

SCHOENBERG ON ORCHESTRATION

The essay *Instrumentation* outlines a theoretical plan for a new type of orchestra with a reduced number of colors. While debating the merits of this hypothetical orchestra as compared with the present-day orchestra, Schoenberg investigates the nature of color and its usefulness in composition.

Instrumentation

Our present day orchestra is highly heterogeneous. It possesses some thirty different types of instruments, not including mutes: two types of flute, two to four types of oboe (oboe, English horn, oboe da caccia, oboe d'amore), three types of clarinets (E-flat, A/B-flat, and bass), basset horn, bassoon, contrabassoon, horns, tenor tubas, tenor horns, trumpets, cornets, Flugelhorn, trombones, bass tuba, four strings and piano. These instruments differ from one another in color, technique, etc., with the crucial effect that *instruments cannot be grouped together into sounds strong enough to hold their own against the rest of the orchestra*. Naturally, the instruments of the orchestra are weak when taken individually, certainly when they are compared with the entirety of an orchestra. (The trumpets and trombones are possible exceptions to this principle, but the ear pays attention to them more because of their fresh color, than because of their loudness. Their entry is still always striking, I believe, because they're usually unsuitable in quiet passages and so play less often than the other instruments. They stand out only in favorable conditions -- they are much less able to do so, for example, when they play rapid notes.) But because most instruments cannot be combined into strong entities, they become overwhelmed by the rest of the orchestra. If the orchestra had a fewer number of types of instruments, each could be combined with its sisters, and the orchestra would be more balanced.

Indeed, if our orchestra consisted of a smaller number of colors, it would be possible to approximate the excellent balance of the string quartet. There, each of the four players -- though only three different colors -- is able to make his part come through, so long as he is using a register of his instrument that contrasts with the other instruments.

Such an orchestra could consist of a high and low types of woodwinds, brass,

and strings, with two extra groups at the extreme registers. (The instruments in the normal high groups would all possess the ranges of the violins, and the low ones the ranges of the cellos; the extreme high groups would all possess the range of the piccolos, the extreme low ones the range of the double bass). Thus:

6 or 12 high woodwinds	6 or 12 low woodwinds
6 or 12 high brass	6 or 12 low brass
10 or 20 violins	10 or 20 cellos
4 or 8 extra high instruments (total)	6-10 or 12-20 extra low instruments (the precise numbers would be based on the loudness of the instruments eventually chosen-if they are helicons or bombardons far fewer will be needed than if they were double basses or contrabassoons)

With such an ensemble, one could score using octet-relationships similar to those of the string quartet. And, as you can see, this smaller orchestra could manage with as few as 60 players.

But this scheme is fatally flawed, because the instruments that are necessary for its realization will likely never exist. No woodwind or brass exists with anything like the violin's compass ($g - c^4$ even without harmonics or the very highest notes). And whereas the horns have the extreme range $C - f^2$ (though move by no means easily in certain parts of it), the range of the trumpets is smaller by almost an octave and a half, from $f - c^3$. If the trumpets had the same compass as the horns, they could go up nearly as high as the violins, and reach deep into the cello range. (In fact, these low notes would be unnecessary, because if they were sacrificed, I assume the higher notes would have better command.) Similarly, the A clarinet commands up to g^3 , and, were the situation logical, the E-flat clarinet would extend to $c\sharp^4$ (in reality, it scarcely goes any higher than the A clarinet).

There is another flaw with our hypothetical orchestra. Like our present orchestra, the organ has a great many different colors (a hundred or more). I suspect it has so many colors because of a supposition I have about the nature of color intensity, that no individual tone color can be intensified beyond a certain degree by being added onto itself. (Physicists should test this supposition; they should also find out what degree it is beyond which a tone color cannot be intensified.) If this is true, then louder sounds on the organ can be produced only by mixing in *different* tone-qualities.

If my supposition were correct, one would have to assume that the same applies to the instruments of the orchestra. Thus our hypothetical orchestra would in fact be dynamically impaired: heavy doubling (of the same colors) would help it very little.

I have another supposition about the aim and effect of doubling: it is not done so much for loudness as for *evenness*. (One can readily observe this with massed choirs and monster concerts.) Doubling eliminates the defects that individual instruments have in intonation, weak registers, and so on -- as well as some virtues, such variations in color. The doubled sound is very even and homogenous. Therefore a solo violin stands out strongly from the rest of the orchestra.

However, even 6 or 10 fold doubling produces the mixed sound (in which weaknesses of a particular instrument would be mostly unimportant, while loudness would be cumulative). So our hypothetical orchestra would indeed offer the advantage mentioned at the outset: *each of the separate groups could easily hold its own against the others, without*

the aid of instruments from outside its group.

But our present orchestra is based on the principle of the organ: *loudness is achieved through mixture.*

The Usefulness of Color in Polyphonic Textures

Naturally our orchestra offers many attractive possibilities through the use of numerous solo groups. If one recalls that it possesses some thirty different types of instruments, it seems almost inexhaustible in terms of color. Against this, the orchestra consisting of eight types of instruments seems very meager.

Nevertheless, I am certain that such an orchestra would be able to render everything imaginable and in sufficient variety.

Remember, first of all, that the piano cannot vary its color at all, and that the string quartet manages on only three different colors. These limited media have forced composers to make the fullest, most economical use of them, and the literature of both possesses unparalleled richness of designs. One almost doubts whether there is really a greater wealth of designs for the orchestra.

But then one must consider the following point: that color serves to clarify different parts, by making it easier for them to stand out from one another. This is similar to painting: the more voices are distinguished from one another (in all aspects, including color), the more they stand out from one another. (If timbre had no other purpose than to provide a variety of interesting sounds, then it would be something very crude -- on the level of a the fondness for explosions and shooting, which some people possess -- and would hardly be worth attention.)

Of course, in painting, one can easily represent objects without using color, simply by using distinctions of brightness. Thus, in orchestration, one could achieve good representation of musical ideas through a reduced number of instruments. And, we must remember that some parts should not stand out from each other, but should dissolve into one another -- as, for example, should the individual voices that comprise a harmonic part.

To what extent should the listener be able to follow *all* the separate parts? To a very large extent. Whatever is written must be must be perceptible, and whatever cannot be perceived should not be written. This rule is only a shade too severe --

the exceptions being, for example, harmonic parts that need to blend into one another. There is another potential objection to raise to the present-day, more colorful orchestra. Polyphony is a texture based on evenness and uniformity. Perhaps when different instruments play different voices, this uniformity is damaged. For example, whenever the same theme is played successively on two different instruments, one is forced to alter the performing indications, the phrasing, the dynamics, and so on. Certainly the musical idea being presented is not then a different idea, though it is a different *representation* of an idea. If this were a valid objection, then keyboard instruments (which have a uniform manner of inflection) are the rightful instruments of polyphony, as the harpsichord and organ were during the Baroque era.

But this line of reasoning is faulty. In truly polyphonic music, all voices are equally important, so that no single voice is any more prominent than any other voice. Color serves to differentiate the voices, and without this differentiation, the voices are liable to blend into one another -- thus damaging the texture.