	12	13	12	12	.7	12	.6
12	8	11	11	10	1.7	9	11	8	9	1.6	10	1.5	14	15	13	14	1.0	15	14	13	14	1.0	14	.9
13	15	15	15	15	—	14	15	17	15	1.6	15	1.0	3	2	—	2	1.6	3	3	5	4	1.2	3	1.7
14	12	16	14	14	2.0	13	14	9	12	2.6	13	2.4	7	7	8	7	.7	9	9	7	8	1.2	8	1.0
15	11	11	9	10	1.2	8	9	13	10	2.6	10	1.8	3	5	—	3	2.5	3	6	8	6	2.5	4	2.8
16	15	14	14	14	.7	12	14	13	13	1.0	14	1.1	9	8	11	9	1.6	11	9	7	9	2.0	9	1.6
17	14	14	11	13	1.7	8	8	13	10	2.9	11	2.8	7	9	6	7	1.6	8	9	10	9	1.0	8	1.5
18	7	7	10	8	1.7	8	9	9	9	.7	8	1.3	6	6	10	7	2.3	9	8	8	8	.7	8	1.6
19	6	8	7	7	1.0	3	4	4	4	.7	5	2.0	10	9	8	9	1.0	11	11	9	10	1.2	10	1.3
20	—	—	—	—	—	—	2	6	3	3.1	1	2.4	—	—	1	—	.7	1	—	—	—	.7	—	.6
21	—	7	8	5	4.3	6	8	6	7	1.2	6	3.0	—	—	—	—	—	—	—	—	—	—	—	—
22	6	3	7	5	2.1	5	6	10	7	2.6	6	2.3	—	—	—	—	—	—	—	—	—	—	—	—
23	3	6	9	6	3.0	4	6	4	5	1.7	5	2.2	—	—	—	—	—	—	—	—	—	—	—	1.1
24	4	4	1	3	1.7	4	2	4	3	1.2	3	1.3												
25	—	4	7	4	3.5	1	5	0	2	2.6	3	2.9												
26	1	1	—	1	.7	—	—			—	0	.6												

TABLE 5

TABULATION OF LISTENER SCORES

Classification		1st Replication	2nd Replication	3rd Replication	Average Percent
Professional	Listener A	*+61 **+59%	+65 +62%	+65 +62%	+61%
Professional	Listener B	+69 +66%	+66 +63%	+74 +70%	+66%
Non-Professional	Listener C	+78 +74%	+84 +80%	+83 +79%	+78%
Professional	Listener D	+66 +63%	+81 +77%	+76 +72%	+71%
Professional	Listener E	+83 +79%	+82 +78%	+78 +74%	+77%
Professional	Listener F	+55 +52%	+63 +60%	+64 +61%	+58%
		Average Score for All Listeners			+68%

* Number of correct responses out of a possible 105 exercises.
** Percent of correct responses out of a possible 105 exercises.

OTHER STATISTICAL DATA

1) Average percent of correct "different" responses 68.5%

2) Average percent of correct "same" responses 65.3%

3) Average percent of correct responses of exercises matching professional instruments with student line instruments 67%

4) Average percent of correct responses of exercises matching same quality instruments (pro-pro; stu-stu) 70%

*** The following three exercises were not included in the test because of problems which developed in the splicing of the tape.

F1 - A1
E1 - E1
F3 - A3

AN APPLICATION OF CERTAIN LEARNING THEORIES TO THE TEACHING OF MUSICAL RHYTHM

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INTRODUCTION

The purpose of this paper is to examine and apply certain basic types of learning to certain aspects of music education and to build and test a sequence of instruction upon ideas and concepts derived from these types of learning. The learning hierarchy used in this paper is based principally on models of learning structures as set forth by Robert Gagne.[1] The "raison d'etre" of this paper is a quest for more knowledge of relating particular learning theories to music education. To date, the author knows of no comparable attempt to relate a structured learning hierarchy to a specific area of music education. What has been done is that certain learning principles have been applied to teaching in certain musical situations. The following is a discussion of two such experiments which incorporate these principles.

Neidlinger[2] attempts to apply certain of David Ausabel's and Jean Piaget's principles to teaching elementary general music. He divides music into dimensions which include pitch, timbre, simultaniety, loudness, and time; and the structures learning situations as a matrix of interrelated facts about specific musical stimuli in terms of these dimensions. Principles of child development by Piaget are used as an indication that the children in this experiment should be able, at their level of development, to understand these complex relations. Two of Ausabel's theories are used.

1. His *theory of subsumption,* that the content of the learning task must be presented to the learner, rather than his discovering it for himself, is used to validate Neidlinger's approach of breaking music into its elements.

2. His concept of the *advance organizer* is used to provide a related concept or an anchoring focus for the musical concepts being taught.

Although this dissertation is extremely well thought out and contains many useful ideas, its basic hypothesis, that music could be better understood if it were taught through its basic elements, was rejected. The experimental classes which were taught the dimensions of music were not significantly superior in musical understanding to the control classes, which were taught musical understanding as a whole by listening to records.

Hypothetically, this experiment should have produced different results; music should be understood better if it is taught through

its dimensions. A reason for its failure could be that the musical steps to musical understanding are not necessarily related to the actual cognitive steps needed by the child to understand music. The dimensions of music were thought out and codified by adults, not children. Perhaps imposing these standards on a young mind, even though it may understand them, does not fit the cognitive structure of that mind. Perhaps certain essential cognitive steps to a musical understanding were skipped.

Another study in this area is Reeves[3] experiment on comparing two methods of teaching elementary instrumental classes, one patterned after Gestalt theories, the other patterned after associationist theories. The first group, those instructed in "whole to part" methods, learned first how to play by ear and rote, then gradually learned to read music. The second group, those instructed in "part to whole" methods learned how to read notes and rhythms first and gradually built melodies from these notes and rhythms. The final results are very interesting; the two methods balanced one another. The Gestalt group was slightly superior in musical interpretation, and the associationist group was slightly superior in sight-reading, but there were no significant differences in the averages of both groups. This dissertation is significant in that there was an attempt to settle the long standing argument over what approach is a more efficient way of teaching music. Reeves found that both methods produced almost equal results.

These two dissertations have given music education valuable information about the application of learning theories to music education. Although nothing spectacular can be said about new discoveries in the field, each proves that structured learning based on certain principles of learning theories can be applied as successfully as other methods which have been "tried and proven" in music education. The question arises, can a learning structure based on learning psychology ever improve upon preexisting methods of teaching music? This paper will try a somewhat different approach in solving this question. Instead of trying to apply principles of learning psychology to general levels of music, like performing and understanding, an attempt will be made to relate specific types of learning to specific tasks in music education. Then the specific tasks which are necessary to learn a single dimension of music; i.e., rhythm, will be structured into a learning hierarchy. From this learning hierarchy will be derived a learning sequence from which the student will learn the ability to read and perform musical rhythms.

The first section of the paper is a discussion of several types of learning thought important in learning to read and perform music at an elementary level. Signal learning is also discussed, although it is not directly related to the reading and performing of music, because of its possible influence on pre-school children. The main emphasis of this section is to classify specific musical tasks as to the type of learning required to incorporate them in a cognitive structure.

SIGNAL LEARNING

The first type of learning that Gagne[4] recognizes is signal learning. His definition states:

> "The individual learns to make a general diffuse response to a signal."

In order for this type of learning to occur, there must first be an unconditioned stimulus which produces an unconditioned response. Gagne[5] says that within the learner there must be natural reflex, typically a reflexive emotional response such as startle, fear, anger, or pleasure. Then a signal must be presented with the unconditioned stimulus. After a learning period where both stimuli are repeated simultaneously or in close proximity, the unconditioned response is elicited by the conditioned stimulus alone and thus becomes a conditioned response. The conditioned response is different from the unconditioned response because it is elicited by the signal and not directly from the unconditioned stimulus. Thus when Pavlov's dogs salivated to the buzzer instead of the food, they exhibited a conditioned response.

There are examples of signal learning in everyday life of humans.[6] The conditioned responses are of two basic types: those initiated from fear or some other form of negative affect and those initiated from pleasure or some other form of positive affect. The first type is exemplified by the fear of young children which causes them to avoid certain places or things because of pairing them with an unconditioned stimulus such as a loud noise. The second type is represented by the pleasure response of a young child to a teddy bear or a blanket and at a later stage of the individual's development, to a particular scene or melody. The paradigm[7] for this type of learning is represented as follows:

S——————R

(Signal)

> "S" is the unconditioned stimulus; the signal (or the conditioned stimulus) is what becomes associated with the response changing it from an unconditioned response to a conditioned response.

Signal learning in music is observed early in a child's life. It is important because it may effect the child's general attitude toward music before he reaches school age. Music as a pure stimulus cannot produce a pain response unless it is at such an intensity level that it produces discomfort or actual pain in the child's ear; therefore, the sound of music itself is unlikely to cause negative forms of signal learning. This is discussed briefly below. Much of an infant's contact with music is through the mother's lullaby while she cradles him in her arms or her nursery rhymes while she plays with him. The music becomes associated with the pleasure of a happy or relaxing time. Soon many mothers find that they can leave a radio or record player in the child's room and go about household chores because the music "keeps him company." Signal

learning has taught the child to exhibit the pleasure response to music. The following would represent what has occured:

Maternal Attention Pleasure Response

S——————R

(Music)

Music————Pleasure Response

It seems safe to assume that this conditioned response will, when the child is venturing, motivate him to seek sources of music other than his mother's voice. These sources are the stereo, the radio, the television, or perhaps a musical instrument such as a piano. Naturally because of the cost of possible danger of these sources, the child will be reprimanded for playing with them. If the child's interest is redirected with substitute objects such as his own toy instruments there is no apparent harm, but if the child is continually punished for playing with the sources or falls or receives an electric shock while playing with them, another type of signal learning might take place. The unconditioned stimulus[8] of a fall, shock, or spanking which produces an unconditioned response such as fear or crying might be paired with the music stimuli, especially if the sole purpose of the child's investigation of the source was to find where the music originated. The following diagram would represent what had occured:

Pain or Fear Stimulus Pain or Fear Response

S——————R

(Music)

Music————Pain or Fear Response

There is no empirical data to support what has just been stated (just as dogs were never known to come running when they heard the rattle of their food plate until Pavlov proved it in his laboratory). However; music educators have always been aware of a small percentage of children of primary school age who refuse to sing or participate in musical activities. Some of these children are even afraid to touch a piano or other musical instrument; in a way they seem actually afraid of musical sound. Perhaps signal learning as discussed above has effected the general attitude of these children toward music.

STIMULUS-RESPONSE LEARNING

The second type of learning Gagne[9] discusses is stimulus-response learning. His definition states:

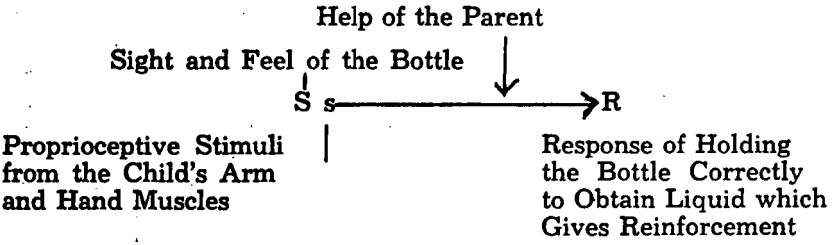
> "The learner acquires a precise response to a connection (Thorndike, 1898) or a discriminated operant (Skinner, 1938) sometimes called an instrumental response (Kimble, 1961)

Basically this type of learning constitutes associating a particular response to a particular stimulus. Usually it takes a period of time to associate the correct response to the correct stimulus during which the individual's behavior is said to be shaped. A set of stimuli, both external and internal, must be connected to a correct response through a "successive approximation" or a "trial by error" procedure depending upon the task. The learning becomes a matter of discrimination of correct and incorrect stimulation; of the set of stimuli which produces a reward and the set of stimuli which does not. The following paradigm is used to represent this form of learning.[10]

S s——→R

The large "S" represents the external stimuli. The small "s" indicates the internal stimuli arising from kinesthesis and the arrow is used to imply the discriminating nature of the process (in contrast to signal learning) and the "R" is the proper response.

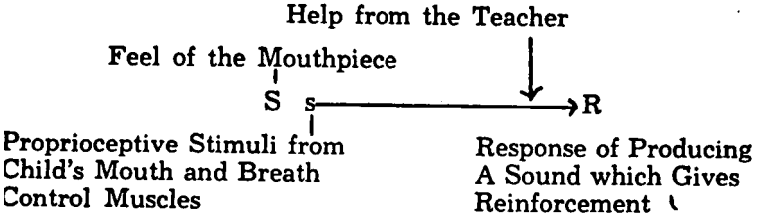
This type of learning is distinguishable from signal learning by the differences in the character of the responses. Whereas signal learning requires responses of a more generalized emotional nature, S-R learning requires responses of a fairly precise, differentiated nature, usually a specific motor task. This is best exemplified by the model Gagne[11] uses in his book to demonstrate this type of learning. At first an infant does not know how to hold his bottle to obtain its contents. The parents must hold the bottle to assure proper feeding; however, the infant will grasp at it, quite unsystematically. Soon the parent begins to release his hold on the bottle so that the child will have to exert greater, more directed pressure to hold the bottle in place. After many trials and much help from the parent, the infant soon learns to hold the bottle at the proper angle for feeding; thus he has learned the correct response and the stimulus response connection has become established. The reward of the liquid is very important because it serves as a reinforcement of the proper response which strengthens its bond with the stimulus. The following model will show what has taken place:



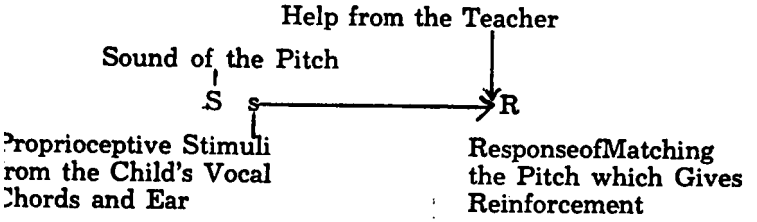
Much of the early learning which occurs through S——R bonds is fairly precise motor learning.[12] This helps to distinguish between signal learning and S——→R learning in music education. Whereas signal learning seems to effect an individual's general attitudes

towards music, S⟶R learning seems to be found in the learning of basic motor skills needed to sing or play an instrument. The following situations will show examples of S⟶R learning in music.

S⟶R learning is seen in the beginning instrumentalist as he attempts to play the first note on his instrument. Although verbal cues may be used to position the instrument in the proper playing position, the actual muscle control needed to vibrate the lips in a cup-shaped mouthpiece or to cause a double or single reed to vibrate is clearly a case of the S⟶R type of learning. At first the child tries quite unsuccessfully to produce the tone. Then through the process of successive approximation and with help from the teacher, the student gradually learns to produce the tone which serves as the reinforcement of the proper response. A set of stimuli, including the sound and feel of the instrument as well as the proprioceptive stimuli from the child's mouth and breath control muscles becomes connected with a correct response of producing the desired sound. This example fits the S—R paradigm very well:



Another example of S—R learning in music is found in teaching a young singer to match a musical pitch, especially when the child has had little or no previous experience in this area. At first the child will sing lower or higher with no apparent systematic approach to matching the pitch which he hears. Then through many attempts and with the help of his teacher, the child will learn to match the pitch which he hears, which provides a type of audio reinforcement.[13] Soon the child will match pitches almost immediately upon hearing them.[14] The following diagram will show this example related to the S⟶R paradigm:



The preceding situations are examples of S⟶R learning in music. When the conditions of this type of learning are not thoroughly understood, much of the teaching benefits which can be derived from using this method of learning is over-looked, as in the instruction of rhythm which will be discussed later in this paper. As

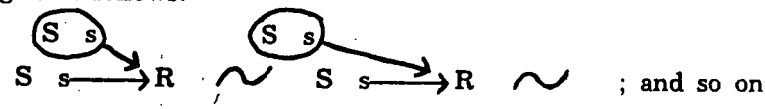
Gagne[15] states, this type of learning is a pre-requisite for higher forms of learning. It also seems safe to assume that a learning situation which uses S⟶R learning and gradually proceeded into higher types of learning would be the most efficient procedure of instruction.

CHAINING

Another simple and widely occuring type of learning which Gagne[16] discusses is chaining. His definition states:

> "What is acquired is a chain of two or more S⟶R connections. The conditions for such learning have been described by Skinner (1938) and others, notably Gilbert (1962)"

Basically, an individual relates two or more S⟶R connections to learn a more complicated task. What is important is that as the individual acquires chains, each S⟶R connection must be previously learned before the chain can be completed. In order to assure the proper order of S⟶R connections, verbal cues are often used, but later abandoned when the chain is firmly established. Reinforcement is received partially with the completion of each S⟶R connection and primarily with the completion of the terminal link, for if this final reinforcement is omitted, extinction of the final link causes the whole chain to disappear. The paradigm for chaining is as follows:[17]

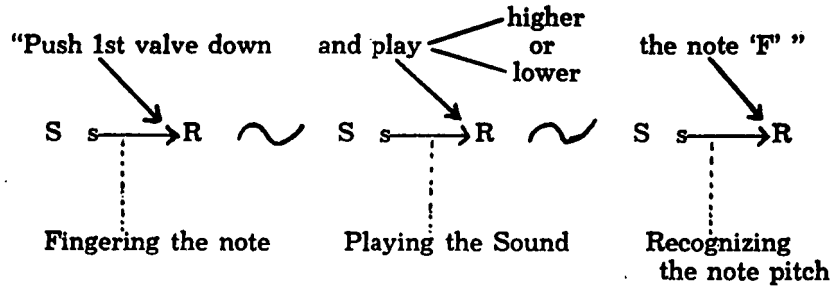


; and so on

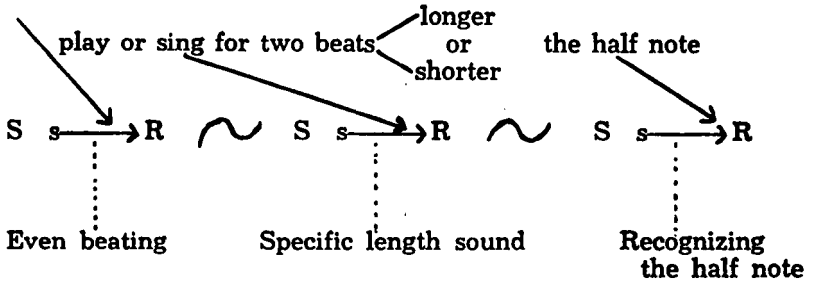
The circled "S s" is to represent verbal cues.

There are many examples of simple chaining which occur in the development of an individual.[18] Gagne[19] also discusses verbal association which he classifies as a separate type of learning, but points out that it might be classified as a sub-variety of chaining dealing with words. It seems as though chain learning has a very broad field of application. It can be used to teach a child to use a key to open a door or to teach an individual words in a foreign language.

Musical development in a child also incorporates learning by chaining. As the elementary instrumentalist progresses to the fundamental skills for reading music, it becomes necessary to recognize symbolic (printed) representations of note pitches. The S⟶R connections of playing a note on an instrument must be associated with the S⟶R connection of recognizing and naming the note by reading the music. The teacher supplies verbal cues to aid in prompting the particular S⟶R connection necessary in the chain, and these are abandoned after the chain is firmly established. The final reinforcement comes from the child knowing that he has played that particular note. This example would fit the chaining paradigm as follows:



Another type of chaining found in music education is learning o recognize the length which a note is to be played or sung. First he S——→R connection of producing an even beat must be associted with the S——→R connections necessary to produce the length f the note value being learned. Then the S——→R connection needd to learn the visual stimulus of the particular note must be associted with the actual performance of the note. The teacher, as in ıe previous example, supplies verbal cues and the reinforcement omes from the child knowing that he has performed the note of ıe proper length. This example would be represented as follows: Establish a pulse, and



As is seen in the previous examples, this type of learning in eginning music education requires fairly complex S——→R learnıg. In a sense, these basic S——→R connections cannot be condered pure types of S——→R learning, for just as in Gagne's[*] ɛample on adult speech patterns, the external and internal stimuli ıcorporate the knowledge of other types of skills. For example, in :der for a child to acquire an S s——→R that permits him to ɔund a note for two beats, discrimination must take place of both ɜpects of the stimulation. The former is provided by discriminating ıe exact length of the sound from other similar, but incorrect ngths. A half note must be two full beats, and not one and a half : two and a half. The latter requires that the child imitate the roper length of the note; i.e., practice playing or singing it, and ıus discriminate the "feel" of the proper length of a half note om that of other incorrect lengths. Several repetitions may be equired, involving differential reinforcement, in order for the exact ngth of the note to be properly "shaped."

Unless care is taken to assure that each of the S——→R connections is firmly established in the child, basic musical tasks, like playing or singing a written note at the proper pitch or the proper time value, will be difficult for the child to learn. Any structured course should include adequate time for these basic types of learning to occur, but as pointed out by a recent survey of elementary heterogeneous band methods,[21] many modern instructional books either assume that the child has already made the necessary connections or spend very little time in establishing these necessary connections. Evidently, as can be assumed from the instructional material, children in the fourth or fifth grade are supposed to have already acquired the skills necessary to learn to read basic rhythms and notes; however, this is a point of contention. The assumption that beginning instrumentalists do not have the necessary cognitive structure to learn these basic elements of music will be examined in the second half of this paper. An orderly learning sequence of basic types of learning will be constructed according to the basic skills necessary to acquire the ability to read rhythms. The emphasis will not be on learning to read music, but on learning the cognitive structures necessary to understand and perform written *musical rhythms,* which are themselves only one element in reading music.

VERBAL ASSOCIATION

Another type of learning, which already has been discussed as a form of chaining, is verbal association. Gagne's[22] definition reads:

> "Verbal association is the learning of chains that are verbal. Basically, the conditions resemble those for other (motor) chains. However, the presence of language in the human being makes this a special type because internal links may be selected from the individual's previously learned repertoire of language."

There are some aspects of this type of learning which occur in music education. The "internal links" selected from previous knowledge of words may be used to help relate the external stimulus (in this case, music) to the response of remembering the music. The following examples will help illustrate this.

In the medieval church, words were added to tropes (free flowing melodies originally sung on one syllable) in order that the singers might remember the melody better.[23] These words served the function of an internal linking or cueing device between the written music and singing of the music, for as a rule choir members at this time did not know how to read music (nor do they now).

The use of previously learned words as an internal link can also help children learn specific rhythmic patterns. (Orff[24] uses similar word patterns to teach rhythmic patterns.) Words like

"apple pie" can be used to link with its proper rhythmic response,

or "blueberry pie" can be used to link  with its proper rhythmic response,

Verbal links such as this serve as a mediating capacity in the complicated task of translating written rhythm into audio rhythm, but there are limitations in using this type of learning to teach rhythm.

The limitations exist in the fact that what is learned is a response to an isolated rhythm. There are so many different rhythmic patterns in music that it would be impossible to learn them all in this manner. An analogy would be trying to learn a foreign language by memorizing all of the sentences and phrases of that language. Learning the individual note values in music is needed to read and perform rhythms just as learning the individual words in a foreign language is needed to read and speak that language.

MULTIPLE DISCRIMINATION

A more difficult type of learning that Gagne[25] discusses is multiple discrimination. His definition reads:

> "The individual learns to make 'n' different identifying responses to as many different stimuli, which may resemble each other in physical appearances to a greater or lesser degree. Although the learning of each S——→R connection is a simple type two (S——→R) occurance, the connections tend to interfere with each other's retention."

Basically, multiple discrimination involves remembering what s previously learned when new learning might interfere with the old. A good example of this type of learning is explained by Gagne.[25] Although new cars may look quite alike to an adult, most teen-age boys can recognize and name each new model and type of most American cars soon after they appear in the showroom. Each type of car serves as a stimulus which must be discriminated from all other cars. Each identifying connection learned is a chain. These chains consist of S——→R connections of the different physical features of that particular car such as grill work, trim or hood shape. The individual must first acquire a distinctive set of S s——→Rs that differentiates the stimuli and sets off chains leading to the response that are the model names.

This type of learning has an important role in music education. Whereas learning the fundamentals of producing a musical sound and recognizing a note value or pitch name requires primarily S——→R and chain learning, the performing of a musical phrase or pattern requires multiple discrimination learning. The individual notes serve as a stimulus which must be discriminated from all other notes. The pitch and rhythm identifying connections are chains. These chains consist of S——→R connections of the features necessary to perform that note (proper time values, beating, etc.). The individual must first acquire a distinctive set of S s——→Rs that differentiate the stimuli and set off the chains leading to the responses which are the performance of the various notes and rhythms in a musical phrase or pattern.

SUMMARY

The preceding analysis of several basic types of learning, as set forth by Gagne, seem to indicate that three types are primarily needed to learn basic music reading: stimulus-response learning, chaining, and multiple-discrimination. Although there is no specific point where one type ends and the other starts, each more complicated type of learning needs the lesser complicated type of learning as a prerequisite. This writer believes that before a child can read a melody, he must learn to perform the pattern or phrases of the melody (multiple discrimination) by knowing how to respond to the individual notes in the phrases or pattern (chaining), which is dependent upon understanding the basic elements of each note (S——→R). Although other types of basic learning (signal learning and verbal association) can be related to music education, they do not significantly effect the learning hierarchy necessary for basic music reading.

EXPERIMENTAL AND TRADITIONAL METHODS FOR TEACHING RHYTHM

The second part of this paper tries to find a practical application of the preceding theory and to test this approach against a popular conventional method. The musicl element *rhythm* was chosen because it appears to be the easiest musical task to teach and yet is one of the most difficult for the child to master.

THE EXPERIMENTAL METHOD

For a child to become an accomplished music reader, he must have the ability to read written rhythms. It is believed that this ability is acquired through three basic types of learning which exist in a hierarchy structure. Specific tasks which lead to an understanding of rhythm must be classified in their proper learning category. By emphasizing the development of each of these tasks it is felt that an orderly learning sequence can be constructed which will lead to an efficient way of learning rhythm. The learning

:ture as based on the specific types of learning could be dia-
ıed as follows:

Phase Three—Multiple discrimination learning
Task: To read written rhythmic phrases

Phase Two—Chain learning
Task: To recognize individual written note values

Phase One—Stimulus-response learning
Task: To play longer or shorter notes
Task: To learn to beat

.SE ONE

First, an important basic element in rhythm, beating, must be
ht. Usually the child has already acquired the ability to feel
ven pulse. This is learned very early in the child's life, and it
'ident when he claps his hands to a nursery rhythm or steps in
to music. What must be taught by S——→R learning is the
ty to respond to a representation of even beats (External
uli) which will be called "beat signs." Thus, the first response
ild must learn is to read "beat signs." (Hindemith" uses a very
ar approach in teaching rhythm; however, the application is
abbreviated, consisting of only one exercise.) The child learns
ıy "one" and tap his foot for the number of beats represented
ıe blackboard.

S | | | | | | | | | | | |

R Says "one" and taps foot 12 times

After this ability has been learned, the child must learn to
long notes or short notes on his instrument represented by
or short horizonal lines on the blackboard.

S———————— S — — — —

or

R Long note R Four short notes

.SE TWO

After the ability to read beats and different unmetered notes
:complished, the notes must be related to the beats. This re-
es the first type of chain learning used. First, the child is
'ucted to play a long note over a certain amount of beats while
ing those beats.

ı the length of the note is shortened to include a specific number
eats and groupings of beats are made.

This process is repeated for other groups of 1, 2, and 3 beats per note, after which these groupings are interspersed with beats which do not receive any note length. The student is instructed to tap but not to play during these beats.

The process is continued until the child can produce the necessary note or rest length for each grouping. At no time are these groupings combined in one exercise. This would require multiple discrimination learning.

Now a new stimulus is added to the chain; i.e., the written symbols for the various length notes and rests. These are introduced along with the note length groupings and beats, first, then later, by omitting the other two, are made into the initial stimuli which set off the chain. The procedure would be instructed in this sequence.

1. 

2. 

3.

This process is continued until the student can recognize four note and rest values ( ) by playing or resting the proper number of beats for a written line of similar notes and rest values.

PHASE THREE

After the basic rhythmic values are firmly established in the child, they must be combined into rhythmic lines which use a variety of the different notes and rests. Before the child can acquire this ability, he must know how to discriminate between similar stimuli in rapid succession; e.g., a rhythmic line like:

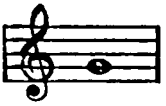
requires discrimination among all the note and rest values which are presented in this example. As the child reads this line, he must classify each symbol so that he may give it the proper number of beats. Even though the child knows all of the time values of the written symbols, when presented in such a spontaneous situation, these might tend to interfere with one another. If this is the case, the child must learn to look for the distinctive marking of that written symbol which aids him in making a rapid response; e.g., the

distinctive marking of 𝅗𝅥. which differentiates it from 𝅗𝅥 is the dot. As an added aid, the whole rhythm may be translated back into the beat group and basic beats for better understanding.

Many different written rhythmic patterns are used to continue this process. What is eventually learned is the ability to read written rhythmic phrases which consist of a variety of notes and rests in a quick, reliable manner.

CONVENTIONAL METHOD

The method which the preceding learning structure will be compared to is a very popular mode of elementary instrumental instruction used quite extensively in many schools. This method includes introducing rhythm directly from the notes printed on a five line staff. The following teaching procedure is representative of this method. The whole note is introduced on the five line staff.



t is described as a circle which is held for four beats. Then the eacher plays the note and has the students count to four while ıe plays. The students are then instructed to repeat the note engths. After the students learn to respond to these notes, they are ombined with their respective rests into rhythmic exercises of one ıitch, written on the five line staff and in a meter with bar lines. The bar lines are explained as the even division of the beats in a ıiece to which an order of counts are applied. These counts are ıdded when necessary as an aid for reading the rhythm.

In this method, the written symbols for rhythm are immediıtely used as a stimulus and the response is producing the proper ength note or rest. Although this process seems to work after a ıumber of trials, it is felt that some of the cognitive steps; e.g., earning to beat, and playing different length notes, are not firmly stablished and that they suffer interference from other stimuli; .g., the staff and barlines. These phenomena become evident and herefore, objectively measurable, when the child tries to read hythmic patterns of varying length notes and rests.

THE EXPERIMENT

The two previous methods of teaching were introduced to two groups of fifth grade students of the Maplewood-Richmond Heights School District. These children were beginning participants in the elementary instrumental music program and were studying brass nstruments. Another group of private piano students were added o the first two groups to check possible intervening variables which night have effected the comparison of the first two groups.

THE EXPERIMENTAL GROUP

This group consisted of six fifth grade male students in the Sutton Elementary School. The average IQ in the group was 97 with a 15 point range, and two in the group had had previous instruction on instruments for less than three months. Four students were instructed on trumpets, and two were instructed on trombones. All six met as a group, and this group received thirty minute lessons three times a week on Monday, Wednesday, and Friday. They were not allowed to take their instruments home to practice. The course of instruction which includes basic aspects of the previously outlined approach to rhythm was pre-designed by the author and the music supervisor of the Maplewood-Richmond Heights School District in an unwritten pilot project done in the spring of 1968. Approximately five to seven minutes of each lesson was spent in learning the structured rhythmic approach. The teaching was done primarily by the author with occasional visits from the supervisor.

THE CONTROL GROUP

This group consisted of four fifth grade students in the East Richmond Elementary School. The average IQ in the group was 106 with a range of ten points and two in this group had had previous instruction on instruments, one for three months, the other for two years. The two female students were instructed on F horns and the two male subjects were instructed on a trumpet and a trombone. All the children were given one thirty minute lesson per week on Wednesday and instructed to take their instruments home to practice thirty minutes each day. The two F horn players were given individual lessons after meeting together for the first two lessons. All of these children were taught rhythm using a conventional method which has been previously outlined. Approximately ten minutes were spent on this approach every lesson. The teaching was done by the author with occasional visits from the music supervisor.

SECOND EXPERIMENTAL GROUP

Due primarily to the scheduling differences of the first two groups, a third group was formed which consisted of private piano students. The amount of instructional time might have been an intervening variable in the comparison of the first two groups, so the time of the lesson of this group was the same as the control group, thirty minutes a week. This group was also instructed to practice the same amount of time as the control group, thirty minutes a day. The children in this group were two fourth grade and two fifth grade students selected because they began lessons at approximately the same time as the other groups. There was one male and one female from both the fourth and the fifth grades and their IQ are not known. None of these students had had any previous instruction on instruments. The same approach to rhythm

it was used in the first experimental group was used to teach rthm to these students. The author did all of the teaching of this up, and each student was instructed individually in a private son.

HER DATA

The first experimental group and the control group were begun ing the third week in February, 1969, and the second experintal group was begun at different times but within two weeks of other groups. Each group received a total of nine weeks of sons after which a test of sight-reading a rhythm was given to h subject. No student missed more than one lesson. The absences anced out in each group with the first experimental group hav- slightly more absences than the other two groups. All students med to enjoy their music lessons.

ALUATION OF THE GROUP

The test consisted of a rhythmic line of notes which included at st one of all the basic note and rest symbols which were learned. different versions of the test were needed to assure that the dents in the first experimental group which met as a class could learn the rhythm by hearing another student play the test. The versions of the test were as follows:

1. 
2. 
3. 
4. 
5. 
6. 

Each version was copied on a separate paper and was adnistered by the author without the other students (of those in same class) being able to see the test.

The test was measured by the number of verbal cues and the mber of repetitions needed by each student to play the rhythmic e correctly. In the class situation, verbal cues consisted of point- to the improperly played note or rest and saying, "This should ve received 'n' (the correct number) beats." The score was kept the author; the following page contains the results of the grad-

RESULTS

Group	Subjects	No. of Cues	No. of Repetitions
First Experimental	1	1	1
	2	0	0
	3	3	1
	4	1	2
	5	0	1
	6	1	2
	Total	6	 7
	Average	1	..... 1.16
Second Experimental	1	1	1
	2	0	0
	3	2	1
	4	1	1
	Total	4	 3
	Average	1	..... 0.75
Control Group	1	0	0
	2	3	3
	3	2	1
	4	1	4
	Total	6	 8
	Average	1.5	..... 2.

RESULTS AND CONCLUSIONS

As is seen by the figures in the results, both experimental groups out performed the control group in the ability to play correctly a written rhythm. The best performing group was the private piano students in the second experimental group. Each group had one perfect performance, but the worst performance existed in the control group.

There seems to be a relationship between the number of verbal cues and the number of repetitions that may have some significance on how well the child has learned the elements of rhythm. Subject number three in the first experimental group corrected three mistakes in only one repetition, but subject number four in the control group took four repetitions to correct only one mistake. If there were more subjects in each group, perhaps more could be infered by this discrepancy.

The data of this experiment suggest no reason why the private iano students performed better than the other two groups. Perhaps ıe piano students could concentrate more on playing the correct ıythm because it is somewhat easier to press a piano key than is to play a brass instrument.

INAL CONCLUSION

The purpose of this experiment was to test a structured learn-g sequence against a popular conventional method for teaching ıythm. Because of the small number of subjects in the experiment, ıe validity of the results may be questionable. However, the basic ypothesis, that a learning structure based on learning theories as t forth by Gagne, seems, at this time, to be workable and points to e need for more sophisticated experimentation in this area.

OOTNOTES

1. Gagne, Robert M. *The Conditions of Learning.* New York: olt, Rinehart and Winston, Inc., 1965, Chapter Seven.
2. Neidlinger, Robert Joseph, "A Study in Teaching Musical yle and Form to Elementary School Children Through the Per-ption of Musical Dimensions." Unpublished Doctoral Dissertation, epartment of Music, Washington University, 1967.
3. Reeves, William N. "An Exploratory Study of Two Sets of arning Theories of Guthrie and Wheeler as they Relate to the evelopment of Instrumental Musicianship." Unpublished Doctoral issertation, Department of Education, University of Southern Cali-rnia, 1954.
4. Gagne. Op. Cit. p. 58.
5. Ibid. p. 65.
6. Ibid. p. 82
7. Ibid. p. 63
8. A loud noise may also fall into this category; however, for e child to exhibit an unconditioned fear response, the noise must instantaneous, extreme, and unsolicited. Because these character-ics are rarely found in music, the intensity level of the music ust be above the pain threshold to produce the pain response. nce ordinary household audio equipment cannot produce this kind intenisty, it seems unlikely that loud music by itself can be con-lered as an unconditioned pain stimulus.
9. Gagne. Op. Cit. p. 58
10. Ibid. p. 73.
11. Ibid. pp. 72 and 73.
12. Ibid. p. 37
13. Lundin, Robert W. *An Objective Psychology of Music* (Second lition). New York: The Ronald Press Company, 1967. Chapter vo.
14. Some individuals have aural perception problems, one example this is the interpretation of the same frequency as two different tches. Naturally, an individual with this problem has trouble atching pitch.

15. Gagne, Op. cit. p. 60.
16. Ibid. p. 58.
17. Ibid. p. 89.
18. Ibid. pp. 39-42 and 87-97.
19. Ibid. p. 42.
20. Ibid. pp. 83 and 84. This example tells of adults learning to pronounce the German umlaut by approximating between the English oo and ee sounds.
21. Milak, John. "Recent Publications of Elementary Band Methods for Heterogeneous Groups of Instruments.'" Unpublished Term Paper, Department of Music, Washington University, (Gaylord Library), January, 1969.
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25. Gagne. Op. cit. p. 58.
26. Ibid. p. 45.
27. Hindenmith, Paul. *Elementary Training for Musicians.* (Second Edition) New York: Associated Music Publishers, Inc., 1961.

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AN EXPERIMENT IN PROGRAMMING RUDIMENTS OF MUSIC FOR FIFTH GRADE STUDENTS COMPARED TO CONVENTIONAL INSTRUCTIONAL METHODS

by
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Purpose

The purpose of this study was to compare two methods, the programmed method[1] and the conventional method,[2] when teaching the rudiments of music to fifth grade students. The control group was taught the rudiments of music by means of the conventional method and the experimental group was taught the rudiments of music by means of the programmed method. The following two hypotheses were considered:

1) The experimental group which is taught the rudiments of music by means of the programmed method, will complete the material before the control group, which is taught the rudiments of music by means of the conventional method, if the same amount of material is presented to both groups.
2) The experimental group will have a higher mean score than the control group if identical tests are given to both groups on identical amounts of material.

The material taught the fifth grade students included the following selected areas of music rudiments: music notation, rhythm, clefs, note names, accidentals, key signatures, major scales, minor scales, and dynamic markings. The music rudiments coincide with the material found in most fifth grade elementary music text books currently being published. It was the purpose of the investigator to teach the students rudiments of music that would enable them to recognize most musical symbols which they might be expected to understand to participate in public school vocal music organizations until the time of their graduation from high school.

Details of the Project

There were two fifth grade classes involved in the study. The experimental group, which we shall refer to as group E, had a total of thirty students. The control group, which we shall refer to as group C, had twenty-five students. The two classes met in separate, non-adjacent rooms in the same school.

The investigator instructed both the experimental and the control group. Each class received instruction in music rudiments for thirty minutes on Tuesday and Thursday of each week for a nine-week period. Under normal conditions each fifth grade class received instruction from a music specialist once each week for thirty minutes. Therefore the students involved in the project received twice the amount of instruction time devoted to the study of music as compared to the amount of instruction time that would have normally been devoted to their musical training.

Administration

Identical pre-tests were given to both the control and the experimental groups. The pre-test was comprised of groups of questions, each group constructed to test the student's knowledge of a particular section of the program.

Students in the experimental group were exempt from completing a section of the program if they gave all correct answers to the group of pre-test questions that related specifically to that section. Due to previous musical achievement, all the students in the experimental group did not work on the same section of the program at the same time.

There are twelve sections in the program each lettered A through L. Of the thirty students in group E, twenty began with section A, five began with section B, two began with section C, two began with section D, and one began with section E. These beginning placements were a direct result of the pre-test given to all students involved in the study.

The results of the pre-test had a different meaning for the control group. Since the investigator instructed the control group by means of the conventional method it was impossible for every student to begin at his present level of musical achievement. However, the identical pre-test was used in order to see where the control group's level of musical achievement clustered. The group of pre-test questions answered correctly by the largest number of students in the control group indicated to the investigator which section of music rudiments should be taught first.

Of the twenty-five students in group C, two could have begun by receiving instruction in section C, eight could have begun by receiving instruction in section B, and fifteen could have begun by receiving instruction in section A. Since the investigator instructed the control group by means of the conventional method, group C's musical instruction commenced with the same material found in section A of the program, the section where most of group C clustered on the pre-test.

One day each week the students were asked to identify various symbols and answer questions about music found in their music book, *Exploring Music* 5.[3] The purpose of doing this was to help the student relate knowledge he was gaining about the rudiments of music to the music with which he came in contact. This was carried out easily in the control group since every child studied the same material at the same time; however, in the experimental group it was necessary for the investigator to know the section of the program each student had completed in order that a student would be asked questions only on the material with which he had become acquainted.

The tests on each section consisted of questions which were keyed to certain frames in a section of the program.[4] When a student in group E completed a section of the program, he was given

test on that section. If all the answers on the test were not correct, he was required to take the test again. The test was given or the second time after the student had reviewed the frames of ne section which were keyed to the question he had answered incorrectly. (Only scores tabulated the first time a test was given were used for purposes of comparison.) Only after a student had ompleted all questions on a test correctly was he allowed to egin the next section of the program.

After the investigator taught the control group the material ontained in a section of the program, the control group was given ne same test that the experimental group was given for the same ection. Naturally the keyed questions were of no benefit to the ontrol group nor was the control group required to repeat the st if errors were made. However, if more than one half the stuents in the control group answered a test question incorrectly adtional time was spent reviewing the material related to the quesion.

The students in group E required from five hours fifteen mintest to eight hours fifteen minutes to complete the program. The ildren in group C all required seven hours fifteen minutes to mplete the identical amount of material.

These facts neither prove nor disprove hypothesis one which ated that the experimental group which was taught the rudiments music by means of the programmed method, would complete the aterial before the control group, which was taught the rudiments music by means of the conventional method, if the same amount material was presented to both groups. However this suggests at it was possible for the students in group E who were rapid arners to progress more quickly than potential rapid learners in oup C. It also may indicate that the slow learner in group E uld work at his own pace and was not forced to conform to the ace of the group, as were slow learners in group C.

Two weeks after the completion of the last section test each udent in both the control and the experimental groups was given post-test, very similar to the pre-test, to measure the amount of usical knowledge that he had retained. For results of these scores nsult the statistical comparisons presented in this paper.

Preparation

A great amount of time is needed to prepare the material for course which is programmed. For each section approximately three ours were required to prepare the stencils so that the material uld be reproduced in quantity. The procedure for preparing the encils involved planning all of the frames in each section, as well s arranging each page with the irregular number sequence so one ould know how many pages were needed for each section, and ne order of the frames and their answers. A dummy then was set p, so the stencils could be typed. Additional time was required process the stencils and to staple the pages into a section. Analyng the material presented in the various elementary music text ooks also added to the time element.

Correction

Correction of tests and the programmed sections was simplified by construction of a mask for each page. The mask was placed over the page to be corrected and the correct answers appeared in spaces in the mask. The use of a mask was made possible by constructing objective pre-tests, section tests, programmed sections, and post-tests, which had multiple choice answers. Since only one answer of the multiple choice questions could be correct, biased judgment on the part of the investigator was eliminated when scoring the various tests.

Materials

The selection of materials to be included in the program was made after a perusal of several programmed texts, and all currently published fifth grade music text books. Careful consideration was also given to the musical knowledge a person must possess to participate successfully in a musical organization in high school.

Statistical Comparisons

The scores of group C and group E were compared by computer computation on fifteen different test scores.[3] The comparative scores answer some of the questions regarding the reliability of the study. Significance is reported at the five percent level.[4] This level of significance was chosen since it is generally used as the means of reporting variance in studies of this nature.

The most important information needed to conduct a study in which teaching methods are compared is one of knowing whether the two groups being used for the comparison are homogeneous or heterogeneous with regard to previous knowledge of the material which is to be taught. A comparison of scores on the pre-test, which was administered to all students in each group, shows the mean for group C to be 55.384 while the pre-test mean for group E is 60.066. Although the means differ approximately five points, there is no significant difference in the amount of knowledge group C has about the rudiments of music as compared to the amount of knowledge group E has about the rudiments of music. (Refer to Fig. 3-1)

Fig. 3-1
Analysis of Variance

	Degrees of Freedom	Squares Sum of	Mean Square	F Test
Source of Variation	1	305.33600	305.33600	.98015221*
among groups	54	16822.024	311.51896	*
Total 55		17127.360		

*The F Test scores must be 4.04 or greater to indicate significant difference between two means. This is true for all F Test scores reported for this study.

The analysis of variance was also computed for the twelve tests given to test the students' knowledge of the material presented in each of the twelve sections. In most cases there was no significant diffrence between the test scores as compared to the method of instruction. However, in some instances there was significant difference in the group mean scores.

Fig. 3-2
Analyis of Variance

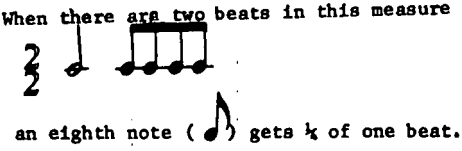
Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Test
Among groups	1	58.258100	58.258100	4.5715223
Total	50	637.18490	12.743698	
	51	695.44300		

Figure 3-2 indicates that there was significant difference beween the group scores on test D. The mean of 14.76 for group E. After reconsideration of section D of the program the investigator feels that if the semantics of the frames were changed the significant difference between the means of group test scores would probably be non-existant.

A frame of section D which reads:

> "An eighth note gets ¼ of one beat if there are two beats in one measure and the bottom number of the time signature is two"

should be changed to read:



All frames which are of this semantic difficulty should be changed in a similar manner.

The mean score for group C on test H was 9.68 as compared to a mean score of 8.93 for group E on the same test.There is significant difference between the means as seen in Fig. 3-3. The mean for group E might not be significantly lower if more review frames concerning the correct placement of stems on notes were included in section H of the program.

Fig. 3-3
Analysis of Variance

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Test
Among groups	1	7.6024000	7.602400	5.3504828
Total	53	75.306700	1.4208811	
	54	82.909100		

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Significant difference also exists between the group means for test L. (Refer to Fig. 3-4). The mean score for group C was 11.65 as compared to group E's mean score of 10.30. A change which may result in a higher mean score for group E might be implemented by placing one extra frame in section L. This frame would show the relationship of the terms to one another. The frames presently exist as individual sources of information without any correlation of the material presented within the section.

Fig. 3-4
Analysis of Variance

	Degrees of Freedom	Sum of Squares	Mean Square	F Test
Source of Variation	1	21.870000	21.870000	8.1471478
among groups	48	128.85000	2.6843750	
Total	49	150.72000		

Although significant difference does exist between the group mean scores on three of the twelve section tests, when all twelve scores are totaled to form a composite score, there is no significant difference between the two group means.

After each student completed the study of rudiments of music, there was a two-week period when the student was not further exposed to the rudiments of music. At the conclusion of this two-week period a post-test was administered to determine the amount of knowledge the students had retained from their instruction. All the material presented in the previous nine-week period was included in the post-test. There was no significant difference between the group means on the post-test scores. (See Fig. 3-5) This indicates that the method of material presentation did not significantly effect the amount of knowledge retained.

Fig. 3-5
Analysis of Variance

	Degrees of Freedom	Sum of Squares	Mean Square	F Test
Source of Variation	1	22.520000	22.520000	.056513654
among groups	54	21518.340	398.48777	
Total	55	21540.860		

In the final analysis of the statistical data of this study the implications are that whether the conventional method of teaching is used or the programmed method is used in teaching rudiments of music, the results will not be significantly different in ninety-five percent of the cases of a purely random sample. Therefore, hypothesis two, "the experimental group will have a higher mean score than the control group if identical tests are given to both groups on identical amounts of material," is proven incorrect for ninety-five percent of the cases of a purely random sample.

Regardless of the method used in presenting material to be learned it is important to determine whether actual learning does occur. In this study learning did occur in both groups. (Refer to Fig. 3-6.) Group C responded correctly to forty-nine percent of the questions on the pre-test and had a correct response for seventy-seven percent of the questions on the post-test. Group E had a similar increase in the percentage of correct answers given. Therefore, it is concluded that learning did occur.

Fig. 3-6

	Pre-test mean Percentage*	Post-test mean Percentage*
Group C	49.4505	77.432
Group E	53.6309	78.333

*Mean percentage is the mean score for each group based on 100%.

Students' Reactions

This section will present facts concerning the study drawn from the answers students gave to questions posed by the investigator. At the end of the nine-week period all of the students involved in the study were requested to answer the questions. The students were told by the investigator that the information they would give by answering the questions would be very helpful to him. The students were instructed not to use their names but only their group identification; i.e., either group C or group E. Since the students knew what was expected of them and the importance of their comments, it is felt that in most cases the comments expressed are the true feelings of the students and are mixed with very few non-constructive feelings.

In order to present unbiased reporting of the answers given by the students, the following procedure was used: when an answer was difficult to interpret, when it was vague, or could be interpreted more than one way, the response was tabulated in the "no answer column." A total of fifty-four responses were given to questions one and two. Twenty-seven answers were given to questions three and four.

Question one: DO YOU LIKE TO STUDY ABOUT MUSIC? WHY? OR WHY NOT?

Fig. 4-1

	Group C %	Group E %
yes	56	85
no	37	15
no answer	7	—

Question two: SINCE YOU BEGAN HAVING SPECIAL CLASSES IN MUSIC HAVE YOUR IDEAS ABOUT MUSIC CHANGED? WHY? OR WHY NOT?

Fig. 4-2

	Group C %	Group E %
yes	48	85
no	22	3
no change	30	12

Those students who gave a positive answer to the question indicated that their attitudes had been changed toward the positive. Those students who gave a negative answer to the question indicated that they had developed adverse feelings toward music. In some cases these feelings were a result of the study; in other cases the adverse feelings were present before the study began. Those answers tabulated in the "no change" column indicate that the student's feelings were not changed since the beginning of the study.

Question three: DO YOU LIKE TO LEARN BY THE PROGRAMMED METHOD USING THE SECTIONS? WHY? OR WHY NOT?

Fig. 4-3A

	Group E %
yes	85
no	15

Of the positive answers, the following were listed as reasons why programming was liked.

Fig. 4-3B

	Group E %
easier learning	22
better retention	22
faster learning	15
more interesting	12

Question four: DID YOU LIKE TO SING A SONG AND THEN TALK ABOUT THE DIFFERENT FACTS YOU LEARNED IN THE PROGRAM? WHY? OR WHY NOT?

Fig. 4-4

	Group E %
yes	67
no	30
no answer	3

Since a small number of answers are involved, the percentages can in no way be termed conclusive. They do, however, present each group's reaction to some of the principles involved in a study of this nature.

Variables

A problem which seems to be common in many experimental designs is the one of uncontrolled variables. When the design of an experiment is created it is difficult to foresee all variables which need to be controlled during the course of the experiment. This experiment or study is certainly no exception. Uncontrolled variables were present and probably effected the results to some degree. (See below)

Motivation

The motivation found in two groups could be found in any classroom situation. The scholastic grade in music that each student received at the end of the quarter was one factor which motivated the child to learn the rudiments of music. The other was intrinsic motivation which most music teachers create by emphasizing the added enjoyment an individual receives from music when he has more knowledge about music.

The experimental group through the use of the programmed method should have received additional motivation by means of immediate feedback. The immediacy of knowing whether the answer to a question is correct should motivate a student to learn because his confidence in himself is constantly increased. Whether this additional motivation in group E did, in fact, actually occur is not known, nor is it known to what degree it affected test performance.

Presentation

The control group recognized certain aspects of music rudiments not only by sight, as the experimental group did, but also by sound. This variable was present because the teacher demonstrations in the control group incorporated sound, whereas sound was not related to the rudiments of music in the experimental group. The variance in presentation could have caused discrepancy in the comparison of test scores for both groups. However, this discrepancy did not occur because the tests were constructed without the use of sound, allowing both groups to respond to questions which were impartial to either group.

Practice

As mentioned above students in group E were required to repeat a section test until they gave all correct responses to all the questions. This caused the students in group E to receive more practice answering questions on the test when compared to the amount of practice received by group C. This in no way influenced scores on the section tests. In group E only the student's first score was tabulated and used for comparison. Practice, however could have influenced the post-test scores in group E, since they did have more practice in being tested on the material than did the students in group C. The full effect of practice on post-test scores is not known.

As a counterbalance to the extra practice received by group E, group C received extensive drill on the material covered in a sec-

tion. This drill was directed by the investigator immediately prior to administering a test to group C. Again the exact influence of this drill is not known but it probably had some effect on test and possibly post-test score results.

Preference for Music

The number of students in group E who liked to study about music was greater than the number of students in group C who liked to study about music. (Refer to Fig. 4-1) A favorable attitude toward a particular subject matter probably influences a student's performance on tests. It is not known to what degree this favorable atttiude influenced the data for group E, but it probably was an influencing factor. This is another variable that was difficult to control, due to previous exposure to music in the classroom.

Absence

In group E all data was available for every student. Programmed instruction made it possible for an absent student to begin at the same place he had stopped, whether it was two days or one week later. In group C, however, absence from class caused a student to miss an explanation of an entire section which he could not make up. Therefore, a complete list of data was not available for every student in group C as it was in group E. This probably effected the post-test performance for some students in group C, since they may not have been exposed to all of the material.

The exact effect of the uncontrolled variables is difficult to determine. However they may effect data enough so that given the same material and the same situation, but different uncontrolled variables, the statistical data would be different in *more* than five percent of the cases in a purely random sample.

Conclusion

This study would imply that programmed instruction is not a superior method of teaching the rudiments of music but that it is equally as effective as other present-day conventional methods. Indeed in this study learning did occur when the programmed as well as the conventional method of instruction was used.

In sum, hypothesis one which stated:

> "the experimental group which was taught the rudiments of music by means of the programmed method, would complete the material before the control group, which was taught the rudiments of music by means of the conventional method, if the same amount of material was presented to both groups"

was neither proven correct or incorrect. Some students in group E were able to complete the program before the students in group C were able to complete the same material presentd by the conventional method of teaching. In other cases, group E students did not complete the material before students in group C. Therefore, a positive statement can not be made that the method of instruction would enable a child to work at a quicker pace. The pace at which

a student works is probably more closely linked to his personal study habits and intelligence than to the method of instruction.

Hypothesis two,

> "the experimental group will have a higher mean score than the control group if identical tests are given to both groups on identical amounts of material"

was not found to be true. Whether the conventional method of teaching is used or the programmed method is used in teaching rudiments of music, the results will not be significantly different in ninety-five percent of the cases of a purely random sample.

The programmed instruction does have the advantage of allowing each student to work at his present level of achievement, work at his own pace, and to respond to every question. Students who receive programmed instruction also have the added opportunity of review if it is needed or the option of not reviewing.

Certainly it would be difficult to teach the aesthetics of music by means of programmed instruction, but it does function as well as any other method when factual knowledge of music is being taught. Thus, I do not mean to suggest that programming is equally as effective to teach ALL phases of music, but that it is effective when used to teach facts about music.

FOOTNOTES

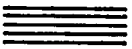
1. The programmed method consists of frames which give the student information, frames which require the student to respond to a question, and the means for a student to immediately find out if the answer he gave to a question was correct. For example:

   There are Italian abbreviations used to indicate dynamics. pp (pianissimo) means very soft. (Answer found on next page)

   Very soft is indicated by ..... pp

   (ff, pp, mp)
2. The conventional method of teaching consists of a series of teacher demonstrations, class discussion, class exercises in the use of music rudiments, review, and testing.
3. Boardman, Eunice, and Landis, Beth, *Exploring Music* 5, Holt, Rinehart, and Winston, New York, 1966.
4. For example a keyed question would read as follows:

   This is a ..... staff .....

   bar line .....

   clef sign .....

   (Frames 1, 3 & 4)
5. Computer computations were carried out with the support of the Washington University computing facilities through NSF grant G-22296.
6. This indicates that significant difference between means would occur in only five percent of the cases in a purely random sample.

PRE-TEST Placement ..... GROUP .....

NAME: ..... SEX: M .....

AGE: Years ..... Months ..... F .....

How many years have you attended school in the Parkway District? .....

What instrument do you play? .....

What instrument do you play in the band or orchestra? .....

Have you had private music lessons? ..... Yes ..... No

What instrument? .....

How long? ..... Years ..... Months

THIS IS A PRE-TEST TO FIND OUT HOW MUCH YOU KNOW ABOUT MUSIC. IF YOU DO NOT KNOW THE ANSWER TO A QUESTION DO NOT MAKE ANY MARK FOR THAT QUESTION ON YOUR TEST SHEET. YOU ARE TAKING THIS TEST SO YOUR TEACHER CAN HELP YOU LEARN EASIER AND BETTER ABOUT MUSIC.

SAMPLE QUESTION: Place a check mark ( ) on the line following the correct answer.

A trombone is:

- a musical note .....
- a musical instrument .....
- a musical riff .....

The correct answer is: a musical instrument

Copies of the actual program used by Mr. Wardenburg may be obtained by writing Mr. Wardenburg, Music Department, Washington University, St. Louis, Missouri.

A STUDY IN DEVELOPING AN ARTISTIC INTERPRETATION OF THE SONG

Chester Troy O'Bannon, D.M.A.

University of Missouri at Kansas City, 1967

ABSTRACT

The writer has found in his experiences as a professional singer and teacher that many singers do not understand the true meaning of interpretation and particularly that they are not aware of the responsibility that goes with its application. It is the writer's contention that too often the singer, becoming involved with vocal techniques and mechanics of a given song, fails to study it in relation to the composer, poet, text and style. The result often times being, a superficial interpretation superimposed upon pure mechanics at the last minute before performance.

With the above problem in mind the writer, based on research and study, designed a study aid for use by a singer when preparing a song for performance. The aid was based on a chart and worksheet principle. The chart consisted of flip-over pages, containing various units of song study. The stages of study were designed to guide the singer's preparation in learning the mechanics of a song, fulfilling his responsibility to the work and blending in his personal creativity, thereby arriving at an artistic interpretation. Worksheets with lined blank spaces were placed underneath the chart. The student was to be required to fill out a sheet for every song studied. Such a method required the singer to do the research and analyzation himself rather than parroting the teacher as is so often the case. The information was thus available for future reference.

This "chart-sheet" study aid was applied to the learning of the materials which constituted the author's two doctoral recitals at the Conservatory of Music of the University of Missouri at Kansas City. The aid was then used by the writer in actual studio situations at the Pensacola Junior College, Pensacola, Florida where he is an Associate Professor of Voice. A paper was then written detailing the research and results of the laboratory developments.

Order No. 68-3574

BRASS INSTRUMENT KEY AND VALVE MECHANISMS MADE IN AMERICA BEFORE 1875

With Special Reference to the D. S. Pillsbury Collection in Greenfield Village, Dearborn, Michigan

Robert E. Eliason, D.M.A. 1968
University of Missouri at Kansas City

ABSTRACT

Although little has been written about the participation of American musical instrument makers in the development of keyed and valved brass instruments, their contribution was ambitious and creative, and produced a number of remarkable results. Several interesting facets of this participation were revealed by a detailed examination of more than 200 brass instruments marked by American makers, together with a search of United States patent records.

In America, the keyed bugle continued a development that was evidently cut short in Europe by the early appearance of good valved instruments. The high Eb keyed bugle with nine or more keys became the standard instrument in America before mid-century, and virtuoso playing on it flourished. By the 1850's the instrument was commonly made in this country with twelve keys. The additional five keys over the seven usually found on European instruments evidently gave the keyed bugle the greater range and facility demanded of it by American band soloists.

At least five original valve designs appeared in this country from 1825 to 1872 including what may have been the first rotary valve ever made. Another of these designs, a cylindrical rotary valve with interior windways in the shape of a flat oval, was produced in quantity by several American firms and continued in use from the 1850's until late in the century.

All early American-made valve instruments, including one dated 1825, were equipped with tuning slides on their valve tubes, a refinement not found on European instruments until at least two years later.

Vienna double piston valves may have been made in America as early as 1830, barely a year after the earliest known European example. Vienna rotary valves were made in this country beginning in the 1840's, but in a distinctly American version, lighter and simpler in construction.

America's most important contribution to valve design, the string action for rotary valves, was made at least by the late 1840's and found wide acceptance. Of all the American-made instruments examined for this study only one has the articulated crank and clockspring action almost universally applied to European rotary valves of this period.

During the 1860's Americans first began to make a piston valve, copying the old *Berliner Pumpen* or Berlin valve. The Périnet piston valve was first introduced and manufactured here by Henry Distin who emigrated to Philadelphia from England in 1868. After 1875 the rotary valve gradually began to lose favor, and by 1900 piston valves of the Périnet type completely dominated American manufacture and usage.

The Pillsbury collection of brass instruments at the Henry Ford Museum, Dearborn, Michigan, contains examples of most of these instruments. This collection is described in a catalogue published by Chickering & Sons for their exhibition in 1902. However, it was found upon examination of the instruments that the catalogue entries contain many serious omissions and errors. An attempt to correct these inaccuracies is included.

Appendixes to this dissertation list the twenty collections examined, forty-seven American firms whose names appear on surviving instruments of the period, some errors in addition to those of the *Chickering Catalogue* found in published materials, and patents referred to.
Order No. 69-07227

A STUDY OF THE APPLICATION OF CREATIVITY IN THE TEACHING OF SECONDARY SCHOOL MUSIC

Elwood Hansel Brown, D.M.A.
University of Missouri at Kansas City, 1968

ABSTRACT

The study is divided into two major sections. The first section, in general, is concerned with the general nature of creativity as it is known in the field of education today. Background is presented concerning thinking in the area of creativity today with some reference made to those personalities involved most prominently with the creative process in the theory and methodology of the current educative processes.

In defining creativity, an attempt is made to clarify the term in terms of music education and education in general to include the distinguishing of creativity in modern educational thinking as a process which is centered in the concept of problem-solving. As an elaboration is attempted of the implications of the process, it is related to basic concepts of music learning. Methodology is implied which can be implemented in the teaching of secondary school music from the standpoint of meaningful experiences and truly *music learning.*

As a part of the background for exploration of the general nature of creativity, an over-view is presented of the philosophical backgrounds and implications for creativity as expressed by those

philosophers and philosophies which most nearly approximate the theories and methodology of creativity as an educational process. An emphasis is placed upon the thinking of the pragmatic school which seems to be very much in accord with the principles and ideals of the creative process.

An over-view of the psychological principles involved in creativity and the practice of creativity as a method or process is presented along with pertinent theories and principles of learning creatively.

The second section of the study is concerned with relating the general presentation of creativity to music education. An attempt is made to indicate how creative methodology can be applied to the teaching of secondary school music. While the material presented relates somewhat to all areas of secondary school music, the writing is slanted toward the vocal-choral area with which the writer is most familiar. An attempt is made to relate principles of a creative philosophy to principles of music education philosophy; principles of a creative psychology to principles of music and music education psychology. Methods, procedures, and principles of creativity are presented which have significance for music education relating how these methods, procedures, and principles may be applied in a general sense to the teaching of and performing of secondary school music for improved *music learning* and more meaningful experiences.

The thesis implied is that music educators are not providing for a meaningful experience with music at the secondary level particularly in the performance area. This has been attempted to be corroborated through a discussion of findings of a questionnaire sent to various high schools throughout the United States to ascertain the expected status of current practices in secondary school music teaching. The questionnaire was also designed to ascertain whether music educators in high schools and colleges throughout the country were aware of the creative process and creative methodology as an avenue of approach for more meaningful teaching of music in the school. Through example and through alluding to implications, it is shown how the creative process can be implemented as a worthy teaching procedure for enriching the musical learnings in the secondary school music curriculum.

(Order No. 68-15,219)

A STUDY OF REHEARSAL TECHNIQUES FOR SYMPHONIC BAND

William Nolley Vereene, D.M.A., 1968
University of Missouri at Kansas City

ABSTRACT

On the basis of a survey of the literature conducted by the author, it was concluded that rehearsal techniques for symphonic bands were not condified in one specific source. A basic list of

two-hundred-seventy-five rehearsal techniques was discovered from utilizing this survey and interviewing band directors, music teachers, and college professors.

A questionnaire, containing twenty-two multi-part questions found to be most pertinent for good rehearsal techniques of symphonic bands and designed to reflect the relative importance of each item for rehearsal techniques was evolved and mailed to one-hundred-seventy-five experienced and reputable band directors throughout the United States. From the eighty-two per cent return of the Questionnaire, grade-level categories of the respondees were formulated, i.e., Elementary, directors who were primarily concerned with teaching beginners; High School, directors who were concerned with teaching intermediate and advanced students; and College, directors who were responsible for teaching college students. A statistical analysis was made for each item according to grade-level category including an All-Level category.

Although each question was believed to be an important factor for rehearsal technique of symphonic bands by the respondees, there was some disagreement among grade-level categories as to the relative importance of some items. An In-depth Study of the results of the Questionnaire was made in order to define why differences of opinion existed. The In-depth Study was mailed to twenty select band directors throughout the United States; and, while there was only a fifty-two percent return, each grade-level was equally represented by the respondees. Each recipient was asked to submit reasons why he thought differences of opinion existed. A comparison of the In-depth Study and Questionnaire results was made in order to clarify the relative importance of each technique according to grade-level category.

The results of the research (1) collate and codify items believed to be most important to rehearsal techniques of symphonic bands, (2) furnish statistical analysis of each item by grade-level category, (3) isolate possible curricula content for educational method courses utilized in the teaching of future band directors, and (4) contain hueristic value for future research relative to specific items concerned with rehearsal techniques of symphonic bands.

FACTORS CONCERNING THE PRODUCTION OF THE MUSICAL IN THE HIGH SCHOOL

John Marcus Burnau, D.M.A.
University of Missouri at Kansas City, 1966

ABSTRACT

The production of a school "musical," a program incorporating the use of music, dialogue, and stagecraft, is an important part of the music curricula of many secondary schools in this country.

Music educators appear to entertain a variety of modes of thought concerning educational purposes and values that may be latent in the development of this facet of the curriculum of music instruction in the high school.

This study was brought about for the purpose of investigating possible musical, educational, cultural, and public relations benefits that may be provided high school students, patrons, and the school by the production of a "musical," and to determine current methods of production procedures in defined Missouri high schools. Questions considered to be important were: "What are possible contributions of the 'musical' to the total personal-educational development of the high school student?"; and, "What are possible benefits afforded the school and public by the production of a 'musical' which are important continuing aspects of the educational design of a democratic concept of public school educational instruction?"

The survey of the study comprised an investigation of methods and manners of "musical" production in eighty-six Missouri high schools. Incidences of production among the replying schools, the types of productions presented, manners and modes of presentation of "musicals," and judgments of the replying music directors concerning values of producing "musicals" were determined.

Materials that have been utilized with success by high school music directors in the categories of Broadway musical comedies, musical comedies written specifically for high school production, original music comedies, operettas, and operas were discussed and specific descriptions of a number of productions compiled. In addition, case studies of musical productions in two high schools are presented: one, a production in a school with an enrollment of less than four hundred students; the other, a production in a school in which the enrollment exceeded two thousand students.

Findings of the study indicated that fifty-eight per cent of the participating schools produced a "musical." Of the schools producing "musicals," forty-six per cent produced a musical comedy: twenty-four per cent produced an operetta; twenty per cent, a musical revue; six per cent, a folk opera; and four per cent, an opera. Methods of accompaniment of the "musicals" ranged from the use of one-piano accompaniments, two-piano accompaniments, piano-drums-double bass accompaniments, to full instrumentation of stage band or orchestra accompaniments. Rehearsal schedules varied from four to twelve weeks in length with the six and eight week schedules predominating. The evening rehearsal was more frequently utilized than morning, school-time, or afternoon rehearsals. The incidence of the use of dance routines in the productions was eighty-seven per cent. Co-operation of the art departments of the schools in the production of the "musicals" was forty-seven per cent; thirty-two per cent of the physical education departments of the schools producing "musicals" were involved in the production. Orchestra instruction was available in thirty-nine per cent of the schools represented in the survey.

Major conclusions and recommendations:

1. Music education students at the college level should be encouraged to enroll in courses of the elements of the "dance," and "theater," because of the many instances in which the high school music director is required to manage all of the facets of a music-dramatic production.

2. The director of a "musical" in a high school of limited enrollment would do well to investigate special materials written specifically for high school production.

3. High school music directors can explore the possibility of editing and re-writing productions of opera to effect compromises that allow students the cultural advantages of producing the opera in the high school.

Microfilm $3.00; Xerography $9.45. 209 pages.

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THE STAGE BAND AS PART OF THE HIGH SCHOOL MUSIC PROGRAM

Lowell E. Weitz, D.M.A.
University of Missouri at Kansas City, 1967

ABSTRACT

Due to a lack of understanding of the values of the stage band in the high school music program, prejudices and resistance to its implementation have resulted. Despite these prejudices, many music educators have channeled the enthusiasm and interest of the teenager into this new area of instruction. Therefore, the problem of what part the stage band should play in the high school music program, and how it can be implemented, is a vast new domain for research.

The stage band is new to the public school program and necessitates careful organizational procedures. The director must devote special attention to acquainting the administrative body with the values of the stage band as a part of the music curriculum. He must be aware of the many purposes of the stage band. Teaching mental and musical discipline, and raising the proficiency level of members in the various musical groups through stage band performance are two of the major purposes which offer the stage band a reason for being.

The function of the stage band differs in some ways from the orchestra, concert or marching band, and choir. It demands that the individual develop self reliance in that although he is soloist, he is subjected to the discipline of ensemble playing. The development of improvisational techniques is unique to the stage band.

Rehearsal procedures for groups common to the high school music program are similar in many respects. However, the stage band offers new challenges. The previous lack of published literature which might be studied is now being remedied. The challenge and opportunity of using unusual instrumental combinations is almost limitless. The stage band offers yet another contribution in the study of harmonic structure and chord building. These challenges must be met by employing techniques which were unfamiliar in past years. Knowledge of arranging techniques improves the overall musicianship of the director by acquainting him with the practical usage of all instruments, as well as scoring procedures.

Jazz, our truly American art form, is the source which supplies the stage band with literature. Following the baroque era, very little opportunity to study improvisation has been afforded the student musician. The stage band fulfills this long neglected aspect of musicianship. A knowledge of improvisational techniques employing *standards'* and *blues'* chords is therefore considered essential if the art form is to be performed correctly.

The combo may be considered as a smaller version of the stage band. It affords the player more opportunity to display individual technique, and permits the usage of unusual combinations of instruments. This unfamiliar procedure proves especially valuable in the smaller school where full instrumentation is often lacking. The practical value of the combo is enhanced by its portability.

Presentation of the stage band offers problems which are more complex than are sometimes apparent. The term "public relations" seems to have assumed the meaning of "selling." While "selling" may to a part, the complete concept requires consideration of the many factors leading to eventual school-community leadership.

Jazz is in a constant state of evolution. Although it first served as functional music, as did the early dance forms, it has come to be recognized as an accepted and respected segment of American music. The public can be made aware of the real value of jazz. This can best be accomplished by the music educator through an understanding of the socio-economic forces at work in the community.
Order No. 67-10111

A STUDY OF THE EVOLUTION OF CRITICISM AND PRINCIPLES OF BAROQUE IN THE ARTS

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ABSTRACT

An investigation was made of a selection of critics and historians of the arts who have written about the seventeenth-century.

The purpose was to gain insight into their attitudes and understandings of both the term *Baroque* and the configuration of the components which make up the style.

The first chapter is devoted to the investigation of definitions of the term *Baroque* as it first appears in eighteenth-century criticism, and as it evolves to the middle of the twentieth century. Its origin as a term is considered. The theory that it is a mnemonics word connected with the syllogistic moods of thirteenth-century scholastic philosophy is noted as is the possibility of its derivation from Portuguese fishermen's descriptions of irregular pearls found on the seashore.

Chapters two through five deal with the attitudes of critics toward the style. Selected critics from the eighteenth-century to the present are used to exemplify the changing attitudes. Seventeenth and eighteenth-century critics are shown to be more concerned for specific artists of the period than for an overall style. The criticism suggests no coherent style which could encompass the entire seventeenth century. Nineteenth-century critics are seen generally to consider the period as a decadent aftermath or late phase of the Renaissance. The Baroque style is thought of as a grotesque exaggeration which is in bad taste. This attitude is shown to exist among some early twentieth century critics as well. Attention is called to the importance of Heinrich Wölfflin and Oswald Spengler as their work influences more positive attitudes and leads to more objective investigations of the Baroque style. The development of more complete interrelationships among the arts by critics in the nineteen forties is noted with particular attention paid to the contributions in the *Journal of Aesthetics and Art Criticism.* Finally tendencies are noted toward oversimplification of style discussions by many late critics who seek to explain the entire style and the entire period in one-word synonyms for *Baroque.*

A re-examination is made of the principles of the Baroque style. Organization is considered as the primary source of any expressive style. Style principles are seen to derive from the particular expressive handling of the focal point, system of continuity, and system of balance within the organizational scheme of *Baroque.* This organizational system of *Baroque* is then applied to specific examples in the visual arts, literature, and music. Interrelationships among the arts are reaffirmed as a result of parallels which are established in the Baroque organizational system as it exists in each of the arts. The system of dynamic moving balance which involves the audience or viewer intimately in the work is seen as one of the prime factors in the establishment of Baroque expression. The interactions of focal point, movement, contrasts, tensions and resolved conflicts are seen to work together intimately and instantly to create the dynamically balanced expression of power which is the Baroque style.

A SELECTED AND ANNOTATED LISTING OF 20TH CENTURY ENSEMBLES PUBLISHED FOR THREE OR MORE HETEROGENEOUS BRASS INSTRUMENTS

John Shoemaker
Washington University, 1968

ABSTRACT

The purpose of this dissertation is two-fold: first, to determine which 20th century brass ensemble scores are considered to be the outstanding literature worthy of performance by heterogeneous brass groups as designated by brass experts throughout the country; and second, to provide analysis and annotation of each of the selected scores for use by directors of this medium.

The procedure has been to compile a list of 20th century brass ensembles as recommended by Mary Rasmussen, editor of *Brass Quarterly,* and Robert Ryker, editor of the chamber music section of *Brass World,* and forward this combined listing to forty members of the National Association of College Wind and Percussion Instructors who were selected by the president of that organization as specialists in the brass chamber music field throughout the United States.

This combined list was divided into sections according to number of performers. Each NACWPI member was informed of the origin of the list and requested to add any scores he felt should be represented as outstanding and to delete those scores felt to be of doubtful musical value.

Thirty-five of the forty questionnaires were returned with fifty-eight scores being recommended for the selected list. Each of these scores was subjected to analysis on the basis of the following criteria: number of instruments, number of movements, structure of phrases, structure of thematic/motivic material, structure of meter, harmonic characteristics, textural characteristics, and instrumental characteristics.

An examination of the listing of characteristics as determined by the analysis of the fifty-eight scores revealed certain patterns of compositional techniques used by 20th century brass composers. These compositional techniques were then compared with those techniques used by composers of ensembles randomly selected from the corpus of brass literature not on the selected list. The differences evinced are significant because they shed some light on the thinking of brass experts in the United States regarding what are apparently considered to be desirable brass compositional techniques as compared to those techniques which are thought to be less acceptable at this time.

A SELECTED LIST OF TWENTIETH CENTURY ENSEMBLES PUBLISHED FOR THREE OR MORE HETEROGENEOUS BRASS INSTRUMENTS

John Shoemaker

The scores listed below have been selected by brass experts who are members of the National Association of College Wind and Percussion Instructors. The format is as follows: COMPOSER, TITLE, (Year of Composition). INSTRUMENTATION, (indicated in the following order: trumpet, French horn, trombone, tuba, baritone). PUBLISHER. YEAR OF COPYRIGHT.

MIXED BRASS TRIOS

Bassett, Leslie. *Brass Trio.* 1110. ACA, 1957.
Bentzon, Niels. *Trio,* (1952.) 1110. Hansen, 1964.
Bialosky, Marshall. *Two Movements.* 1110. King, 1954.
Cabus, P. *Sonata a tre.* 1110. Maurer, 1962.
Glasser, Stanley. *Trio.* 2010. Musica Rara, 1959.
Louel, Jean. *Trio.* 1110. CeBeDeM, 1956.
Marek, Robert. *Trio.* 1110. King, 1959.
Meulemans, Arthur. *Trio,* (1933). 1110. Brogneaux, 1950.
Muelemans, Arthur. *2e Trio,* (1960). 1110. CeBeDeM, 1961.
Poulenc, Francis. *Sonata,* (1922). 1110. Chester, 1924.
Quinet, Marcel. *Sonata a Trois.* 1110. CeBeDeM, 1961.
Sanders, Robert. *Trio.* 1110. King, 1961.
Scharres, Charles. *Divertimento.* 1110. Brogneaux, 1958.

MIXED BRASS QUARTETS

Addison, John. *Divertimento.* 2110. Williams, 1954.
Andriessen, Jurriaan. *Introduction and Allegro.* 2110. Donemus, 1958.
Baker, David. *Hymn and Deviations,* (1957). 1111. MBQ, [n.d.]
Berger, Jean. *Intrada.* 2110. King, 1961.
Bergsma, William. *Suite for Brass Quartet.* 2010 baritone. Carl Fischer, 1946.
Bright, Houston. *Legend and Canon.* 2020 or 2110. Associated, 1953.
Frackenpohl, Arthur. *Quartet.* 2020. King, 1950.
Haines, Edmund. *Toccata.* 2020 or 2110. King, 1949.
Hindemith, Paul. *Morgenmusik.* 2020. Schott, 1932.
Hovhaness, Alan. *Sharagan and Fugue.* 2110. King, 1950.
Jacob, Gordon. *Scherzo.* 2110. Williams, 1954.
Kay, Ulysses. *Quartet.* 2020. Peer, 1958.
Keller, Homer. *Quartet.* 2110. King, 1954.
Piket, Frederick. *Dance and March.* 2020. Associated, 1952.
Sanders, Robert. *Suite,* (1949). 2020. King, 1956.
Schuller, Gunther. *Little Brass Music.* 1111. Mento, 1962.
Starer, Robert. *Dirge,* (1955). 2020. Presser, 1957.

MIXED BRASS QUINTETS

Adler, Samuel. *Five Movements.* 2111. King, 1965.
Arnold, Malcolm. *Quintet.* 2111. Paterson, 1961.
Bozza, Eugene. Bis. 2111. Leduc, 1963.
Bozza, Eugene. *Sonatine.* 2111. Leduc, 1951.
Cheetham, John. *Scherzo.* 2111. Avant, 1965.
Dahl, Ingolf. *Music for Brass Instruments,* (1944). 2120 or 2111. Witmark, 1949.
Frackenpohl, Arthur. *Brass Quintet.* 2111. Elkan-Vogel, 1966.
Hartley, Walter. *Quintet.* 2111. Tenuto, 1963.
LeGrady, Thomas. *Suite.* 2111. MBQ, 1962.
Presser, William. *Folk Song Fantasy.* 2011 baritone. Composers Press, 1955.
Sanders, Robert. *Quintet in Bb.* 2120. Mercury, 1948.
Schuller, Gunther. *Music for Brass Quintet.* 2111. Associated, 1962.
Zindars, Earl. *Quintet.* 2111. King, 1958.

MIXED BRASS SEXTETS

Bezanson, Philip. *Prelude and Dance.* 2121. Interlochen, 1961.
Kroeger, Karl. *Canzona III.* 3030. Presser, 1968.
Osborne, Willson. *Prelude for Brass Instruments.* 2220 or 3030. King, 1952.
Viecenze, Herbert. *Blaser Suite.* 2220 or 3030. Hofmeister, 1956.

MIXED BRASS SEPTETS

Berezowsky, Nicolai. *Brass Suite, Op.* 24. 2221. Mills, 1942.
Ruggles, Carl. *Angels for Muted Brass,* (1938). 4030. American Music Edition, 1960.
Weber, Ben. *Colloquy, Op.* 37. 2221. ACA, 1955.

MIXED BRASS OCTETS

Zillig, Winfred. *Serenade* #1, (1928). 3221. Barenreiter, 1958.

MIXED BRASS ENSEMBLES FOR NINE OR MORE INSTRUMENTS

Arnell, Richard. *Ceremonial and Flourish.* 3430. Associated, 1948.
Cobine, Albert. *Vermont Suite.* 4341 baritone. King, 1957.
Hartley, Walter. *Sinfonai* #3. 5431 baritone. Tenuto, 1966.
Holmes, Paul. *Suite for Brass.* 3431. Shawnee, 1960.
Kauffmann, Leo. *Musik.* 3431. Hofmeister, 1957.
Merriman, Thomas. *Theme and Four Variations.* 4231 baritone. Associated, 1951.
Riegger, Wallingford. *Nonet for Brass, Op.* 49. 3231. Associated, 1951.