

The Factors Defining the Orchestral Colour or Timbre

Disciplines which teach us about musical instruments are either practical (concerning how to play an instrument), or theoretical (science of instruments, acoustics, history of instruments and orchestration) or a mixture of both (instrumentation and orchestration). Although all of these disciplines are important to master the technique of scoring three of them especially help us to define the timbre or colour of the orchestra.

One important thing should be understood before we talk about the “orchestral timbre”: Orchestra is not an instrument with a certain timbre. Its timbre can be modified according to the instrumentation and interpretation of the compositional elements, may these be melodic structures or cluster chords; Alberti figurations or glissando effects, among many others. The placement of these elements in fore-, middle- or background may alter the resulting orchestral sound dramatically. Thus, even a conductor or a recording engineer can be responsible from the resulting sound, which may at times adversely reflect the intention of the composer.

In today’s composition the elements like melody, harmony and bass have been frequently replaced by other elements. However, I would still prefer to start with these conventional elements because their instrumentation played undoubtedly a major role in the definition of the orchestral sound in the last 400 years, if not more.

The students who learn instrumentation and orchestration must broaden their horizons right from the beginning, by realising that these disciplines do not solely deal with the subject “who is going to play what?” in the orchestra. Orchestral colour or timbre should be introduced to the students as early as in the first lesson. As far as the correct understanding of the term “orchestral timbre” is concerned, the students should be exposed to the techniques, which they can utilize to create, analyse, evaluate, interpret and record not only an ordinary orchestral sound but also the orchestral timbre. In order to achieve this goal, the “learning orchestrator” should be more than familiar with the following disciplines:

- Science of Instruments
- Instrumentation
- Orchestration

Science of Instruments is the study of the instruments: their basic history, their separate technical and acoustical properties, their families, their principles of tone production, and their individual different characteristics and features.

Science of Instruments should therefore be regarded as the “*theoretical aspect*” of scoring.

Instrumentation is the study of how to combine similar or different instruments of variable numbers in order to create an “ensemble” sound, as well as different colours. Parameters include dynamic balance, colour contrasts or similarities, articulations, use of different registers of the instruments and the orchestra, different methods of sound production on the same instrument. Discussions of instrumentation are usually limited to a certain number of measures since instrumentation often changes continuously within a composition or a movement. Instrumentation should therefore be regarded as the “*technical aspect*” of scoring.

Orchestration is the study of how to select and combine similarly or differently scored (or “instrumentated”) sections, how to create, enhance or reduce contrasts between these sections, and how to express and reinforce musical ideas, gestures and feelings as well as the general character of a composition. Orchestration plays an additional role in the reinforcement of musical form. Orchestral colour is much more perceptible than the abstract aspects of the form. Thus the *colours (instrumentation)* are brought together within a certain *aesthetic (orchestration)* to enhance and support the form. Orchestration should therefore be regarded as the “*aesthetical aspect*” of scoring.

Surely everyone agrees with what the great master of orchestration, Rimsky-Korsakow, says in his well-known book “Principle of Orchestration”: that composition and orchestration are inseparable. He denies that one of these can be good while the other is bad. Truly, a case of a “bad” composition with a “good” orchestration seems rather difficult to imagine, proving the master correct. However, the opposite can be true. There are quite a good number of “poorly” orchestrated “good” compositions. Many works of Schumann and Mussorgsky are examples. (Ironically, Korsakow himself undertook the orchestrations of some such works, whether or not they were orchestrated before.)

A score can also have good instrumentation but be poorly orchestrated. That means that the individual measures or small sections show no technical problems; the instruments are well balanced with each other;

musical elements are *easily* distinguishable, etc. All these points define instrumentation. But if there is not sufficient contrast between these groups of measures; if the same colour is repeated over and over again; if the score lacks the above-mentioned criteria such as aesthetics, logic and structure (which vary according to the taste of the composer or arranger), then the work is poorly orchestrated. Conversely, it is not possible to talk about a “good” orchestration if the instrumentation is “poor”. “Good” instrumentation is a prerequisite for “good” orchestration.

Now, let’s go back to the melody-harmony-bass trilogy. In my first orchestration class I tell my students that I can teach them how to score a melody or a bass line in maximum 2 hours but I would need at least 2 years to teach how to orchestrate the so-called secondary lines and/or accompaniments.

Compared to what one can do with the so-called secondary lines or harmonic elements, it is rather straightforward and easy to learn what to do with the melody or the bass-line:

To score a single line, may that be a primary or secondary line, one can use the following techniques:

- Solo employment of one instrument
- Employment of more than one instrument in unison or in octave doubling(s)
- Dove-tailing (different instruments playing the line alternatively, each instrument or a few instruments one fragment at a time)
- Melodic shadowing (one or more instruments highlight the line played by one or more instruments. This “highlighting” can also contain some notes which are not present in the melody.)

That’s all!

In that sense there is not much difference between the scoring techniques of a melody used by Mozart, Tchaikowsky or Ravel.

Classification of colours:

Colours are classified in two different ways:

- According to the combinations

There are three types here:

1. *Unmixed colours*: combination of two or more instruments with the same structure, belonging to the same family, such as oboe and bassoon; trumpet and trombone; violin, viola and cello.
2. *Half-mixed colours*: combination of two or more instruments with different structures, yet belonging to the same family, such as trumpet and French horn; flute, oboe and clarinet.
3. *Mixed colours*: combination of two or more instruments with different structures, belonging to different families, such as violin and flute; oboe, French horn and Cello.

- According to the stability:

There are two types here:

1. *Macro-Colour*: The basic colour of a particular (sub)section, defined by the instruments that play throughout that (sub)section continuously. These colours provide stability and characterise the (sub)section.
2. *Micro-Colours*: Minute changes within a particular (sub)section, governed by various alterations in the six basic elements used in scoring (see below). Micro-colours add contrasts without compromising the macro-colour.

How do we define the orchestral timbres?

There are 6 basic elements, which are used as tools in instrumentation and these create and influence the orchestral timbre:

- *Instruments*
- *Instrumental registers*
- *Orchestral registers*
- *Dynamics*
- *Articulations*
- *Methods of sound production*

Some of these elements remain constant within a section, in order to provide stability; some undergo changes to create contrasts. In either case these 6 basic elements were almost always subordinate to the composition until the end of the 19th century. Until then they reinforced, enriched and supported the musical material of the composition. Starting with *Impressionism*, especially in the music of *Debussy*, this situation underwent radical changes. Each of these elements (together with its modifications) started playing a major role, if not a primary one, in the definition of modern orchestral sound. Timbre varieties of an orchestra primarily depend on these six elements. Acknowledgment and purposeful employment of these elements lead to the correct understanding, practice and appreciation of contemporary orchestral music too.

It is of vital importance that these subjects and their practical aspects should be considered not only by composers and arrangers but also by orchestra conductors and recording engineers. These professionals should be aware of the continuity and development of the orchestral sound throughout the history and not treat these as isolated different individual units. It should be noted that the theoretical analysis, aural perception and artistic interpretation of a score are equally important as the creation of a score.

Regardless of the versatile and extremely contrasting types of composition in the 20th century, the basic concepts of instrumentation and orchestration have remained almost the same. The advanced and new playing techniques as well as new criteria of aesthetics have been added to the orchestral language of the 19th century. Orchestration and composition united absolutely as the colours and effects became more and more prominent in acoustical music. While electronic music was establishing its own and separate way, the acoustical music went through many experimental stages, some of which developed into new styles. However, it is too early to predict the final and permanent influences of this “pluralistic” era on the music of today. On the other hand we can now judge the impacts of the orchestration of the 17th, especially 18th and 19th centuries, as well as the first quarter of the 20th century on the orchestration of the last 75-80 years.

We know by now that there are 6 basic elements, which are used as tools in instrumentation: instruments, instrumental registers, orchestral registers, dynamics, articulation and methods of sound production.

Thus it was not a rare incidence any more to witness the dominance of one of those elements in a section while the other elements remained unchanged. Let us think of a composition where the contrasts are created only by different dynamics: Some instruments play decrescendo, some crescendo, some remain with the same dynamic. Most of these changes can take place irregularly or even randomly. Instruments, instrumental registers, orchestral registers, articulation and methods of sound production remain unchanged, thus displaying no contrasts.

As a further example, one could think of a composition where only different instrument registers are used to create contrasts, while the other elements stay unchanged. In such a case the instruments may switch from one register to another even within a constant orchestral register.

Keeping these facts in mind, we will summarize how these six elements of instrumentation could be used in the technique of instrumentation. Let us take a very simple texture scored for two clarinets and the first violins (Example 1, section I). In each of the following examples only one of the six elements has been particularly altered in order to create colours by means of scoring.

Instruments

Instruments are the most important of these 6 elements since they are the primary source of “colour” in instrumentation, thus the primary factor defining the orchestral timbre. It is possible to create very sharp contrasts by treating every individual element of a composition by totally different instruments, in other words, different colours. Or it is possible to reduce contrasts to a minimum by using same types of instruments for different elements. Needless to say, there are many other possibilities to create contrasts of different magnitudes by sharing some common some different instruments while scoring. This way the instrumentation of one section can have contrasting colours, another section less or no contrasting colours. The combination of these sections within certain aesthetics defines the orchestration of the movement or of the piece. Thus, the timbre of the orchestra changes according to the composer’s choice of instruments. In Example 1, section II, we observe three different colours at different moments: clarinets and violins, violins alone, clarinets alone.

Instrumental registers

Instrumental register strictly refers to the instruments and indicates the different locations throughout their range (e.g. low register on the flute, high register on the trumpet etc.).

Some instruments, especially woodwinds, are blessed by different register colours. Using different registers is not only important in the orchestral music but also in chamber music. Even in a woodwind trio or quartet it

Example 1

Example 1 consists of seven systems of music, each with a tempo marking of $\text{♩} = 112$.

- System I:** 2 Kl. in C and I Vln. Dynamics: *p*. Includes *div.* marking.
- System II:** 2 Kl. in C and I Vln. Dynamics: *p*. Includes *div.* marking.
- System III:** 2 Kl. in C and I Vln. Dynamics: *mp*. Includes *div.* marking.
- System IV:** 2 Kl. in C and I Vln. Dynamics: *mf*. Includes *div.* marking.
- System V:** 2 Kl. in C and I Vln. Dynamics: *f*, *p*, *ff*, *p*, *ff*. Includes *div.* marking.
- System VI:** 2 Kl. in C and I Vln. Dynamics: *mp*. Includes *div.* marking.
- System VII:** Fl. I, Fl. II, Vln., and Vcl. Dynamics: *mf*. Includes performance instructions: Flzng. → ord., (ord.) → Flzng. (ord.), div. sul tasto → sul pont. pizz., and sul tasto.

is possible to create many different colours and colour combinations by using different registers. For instance an oboe in a low register combined with a clarinet in a high register sounds much different than an oboe in a high register combined with a clarinet in its lowest (the so-called chalumeau) register.

We can even stretch this option further. 3 clarinets in the lowermost register sound much different than the combination of 3 clarinets in the middle, high and highest registers respectively. This is a very important and basic principle to be kept in mind during instrumentation. It is the fundament of “economical” instrumentation, especially when there are limited instruments accessible. If we imagine 4 different woodwind instruments playing the same pitch (with or without octaves) in 4 different instrumental registers we will have 256 possibilities of colour combinations. Each of these combinations will vary the resulting orchestral timbre more or less. In Example 1, section III, the clarinets and the violins change their registers however the orchestral register does not change.

Orchestral registers

Orchestral register is used to refer to different levels of the orchestral range (e.g., soprano register, baritone register, alto-tenor register, etc.).

Choosing the correct orchestral registers plays an important role in the resulting sound of an orchestral work. It is not only the placement of instruments and compositional elements (i.e. melodic and harmonic elements, the effects and the bass line) in certain orchestral registers but also determining to what extent these instruments should be separate from each other or overlap. Employment of only soprano and alto registers; or the tenor and bass registers will definitely effect the orchestral timbre even though the compositional material remains the same in both registers. The changes in the orchestral registers are easy to detect in Example 1, section IV. These changes are usually accompanied by the changes in the instrumental registers unless the instruments play alternatively and each staying only in one particular register.

Dynamics

Dynamics have two different applications in instrumentation: Firstly they are used either to define the general volume of the sound or to create balance among individual instruments or groups. A perfect example would be the frequent use of moderate dynamics in the heavy brass as opposed to the higher dynamics given to the woodwinds and the horns, especially when the strings do not back up the latter two groups. Another common fact would be the assignment of somewhat elevated dynamics to the more important lines. This is especially of importance when the melody playing instruments remain weaker compared to the other instruments due to different reasons such as weak register, insufficient doublings, heavy texture and many others. No attempt should be made, however, to use exaggeratedly different dynamics in order to correct the dynamic imbalances in a poor instrumentation. This will result in failure.

Secondly, different dynamics are especially significant as a means of instrumentation when they are used as effects. Simultaneous crescendo in one instrument or group, decrescendo in another; highlighting certain notes or fragments of a line by using additional instruments with different dynamics are only two of many possibilities. The colour effects created as a result of different dynamics in Example 1, section V, require no further explanation.

Articulation

Different articulation of different elements, such as a legato melodic line accompanied by staccato chords, is rather an issue of composition. The resulting contrast could be reinforced by an appropriate instrumentation. Articulation as an element of instrumentation, however, refers to the application of different articulation to the same material such as a melody, which appears legato in one instrument (e.g. oboe) and staccato in another (e.g. violin or even another oboe). This fact will be observed in Example 1, section VI, between the clarinets and the violins.

Methods of sound production:

Whether applied to the same or to a different line, different methods of sound production play a very important role in instrumentation. Such techniques are especially effective within the same group of instruments. The obvious contrasts created by arco and pizzicato; or by sul ponticello and sul tasto; or by muted and not-muted trumpets do not need any further description. In Example 1, section VII, the flutes replace the clarinets, and the celli are added to enhance the differences between these methods.

It has been mentioned before that the orchestra does not have a particular timbre as one might think. One of the main goals of teaching orchestration is to challenge the “learning orchestrator” with this issue. Therefore the most important and efficient pedagogical approaches should be mentioned here as well:

- **Scoring piano works for orchestra:** This is the most widely used technique. Although an effective method, this technique usually proves unsatisfactory when used alone, especially in such cases where the students are not able to create secondary lines, filling voices etc. from the piano work in order to enrich the orchestral score. Compositions written for smaller groups (such as a trio, quartet, chamber ensemble etc.) could also be used instead of a piano piece.
- **Recreation of the score from a reduced score (particell):** According to my experiences this has proved to be one of the most effective teaching methods to teach orchestration. It is by no means a substitute for scoring piano pieces but rather a complementary method. More on this subject will be explained later.

- **Analysis of scores:** This is of utmost importance. Especially the conductors who are to create the timbre of the orchestra aimed by the composer should undertake this as a careful and through task. Most of the conductors are satisfied in their analysis by marking the entrances of the instruments and cueing them during performance, a task which does not necessarily require a conductor. The finding out of the hidden relationships between “seemingly” (optically) different voices, categorizing the melody, harmony and bass functions and defining how important these functions are; placing these elements in fore-, middle- or background depending on the style and era (for example the placement of melodic elements often in the middle-ground in Impressionism; equal treatment of all elements in Expressionism etc.) and alike should be tasks to be considered.
- **Attending orchestral rehearsals:** The students should preferably sit next to the instrumentalists and experience the orchestral music “live”. This method is especially useful if the composer/arranger is not very familiar with the individual instruments. If this is not possible at all, the student can pick any voice from a score (Violin I, Oboe II, Horn IV etc.) and analyse only that particular line, or sing it –as much as possible– and count the rests! This exercise could be accompanied by a recording, which will make the student feel “in a live performance”. This wonderful technique does not only teach the appreciation of the orchestral colours but also the importance of writing an “interesting” line for each and every instrument which is a very frequently neglected issue in orchestration. Instrumentalists appreciate very much if they play parts, at least from time to time, which are written solely for their instrument and reflect the true “personality” of it.

Although the following subject is not directly related to ones mentioned above, it should also be mentioned here as a further suggestion for the teaching methods of scoring. That is the acknowledgement of the limitations of the players. No matter how good the players are, they should not be forced to exhaustion. Scores with extremely long and tiring passages, unreasonably complex structures are bound to be put aside after a performance or two, for obvious reasons. Although the orchestra players of our time are not as “fragile” as Monteverde’s who failed to understand the “reason” behind the “bow-tremolo” (for the first time in the history) and rebelled against him; or like Wagner’s musicians who unwillingly had to take their orchestra parts home to “practice”, we should still consider “moderation” in our score writing. We see lots of scores nowadays with impossible to play effects and techniques. Even if these works carry the signatures of well-known composers, this does not make the impossible possible!

Now I would like to devote some time to the importance of using reduced scores (particelli) in the pedagogy of scoring, since this technique has proven to be a very efficient one, at least in my classes, in the comprehension of orchestral colour. This pedagogical approach has been used in order to teach how to create an orchestral language, which consists of multiple orchestral colours or timbre. Below is an example taken from my treatise on instrumentation and orchestration (*Ertugrul SEVSAY: Handbuch der Instrumentationspraxis, Kassel: Bärenreiter, 2005*):

Example 2. Gustav Mahler: Symphony No. 1 in D Major, 1st Movement

As we see in this example a reduced score is a condensation where all of the lines used in the original score and their octave doublings, all of the dynamic markings, all of the articulations and the rhythmic data are provided. Depending on several factors some of the unison doublings may have been added, too. Although the listing of the instruments participating in each exercise is given in the instructions, the “learning orchestrator” has to find out which instrument will be playing which of these lines. Furthermore, special effects such as pizzicato, con sordino, col legno, etc., are not provided and hence to be decided by the student. Thus the students are exposed to real “orchestral language”, complete with all pedal tones, harmonic “fillers”, secondary countermelodies, etc. with which they are almost never confronted if they orchestrate from piano scores. As I said in the beginning the composition of the so-called secondary or accompanying elements are the primary factors in the definition of the orchestral colours or the timbres.

Each exercise challenges the student with one or more specific problems. Upon the completion of each exercise the student should be provided with the original score for comparative purposes. The instructor should also provide an analysis of the score and the techniques used within.

The reduced scores do not only provide the material to be used in the full score but they also teach certain discipline, if the guidelines are observed strictly.

Important guidelines for the exercises

While orchestrating from a reduced score:

- All of the instruments listed in the instructions, all of the lines, octave doublings, dynamics, articulations as well as rhythmic data provided must be used.
- They can not be modified, neither can anything be left out.
- *No additional* lines, notes or octave doublings may be added.
- Unless the instruction “*Not all unison doublings are shown in the reduced score. Use them wherever necessary*” is given, no additional unison doubling can be done.
- The voices may not be moved up or down to other registers.

These are some of the challenges of orchestrating reduced scores. Compromising the instructions with excuses like, “I could not find a line for Horn III, so I did not use it,” “I thought an English Horn would sound better here, so I added one,” or “I did not think an octave doubling would be necessary here, so I left it out,” should not even be considered.

Each reduced score should be preceded by a general information about the excerpt, a list of the instruments in that particular section (not of the entire composition).

Hints for the exercise that should preferably accompany each exercise will be providing the student with basic guidelines.

Even if these exercises are taken from well-known works and the basic colour of their orchestration may be known to the students, this is of no disadvantage but rather the contrary, according to our experience. One should actually try to follow the sound in “his/her ear” and orchestrate accordingly. After comparing this “new” version with the original score, one will be convinced, even surprised, how deceptive the acoustical memory can be.

Santrauka

Orkestrinę spalvą lemiantys faktoriai

Norint suprasti orkestrinės spalvos fenomeną, būtina išmanyti tris toliau išvardytus dalykus.

Mokslas apie instrumentus – tai instrumentų mokslinis tyrinėjimas, apimantis jų kilmės istoriją, technines ir akustines savybes, garso išgavimo principus ir t. t. Mokslą apie instrumentus reikėtų laikyti partitūros *teoriniu aspektu*.

Instrumentuotė – mokslas apie tai, kaip derinti įvairių skaičių panašius ar skirtingus instrumentus, siekiant sukurti „ansamblinį“ garsą ir skirtingas spalvas. Instrumentuotę reikėtų laikyti partitūros *techniniu aspektu*.

Orkestruotė – mokslas apie tai, kaip parinkti ir tarpusavyje derinti panašiai ar skirtingai į partitūrą įtrauktas (arba „instrumentuotas“) instrumentų grupes, kaip sukurti, padidinti ar sumažinti kontrastus tarp jų ir kaip perteikti bei išryškinti muzikines idėjas, veiksmus ir emocijas, taip pat bendrą kūrinio charakterį. Orkestruotę reikėtų laikyti partitūros *estetiniu aspektu*.

Yra šeši pagrindiniai elementai, naudojami kaip instrumentuotės įrankiai ir sukuriantys bei veikiantys orkestrinę skambėjimą:

- Instrumentai
- Instrumentų registrai
- Orkestriniai registrai
- Dinamika
- Artikuliacija
- Garso išgavimo būdai

Kai kurie šių elementų konkrečioje instrumentų grupėje išlieka nekintami (tuo siekiant stabilumo), o kiti kinta, kad sukurtų kontrastus. Iki XIX a. pabaigos šie šeši pagrindiniai elementai beveik visada priklausė nuo pačios kompozicijos – jie paryškindavo, praturtindavo ir sustiprindavo kompozicijos muzikinę medžiagą. Nuo impresionizmo (ypač Debussy kūrybos) šioje sferoje įvyko radikalių pasikeitimų. Kiekvienas šių elementų (kartu su jų modifikacijomis) pamažu įgavo didelę (jei ne pagrindinę) reikšmę siekiant modernaus orkestrinio skambesio. Tembrinis orkestro įvairiapusiškumas pirmiausia priklauso nuo šių šešių elementų. Sumanus ir tikslingas šių elementų naudojimas taip pat leidžia teisingai suprasti, kurti ir įvertinti šiuolaikinę orkestrinę muziką.

Labai svarbu, kad šiuos dalykus ir jų praktinius aspektus įvertintų ne tik kompozitoriai ir aranžuotojai, bet ir orkestrų dirigentai bei įrašų inžinieriai. Šie profesionalai turėtų išmanyti, kaip orkestrinis skambėjimas kito ir kokias savybes jis išlaikė istorijos eigoje, ir suvokti, kad tos savybės neturėtų būti traktuojamos kaip skirtingi, vienas su kitu nesusiję elementai. Derėtų pastebėti, kad partitūros teorinė analizė, garsinis suvokimas ir meninė interpretacija yra ne mažiau svarbūs nei pats partitūros sukūrimas.

Orkestras – tai ne tam tikro tembro instrumentas. Jo tembras kinta priklausomai nuo kompozicinių elementų (ar tai būtų melodinės, ar akordinės struktūros, Alberti bosai ar *glissando* efektai) instrumentavimo ir interpretavimo. Būtent tai, kokia reikšmė suteikiama šiems elementams (ar jiems priskiriamas pagrindinis vaidmuo, ar jie įsilieja į bendrą skambėjimą, ar paliekami fone), gali kardinaliai pakeisti orkestrinio skambėjimo rezultatą. Taigi net dirigentas ar įrašo inžinierius gali būti atsakingas už pokyčius, kurie kartais gali ir neatitikti kompozitoriaus intencijų.