

## **Analysis of Ligeti's piano etude "Columna Infinita"**

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**Abstract:** As world renowned twentieth century composer, Ligeti is famous for his originality and innovation in music. He is always looking for nutrition from other disciplines and different formats of arts to create his own music. For examples, Sculpture, Mathematics, literature, painting are all rich resources of inspiration for Ligeti. Many of his etudes are composed in this way. This article will analyze the last Etude from book II which is the same title from the sculpture "Columna Infinita". Ligeti is impressed by the spirit and essence of the sculpture and created this piece with a tremendous momentum. The researcher will address related aspects of Modern music and present a comprehensive analysis discussing how Ligeti apply modern composition techniques, such as tone serious, the gradual change and figuration motif to his imagination of "Columna Infinita".

## **Analysis of Ligeti's piano etude "Columna Infinita"**

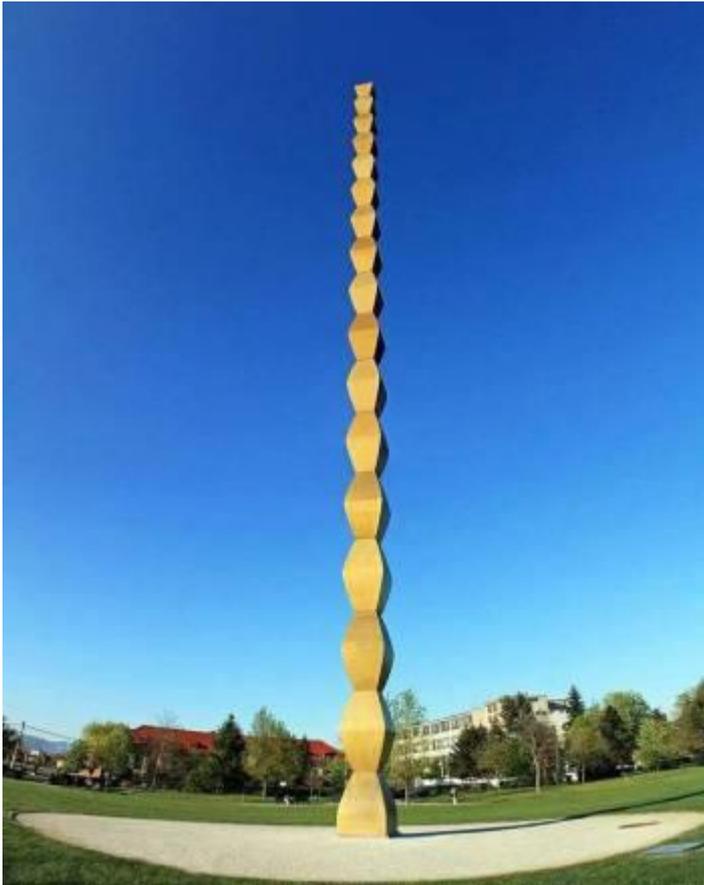
Gyorgy Ligeti (1923-2006) is a world-renowned Hungarian composer. He composed wide range of genres of works that has had deep impacts on the music world. Many of the works has been adored by music lovers. His piano etudes were immediately sought after since publication. The first book of his etudes is the Grawemeyer winner. Ligeti's etudes are divided into three books, 18 pieces in total. They involve all kinds of virtuosic techniques and innovative rich musical connotation. The modern and unique artistic style of Ligeti's etudes made themselves one of the most important 20<sup>th</sup> century piano works. This article would focus on the last etude of book two "Columna infinita".

### **Artistic Image:**

The title of the etude is from 20<sup>th</sup> century Romanian sculptor Brancusi's work "Columna infinita". This work is built in memory of the Romanian soldiers that died in the battle during World War I. Seated in Tirgu-Jiu, a southern city in Romania, it was one of the series landscape art works designed by Brancusi. "Columna infinita" was copper coated, made by units of hexagonal columns, rooted on the half unit base. With 15.5 repeated units seating on the base, the ascending vertical column ends itself in the air with the height of 30 meters.<sup>1</sup> (see picture 1).

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<sup>1</sup> Chen hong-duo, Ligeti piano etudes. Shang hai, Shanghai music publishing house. 2018. P181-P182.



As the picture 1 shows, it is a simple and symbolic sculpture. By placing repeated units on each other, it expresses an infinitely ascending gesture. The enormous energy it contains is intimidating. Ligeti, as a composer, was deeply attracted by this work and used this title as the title of his own etude. If you check through the whole piece, you would feel no prominent melody, complicated rhythm, clear sense of color or clarified layers of voices. You could only feel the tremendous streams of sound. However, it was meticulously constructed by the composer no matter how chaotic it seems. On Ligeti's mind, "music is not for daily life, art is artificial, it is man-made, 'enclosed'. It must be carefully built, with no lack of poetic feeling...complicated and sophisticated, not 'minimalist', but 'maximalist'!"<sup>2</sup>

By comparing these two works, they both express themselves in extremely modern and abstract ways. Both of them are masterpieces with a lot of refinement. When we come to the details of composing techniques, what kind of relationship could we find between musical language and sculpture? What kind of inspiration had Ligeti got from this sculpture?

Firstly, we need to analyze the sculpture work to search the possibly related connections with this etude. The sculpture shows the following features:

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<sup>2</sup> Richard Dufallo, *Tracking: Composers Speaks with Richard Dufallo* (New York: Oxford University Press, 1989), p. 334

- (1) Unicity. The sculpture is consist of repeated units of hexagonal columns with no decoration, and using unified color.
- (2) Repeatability. The same unit multiplied by 15 times, Even the base is repetition of the half unit.
- (3) Sense of movement. After the units being piled up, trim lines on the sides are like waves moving from bottom to top of the sculpture.
- (4) Sense of heaviness. Built by metal that was copper coated.
- (5) Direction. Vertical, ascending to the sky.
- (6) Sense of Illusion. It gives the observer the feeling of endlessness.

How did Ligeti absorb these features and express his feeling using the medium of music? In macroscope, the rhythm of this etude is monotonous. The whole piece has no clear sense of phrasing. Through the moving of the musical line to higher and higher pitches, it depicts the ascending gesture. The composer masterly used polyphonic texture in this piece to reveal the multiple trim lines of the sculpture. The undulating figurations of the piece perfectly match the waving figuration of the trim lines of the sculpture. Ligeti used thick and turbid texture to represent the metal and column quality of the sculpture. In the following passages, the researcher will analyze each specific musical features, and the way techniques and expressions Ligeti used to build "Columna infinita" on his mind.

### **Rhythm**

The rhythmic pattern of this etude is very concise, which is strikingly different from Ligeti's other etudes. In this etude, most of the rhythm is simple and unified. Through out the etude, the synchronous vibration of the quavers is the fundamental rhythmic pattern. There is only one passage using polyrhythm from measure 27 to 38. By setting fast tempo, the quavers become very dynamic and mechanical. In terms of pulsation, the time signature of 16/8, the division of bar lines and the notes-grouping suggests a steady pulsation by the unit of even multiple of quavers. However, Ligeti subtly differentiated the entrance and exit of the phrases, by constantly readjusting the phrases' beginning and ending point with new placement of the beats. For examples, on the downbeat or off the downbeat, on the odd or even number's beat, which arouses the sense of instability and dislocation. As we can see, the simplicity and impetus achieved from the rhythmic pattern artfully expressed the simple and motile spirit of the sculpture .

### **Polyphony**

This texture of this etude is polyphonic. There are two voice complexes disposed on two hands, each hand controls one complex. According to the legato lines marked above the phrases, there are ten sentences in the right hand and twelve sentences in the left hand. Ligeti deliberately designed the figuration with alternation between the single note and multiple notes. By doing so, two complexes are embedded with each other. When right hand is single note, the other hand is multiple notes and vice versa. As a result, the contour and border area of two voice complexes become zigzag. Each of the them turns into a "belt" with a regularly varying width. This tight relationship

between voice complexes makes the vertical sonority very tense.

## **The horizontal construction**

### **(1) The application of tone series and gradual development**

The pitches' construction in horizontal direction is an essential feature in this etude. Ligeti incorporated tone series in the development. For the asynchronism between two voices complex, such as the polyphonic texture, different length of sentences and structural points of phrases, this article will focus on single hand's voice complex to discuss the pitch construction in horizontal direction.

On a macro scale, Ligeti used gradual change of tone series to make progression in musical construction. All of the pitches appeared in every four quavers constitute one tone series. This observation is based on following reasons: the tempo marking, the given time signature, the composer's hint of bar line, and the figuration motif. Firstly, the tempo is marked half note as the unit beat with the tempo of 105 in metronome. Ligeti also wrote "Presto possibile, tempestoso con fuoco". This means a rather fast tempo especially for the half note with the minimal beat of eighth note. It indicates that the composer intended to let the music flow in a larger scale pulsation. Secondly, the time signature of 16/8 and the bar lines both suggest the musical construction is rooted in even multiple numbers of quaver. Another convincing evidence for this assumption is the presence of the figuration motif, every four quavers conduct a regular growth and variation (will be discussed in later paragraph). As the result, this article choose the half note as the unit for analysis of tone series.

The tone series provide the pitch materials and interval contents for this piece. Each tonal series distinguishes from each other by its pitch content, the number of pitches and interval relationship, especially the semitone, whole tone and other intervals. For instance, Ligeti used seven tonal series in the first sentence on right hand. They are (0, 2, 4, 6), (0, 2, 4, 6, 7), (0, 2, 4, 8), (0, 2, 3, 4, 6, 8), (0, 1, 3, 5, 7), (0, 1, 3, 5, 7, 9, 11), (0, 1, 3, 5, 6, 9)

In general, these tone series all contain the whole tone component, at least two whole tones involved (in series 3), at most five (in series 6). Meanwhile, there are two differences overall in these seven tone series: the first difference is the amount of pitches, the shortest series is tetrachord series, and longest series is hepta-chord series; The second difference is the interval content: some tone series are pure whole tone series (in series 1); some tone series applied a few semitones within whole tones (in series 2,4,5,6); some tone series combined various intervals such as semitone, whole tone and minor triad (in series 7). When comparing these series, every tone series is not the same and has their own pitches' characteristic. Moreover, the neighboring series exhibit an organic relationship in evolving. While keeping most of the pitches in the old series, Ligeti manipulated a few intervals higher or lower, to obtain updated pitches material in new tones series. Some of other manipulation also applied, such as increasing or deleting a few pitches, taking pitches for a transposition before minor adjustment. All of these techniques are for the purpose of tone series' gradual change. Taking the first sentence on right hand for an example, see example 1.

**Presto possibile, tempestoso con fuoco,  $\text{♩} = 105$  \*)**

16 *fff* sempre con tutta la forza, legato possibile

非常少的踏板 \*\*)

Example1: (measure1-3)

As we can see, the common tones of the first tone series and the second is C D E, of the second tone series and the third is d e #f, of the third series and the fourth is e #f b flat, of the fourth tone series and the fifth is g a flat b flat c1, of the fifth tone series and the sixth is g a flat b flat c1 d1, of the sixth tone series and the seventh is c1 e1 #f1. Each pair of neighboring tone series has the common tones while varying the other pitches. It helps to renew the whole pitch material so that the upcoming common tones also keeps updating.

This technique of gradual change makes no auditory gap during the alternation of tone series. However, while fusing new pitch content with the old, the subtle change of colors is produced. After a complete progression of the first sentence, the beginning tetrachord tone series becomes the hexachord tone series in the end which are very different from each other in many aspects. Moreover, by the accumulation and alternation of tone series, the entire sentence achieves ascending motion, the tone series from low register at beginning reaches to the high register in the end of the sentence. The seemingly striking differences come from this kind of closely gradual change.

Why did Ligeti favors the principle of gradual change in construction? Comparing with the sculpture, the sculpture is constructed by the constant repetition of the same hexagon column. Ligeti chose the technique of gradual change to imitate the use of repetition. This composing technique not only ensures the newly required pitch materials but also obscured the differences of sound, which makes the music sounds like a “repetition”.

## (2) The micro variation of chords

The gradual change of tone series happens in the unit of half note horizontally, it provides the pitch content for the sound. How did the music develop in the shorter

quarter note's time within the given pitch material? If we put the neighboring quavers together, the successive chords progression appeared (mainly are triads). During these chords' progressions, Ligeti also applied the principle of gradual change between neighboring chords in quarter note's time which makes it seems like a micro variation of the chords. (See example 2) The basic rule is still to remain most of the pitches while adjusting a few pitches, by manipulating a few pitches higher or lower, adding or deleting a few pitches, and transposing the pitch in different register before minor adjustment. The micro variation of chords' mainly happens among triads, and occasionally happens in dyads or other pitch class sets.



Example 2: (the chord progression of quarter note's time in the first sentence on right hand)

Based on the observation, the micro variation of chords not only absorbs the pitch material of the tone series, but also follows the principle of gradual change.

### (3) The broken chords

In the shortest eighth note's time, Ligeti broke the chords of quarter note's and deliberately arranged the pitches into an alternation between single note and double-note. This concept of decomposing sonority is just like the broken chords. This traditional composing technique help to solve the problem of how to settle the pitches in eighth note's time.

By the application of gradual change in tone series, micro variation of chords and broken chords, Ligeti presented the unique texture in the score. Till now, this article has already discussed the musical construction horizontally and related composition techniques.

### (4) Figuration motif

Another unusual aspect of musical development horizontally is the distinctly fluctuating lines in voices, which is obviously influenced by the sculpture. Different from the strict repetition of the waves in sculpture, Ligeti incorporated the figuration motives within the lines. The figuration motives become the dominant cell in musical construction. In the same layer of line, every four quavers constitute a figuration motif and conduct a regular variation systemically. If we take a deep inspection on the figuration motives, the distinct characters of gesture and sound will be found. Based on the direction of motion, the intervals and the shape of contours, the figuration motives could be divided into three types: the turn motif, the wave motif, the zigzag motif and their variants.

The turn motif: This type of figuration motif is consists of steps and small intervals (within fourth). The direction only changes once and the contour of figuration is placider than the other two types. The shape of the figuration is like a

turn. See example 3,



Example: 3

Based on the different direction of motion and points of turning, this type of turning figuration has some variants. For example, the highest line in the third, fourth, sixth and seventh group of figuration motif are variants of the turning motif with different extension. See example 4

group3

group4

group6

group7



Example: 4

The wave motif: This type of figuration motif is also constructed by steps and small intervals (within fourth interval). The direction changes twice and the contour of the motif is like the waves. Taking the first group of figuration motif in the first sentence an example, see example 5,



Example: 5

According to the different direction of motion, the order of the intervals' appearance, the range of waving, the diverse proportion and frequency of steps and jumps, the wave motif has many variants. For examples, the fifth group in the first sentence on right hand, the first and fourth group in the second sentence on right hand, the sixth group in the third sentence on right hand are all the variants of the wave motif. See example 6,

group5(sentence1)

group1(sentence2)

group4(sentence2)

group6(sentence3)



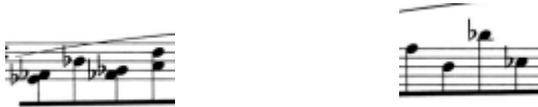
Example: 6

The zigzag motif: This type of figuration motif is characterized by consecutive jumps of large intervals (more than fourth). The change of direction happens twice. The large interval involved and fluctuant contour makes this motif zigzag. Taking the third group of the lowest line in the second sentence on left hand for an example, see example 7,



Example: 7

According to the different direction of jumps, the intervals of related pitches and the range of the jumps, the zigzag motif has different variants. The zigzag motif occasionally appeared in the early sentences on left hand, and appeared more often from the fifth sentence on right hand. Taking the second and ninth group of motives in the fifth sentence on right hand for an example, see example 8,  
 group2(sentence 5)                      group9(sentence 5)



Example: 8

Starting from the end of measure 27, Ligeti introduced the chords motif in texture. Although the texture is not like previous four quavers' motif anymore, the highest line of the successive chords still applied the figuration motives based on their rhythmic grouping. For example, the highest line of the chords in measure 28 applied the wave motif and turn motif. See example 9,

Wave motif                      Turn motif



Example: 9

The turn, wave and zigzag motives are the main patterns in the development of horizontal lines. The sound effects of turn and wave motives are steadier and more introverted, while the zigzag motives are vibrating and aggressive. These motives and their variants are organized together to shape the lines. When these motives are incorporated with different combinations, the sound effects are splendidous. Taking the first sentence to the third sentence on right hand for an example, Ligeti employed a large number of the turn motives and wave motives which make the lines flowing smoothly. Starting from the fourth sentence and especially in the fifth sentence on right hand, Ligeti integrated the zigzag motif into the sentence which immediately makes the lines unstable. The contrasts brought by different motives make music more energetic.

## Harmony

The horizontal and vertical relationship is always a crucial aspect in composition. In this etude, two voice complexes are vertically embedded with each other and sounded in unison. How would the harmony progress under this design?

In general, the rich harmony is distributed from simple to complex and from less to more across the whole piece. The harmonic rhythm is fast and steady. Though many passages are rooted in the same harmony, Ligeti applied different inversions of harmony and putted pitches in unequal positions. These adjustments made the interval relationship vary all the time which also changed the colors of each sonority. This special treatment of harmony is to satisfy the music construction in horizontal, such as the given pitch material from tone series and figuration motifs. As a result, the sonority is varying constantly under this design. The following paragraphs will take sentences on right hand as examples to analyze the harmonic activities.

### **Harmonic analysis of 10 sentences on the right hand. (The length of the sentence is measured by quavers, rests are not included)**

From the first sentence to the third, the composer used very rich harmony, including different kinds of triads, different kinds of seventh chord, parts from diatonic scale, parts from pentatonic scale and some unusual pitch class sets. Based on this foundation, the composer particularly stressed the pitch class set [0,2,6] which has strong major third and whole tone quality. For example, [0,2,6] appeared 13 times in the first sentence (length of 18 quavers), appeared 11 times in the second sentence (length of 34 quavers), appeared 14 times in the third sentence (length of 42 quavers).

Starting from the fourth sentence (length of 48 quavers), we could see more diversified quality of the harmony, their ratio changed as well. For example, [0,2,6] appeared only 7 times, different kinds of triads increased to 11 times, seventh chords increased to 8 times while [0,2,5] increased to 5 times.

The fifth sentence (length of 80 quavers) is quite sectional in terms of harmony. Each section is dominated by certain kind of harmonic quality. We could divide this sentence into three sections (23+24+33). In the first section, [0, 2, 7] and [0, 2, 5, 7] are dominating (each appeared 9 times and 10 times). The middle section has a transitional function, dominated by [0, 3] and [0, 4] (each appeared 12 times). The last section is of 33 quavers' length, dominated by different kinds of triads (appeared 22 times).

The sixth sentence's (length of 66 quavers) harmony goes back to diversified. [0, 2, 6] appeared at most (12 times), seventh chords increased to 9 times, triads decreased to 6 times. At the same time, the other pitch class sets take their positions, [0, 2, 7] appeared 6 times, [0, 2, 5, 7] decreased slightly to 5 times, parts of diatonic scale appeared 5 times.

The seventh sentence (length of 85 quavers) maintains the diversity. Different kinds of seventh chords increased drastically to 20 times, triads increased to 11 times. When the sentence went to 2/3 point, [0, 1, 6] was newly introduced and appeared 10 times in the whole sentence. This new harmony is built on semitone and fourth., it foreshadows the appearing of block chords. What other sets that come along are [0, 2, 5](appeared 7 times), [0, 1, 5](5 times), parts of diatonic scale (5 times).

The harmony of the eighth, ninth and tenth sentences changed quite a lot, because the texture of one layer changed. What was broken chords became block chords. As the motives of the chords changed to different patterns, the synchronized embedded texture ended. The length of the block chords are double or triple times of a quaver. Ligeti is very sophisticated this kind of rhythmic design. He let one layer flowing in steady even rhythm while let the block chord layer become irregular and wild. The harmony then would be inevitably influenced by the changing of rhythmic pattern. The interval of fourths are overlaid on each other and stressed, however they are actually the transposition of [0, 1, 6] which appeared in the seventh sentence. As more and more notes from this pitch class set adding in, the sonority became more and more complicated. See example 10,

(3+2+2+2)+(3+2+2)

28 *cresc. molto* *non arp.* *sempre fffff*

(m.s.: 16/8) (sempre fffff)

Example: 10 (measure 28-29)

Taking the first three quavers of measure 29 for example, the chord on the right hand was [0, 1, 3, 5, 7]. As we add each quaver of the left hand, the harmony became consecutive [0, 1, 2, 3, 5, 7, 9], [0, 1, 3, 5, 7, 8], [0, 2, 3, 5, 7, 9]. This kind of intensive harmony has never appeared in this piece before.

As the piece develop to the second half of the tenth sentence, that is from measure 39 till the end of the piece (length of 76 quavers), the texture came back the embedded type, and the harmony became simple again. What appeared in the first seven sentences came back again. For examples, parts from diatonic scale appeared 6 times, seventh chords 4 times, triads 4 times, important pitch class sets like [0, 2, 6], [0, 1, 6], [0, 2, 5], [0, 2, 5, 7] reappeared together with the pentatonic set [0, 2, 4, 7] and some other short sets. The harmony of the ending measure 43 reduced to the repetition of semitones (see example 11) and then disappeared, imitating the sculpture ascending to the sky.

15 43

(forza estrema al fine)

15

\*\*)

时长约1分41秒

Example: 11 (measure 43)

As we could see, although the pitch materials and the contours of the outer voices are limited, the composer still planned rich and intensive harmony for this piece, thus keeping a thick and dense sonority while running in a fast tempo. We could feel the sculpture's metal quality and column shape in this etude.

### **Epilogue**

This etude's sonority seems to be chaotic, but actually well and carefully conceived by the composer. Ligeti constructed the horizontal pitches and vertical harmony very cautiously while compacting all the materials into 10 phrases. The composer successfully brings the spirit of the sculpture "Columna infinita" into this etude. The thick embedded texture runs fast and forcefully, giving us primitive impression. The fluctuant voices and rich harmony come together to show us chaotic sonority. The motives changed gradually to give us the sense of repetition and moving at the same time. "Music is the flowing form of the sculpture." Ligeti's this etude is the best modern example for this motto.

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## DR. WEN YANAN'S CV



Wen Yanan, piano faculty in the school of music, Shanxi University, in the city of Taiyuan, Shanxi province, China.

Yanan started playing the piano since a child, and studied in the China Conservatory during 2006-2010 in Beijing where he got his Bachelor degree in piano. During 2010-2016, he went to the U.S. to continue his graduate study in the University of Kansas where he got the master degree and doctor degree major in piano performance. While at KU, he studied piano with professor Richard Reber and Jack Winerock. During that time, he was awarded a four-year's GTA scholarship and won some piano competitions.

Since working in the Shanxi University in 2016, Yanan has continued to be active as a recitalist and lecturer throughout China and abroad. He has strong interests in the 20<sup>th</sup> century piano music as well as the traditional repertoire. Most recently, he is working on a project of Ligeti's music and Chinese contemporary music.