

The Study on the Spectrum Composition Technique of Gérard Grisey

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Abstract. Spectral music is a composition technique with the help of instrument to analyze the keynote and overtone of music sound. In this field, Gérard Grisey could be regarded as a very talented man. It was said that he was able to identify 11 overtones of one sound without any help of instrument, which made his attention and emphasis on the creation of the world of sound completely different while he was composing. In his realm of creation, melody, rhythm and other factor once were deemed as very important. Yet, all of these, in his opinion, were the intrinsic product of sounds. Gérard Grisey perceived the music as the pure sound movement, of which rhythm and melody are the driving force of music. In this paper, the author will take Gérard Grisey's music works as an example to analyze his unique style from other composers regarding musical instrument synthesizing, ringlike adjustment, form patterns and so forth and to reveal Gérard Grisey's exploration for music based on these works.

Introduction

Gérard Grisey, born in France, was one of the representatives for spectral music. He was long engaged in studying the physical characteristic of sound and took it as a starting point to create spectral music. In the course of creating spectral music, Gérard Grisey did not use electronic instrument as a creation tool, instead he put all his effort in traditional instruments during the whole creation process and made music through instrument synthesizing, ringlike adjustment, form patterns. In addition, Gérard Grisey held unique view on the relation between music and time, which contributed his great success in the field of music. In this paper, we will study the spectral composition techniques contained in Gérard Grisey's works so as to unveil the mysterious veil of his creation.

Overview of Spectral Music

The birth of Spectral Music

Since the 60s of last century, problems appeared one after another in serial music. For example, there were some difficulties in auditory sense and playing and the technique of expression was in few varieties. Under such context, the appeal for returning to the original state was becoming stronger and stronger. When the sound itself became a new trend, spectral music came into birth. In the beginning of 70s, Gérard Grisey and other 4 outstanding composers co-founded the "l'itinéraire" band and took it as an opportunity to create the sensational genre of spectral music.

Spectral Music and Gérard Grisey

Gérard Grisey was the most influential composer at that time. He had learned music from George Ligeti, Yannis Xenakis and other famous composers in Germany and worked as a music teacher in Berklee College of Music and Conservatoire National de Région de paris. After the trend of "sound itself" became popular, Gérard Grisey separated himself from serial music and turned to the exploration of the nature of music and human's recognition and created a completely different music genre on this basis. Gérard Grisey's act was the symbol of French music back then.

Spectral Music Composition Technique of Gérard Grisey

The core idea of spectral music was to explore the nature of music, which made composers of spectral music re-recognize the way of human's perceptive mode in the exploration. They took the overtone spectrum as a starting point, based on their own different composition techniques, to create

the unique sound. For example, Levinas once created the “compounded sound” by mixing real sound with the theatric of live instruments with the help of electrical appliance. Gérard Grisey employed a different approach for composing. For example, he would not put any element of electric music in his works; instead he conducted sound mixing creation based on the basis of traditional instruments. That was his techniques of instrument synthesizing and ringlike adjustment.

Since 1974, Gérard Grisey created the masterpiece of *Les espaces acoustiques* integrated music and aesthetics with his spectral music techniques. This work is composed of 6 parts, Prologue, Períodes, Partiels, Modulations, Transitoires, Epilogue respectively. During the playing of these 6 works, from violin solo to orchestra, each part can be linked from the start to end and the rhythm, from weak to strong, of the sound endows the music with extraordinary vitality and perfectly embodies Gérard Grisey’s talent on spectral music.

Toning of Instrument Timbre of Spectral Music

In the performance of a band, the characteristics of each instrument can be reflected in waveform. For instance, in an orchestra, piccolo has a few overtones; therefore it is the closest to sine wave; saxophone or clarinet has many overtones, therefore they are more close to square wave; oboe and bassoon also have many overtones, they are more close to impulse wave; string instrument has the most overtone and its timbre is more close to sawtooth wave, thereby the sound is very clear. Therefore, we know that when the waveforms of the instruments are close, so are their timbres. In addition, the different dynamic of playing also affect the quantity of instruments’ overtones that eventually will change the timbre.

In this session, we will make a brief introduction about the modulating technique of sound in spectral music.

Filter Technique

This technique is to complete the music composition through selectively extracting sound of high frequency. For example, in the spectral music, it can filter sound of high frequency and only use the sound of low frequency to compose or just select a segment of pitch and filter all other sounds except for this. This is the filter technique in spectral music

Compression or Expansion of Partial Tone

On the keynote are some partial tones. These partial tones cannot overlap with other sounds after the diversion of octave, thereby result in producing high pitch of side frequency and forming a deformed spectrum. The deformed spectrum eventually will lead to the deflecting or distortion of the effect of spectrum. This is the compression or expansion of partial tone.

In the ‘four songs to cross the threshold’, Gérard Grisey made a meticulous arrangement for instruments and combined the characteristics of instruments with the physical characteristics of keynote and overtone, with the minor adjustment of sound color to blend the characteristics of instruments with sounds, to obscure the line between sounds and make the sound flow naturally in the music.

Spectrum Composition Techniques Reflected by Gérard Grisey’s Works

The Synthesizing Techniques of Instruments in Gérard Grisey’s Works

In the third part of *Partiels* of *Les espaces acoustiques*, Gérard Grisey adopted instruments synthesizing technique to create. The so-called instrument synthesizing sound compounding technique that is to add overtones on the basis of keynotes and make music special undergo special change. In the age of Gérard Grisey, there was no IRCAM audio modelling software, therefore it was only to conduct the structure research in spectrum’s corresponding waveform and intensity and apply it into performance. This is what we mentioned sound synthesizing in instruments. The sound created by this is just like the synthesized sound of electronic music.

The integral construction of *Partiels* is made up of: 1、 from beginning to 11; 2、 12-22; 3、 23-27; 4、 28-32; 5、 33-41; 6、 42-46; 7、 47-53, of which 1、 3、 5、 7 use overtone, from overtone turning to chaos sound, instead 2、 4、 6 is from chaos sound to overtone spectrum. From the dual-change, it creates the tension and relaxation in music and the comparison between the harmonious and the inharmonious, thus enrich the variations of music score.



Fig. 1. Music notation of *Partiels*

Ring-like Adjustment in Gérard Grisey's works

The so-called Ring-like Adjustment is refer to that when two sounds of different frequency make sound at the same time, the two sounds will generate supplementary tone and differential tone, which are very weak of the sounds. Thus, it is to use the ring-like regulator to raise the voice. The differential tone normally can be heard by human, but the supplementary tone usually beyond human's hearing capacity. When there is supplementary tone or differential tone, in order to make to it an extent of obvious, composers often use ring-like adjuster to increase the amplitude of these two sounds and make them increased markedly. In the second part of Gérard Grisey's *Partiels*, it adopts this technique.

In the second part of *Partiels*, it goes into the state of chaos sound and creates the differential sound, as it is showed in the illustration two;

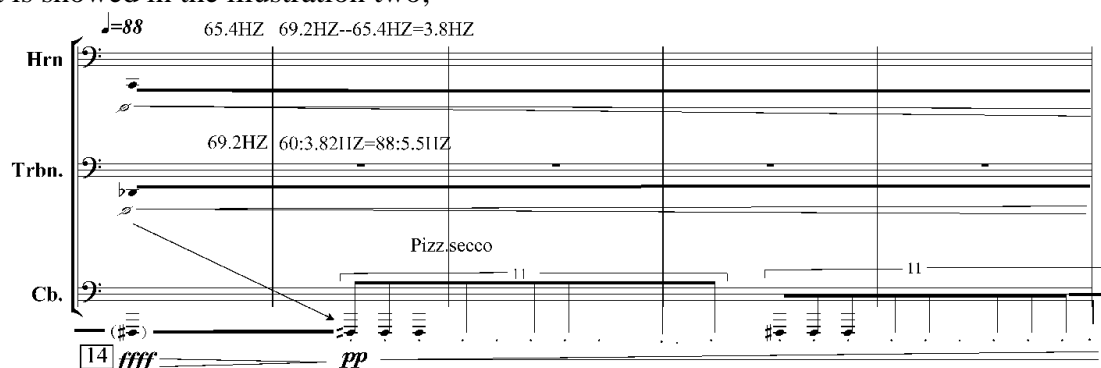


Fig. 2

In the illustration 2, on the point of 14, the C of French horn with sordine and the D-flat of trombone have a differential tone of B; the difference is $69.2\text{Hz} - 65.4\text{Hz} = 3.8\text{Hz}$. The generated B is beyond the hearing capacity. From the staff, we know that, this chapter of music is at a speed of 88 musical notes per minute and they are all quarter notes. In addition, the relation between music tempo and frequency in this chapter is $60:3.8\text{Hz} = 88: 5.5\text{Hz}$. It can be concluded that the ratio of 60 and 5.5Hz is 11; therefore it is reflected on the double bass with 11 liaisons that is the rhythm generated by the difference between French horn and trombone.

The Idea of Form Patterns in Gérard Grisey's Works

This idea of music creation is reflected in the Prologue of *Les espaces acoustiques*. The idea of form pattern is developed on the basis of German gestalt psychology. According to the gestalt psychology, human's hearing is an integrated structure. In human's perception, feeling is the objective basis. In daily life, what we can perceive is all something as a whole. For instance, when you are listening music, what we heard is an integrated music instead of some separated notes. This is the idea of integration of gestalt psychology.

G rard Grisey is deeply affected when he created his works. He integrated the psychological pattern with waveform of sound wave and blended the perception of music and time, which made the work with the idea of form pattern.

For instance, in the *Vortex Temporum*, there are mainly 3 waveforms, namely sine wave, rectangular waveform, sawtooth wave. These three waves are defined as 3 different forms and used for specific form patterns. As in the illustration 3:

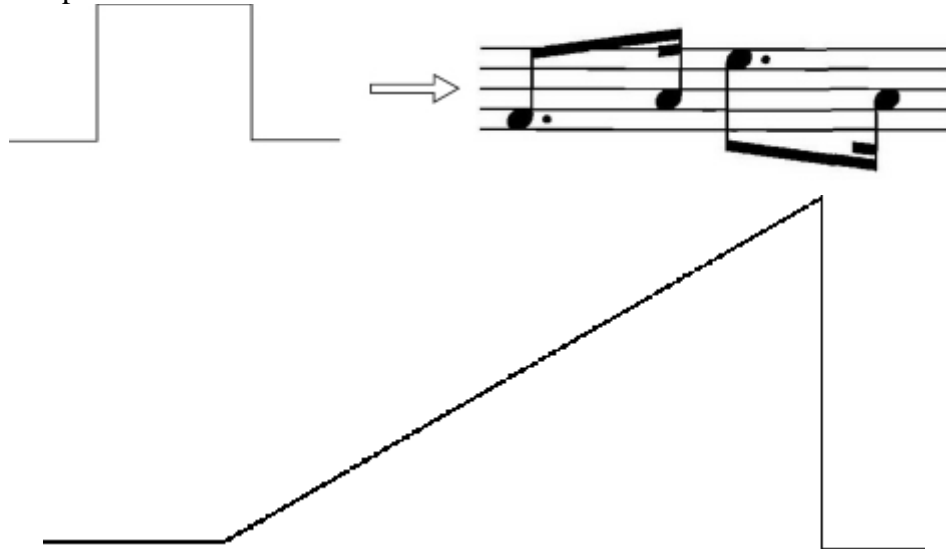


Fig. 3. Sine wave, rectangular waveform, sawtooth wave

At the beginning of *Vortex Temporum*, it adopts piano, flute and clarinets to perform so as to create a music patten similar to weave for the audience. This music form focuses on the music theme of *Vortex Temporum* with constantly repetition of ascending and descending sound pattern through different waveforms.

The Concept of Sound and Music in G rard Grisey's Works

In the beginning of 20th century, due to the influence of idea of returning to nature, many composers used the original state of nature as material to create music. Wind, water and other natural sounds were presented in the form of music at all kinds of big concerts. But for musicians of spectrum, they paid more attention on the other side of nature, namely the nature of sound. These composers utilized sound techniques to fully explore the connotation and physical characteristics of sound and reflected the trend on the concept of time. That is to say, musicians of spectrum no longer treated the time as an additional material, instead they treated as the essential. In addition, musicians of spectrum focused more on human's perception in the creation of music and took time as a form target, meanwhile started to explore how to create a soft rhythm from the concept of time.

G rard Grisey's entire life was to explore the development of sound and insisted to explore the relation between time and music from the perspective of aesthetics. G rard Grisey believed that the course and goal was similar. The goal of the course was to expand, yet the course of the goal was to compress. This point of view fully explains his opinion on the relation between time and music. Besides, G rard Grisey also thought that rhythm was product from cotrolling the timbre and pitch. That is to say, if we take the instruments presenting the overtone spectrum as vertical line and take the whole sound as a parallel line, then the relationship between music and rhythm is unfolding in this field.

In *L'icne Paradoxe*, G rard Grisey's idea of sound and time is fully reflected. In this work, each part can be divided based on time: extreme contracting time, language time, expansion time and extreme expanding time, of which extreme contracting time adopts the form of concert of instruments with high pitch; language time adopts the form of soprano and small-scale concert; expansion time adopts the performance of bass; extreme expanding time adopts the joint-performance of the whole band. This approach of integrating music and time is fundamental idea in the later period of G rard Grisey's creation.

Conclusion

In the 80s of last century, composition technique of spectral music set off a huge sensation in France, which affected lots of musicians across the world. From then, many musicians started to turn from field serial music to spectrum music and explore the nature and natural features of music with the slogan of returning. These spectrum musicians all had such traits: value the sound, actively in using overtones, employ electronic instrument, exploring all kinds of deploy methods; attach importance to the relation between sound and time. In the creation of spectral music, the most prominent characteristics of Gérard Grisey is not to use electronic instrument and immerse himself in traditional instruments. His creation form did not impede the spectral music development in France, instead it put a new element in spectral music, which made French spectral music stand in the European art world as a unique art form.

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