COMPOSING ELECTROACOUSTIC MUSIC RELATING TO TRADITIONAL JAPANESE MUSIC

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CONTAINS

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Reference CD "Examples of traditional Japanese music"

Track 1 – 3. ***Noh Shakkyo*** (Ocora C559005 HM65)

Singer: N. Umewaka

Tr. 1. Noh flute introduction

Tr. 2. Noh singing. From the scene in which a pilgrim monk comes across a sacred stone bridge and inquires of a young boy nearby.

Tr. 3. The chorus and the final scene played by the Noh ensemble, including the Taiko. The Taiko takes on a sacred role.

Track 4 – 5. ***Bunraku (gidayu) Ichinotani futaba gunki*** (JVC VICG 5356)

Storyteller: Takemoto Tsudayu IV

Futozao: Takezawa Danshichi

Tr. 4. The scene describes a furious warrior (main role) and his wife who makes excuses for visiting the battlefield. All roles performed by a male storyteller.

Tr. 5. Battlefield description. The storytelling transforms between singing and intoning.

Track 6. ***Gagaku Shunnoden juha*** (Columbia COCF 7890)

Performance: Tokyo Gakusho (Instrumental ensemble)

Composition Folio

List 1: Works

1. *Steine, Stimme und Sterne* für Vokalensemble und elektronische Klänge

(2001-2002)

[Live electronic]

2. *Himorogi I* for satsuma-biwa and live electronics

(2002-2003)

[Live electronic]

3. *Himorogi II* for shakuhachi and live electronics

(2003)

[Live electronic]

4. *Summer Grasses*

(2004)

[6 channel acousmatic]

5. 東方へ！ (*Higashi-e!* (*Nach Osten!*)) for renaissance tenor recorder and live electronics

(2004-2005)

[Live electronic]

6. 風の道 (*Kaze no Michi* (*Wind Way*)) for shakuhachi and live electronics

(2005)

[Live electronic]

List 2: Details of submitted recordings

Stereo audio CD

1. *Steine, Stimme und Sterne* für Vokalensemble und elektronische Klänge

Duration: 7' 49".

Performance: Vocal Ensemble Moderne

Conductor: Christfried Brödel

Voice from computer: Victoria Brudal

* Live recording at State Opera House *Semperoper* Dresden on 16. 06. 02.

2. *Himorogi I* for satsuma-biwa and live electronics

Duration: 16' 38".

Satsuma-biwa: Kazuyuki Shiotaka

* Live recording at City University London on 20. 05. 03.

3. *Himorogi II* for shakuhachi and live electronics

Duration: 13' 09".

Shakuhachi: Ernst Gunnar "Jinmei" Linder

* Live recording at City University London on 20. 05. 03.

4. *Summer Grasses* (Stereo mix. Only for broadcast)

Duration: 11' 42".

5. 東方へ！ (*Higashi-e!* (*Nach Osten!*)) for renaissance tenor recorder and live electronics

Duration 9' 05".

Recorder: Ulrike Volkhardt

* Live recording at Folkwang Hochschule Essen on 12. 02. 05

6. 風の道 (*Kaze no Michi* (*Wind Way*)) for shakuhachi and live electronics

Duration ca. 16' 15".

Shakuhachi: Sachio Suginuma

* Live recording at City University London on 19. 04. 05.

CD-ROM

Summer Grasses

6 audio files (for concert performance)

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Declaration

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Abstract

Throughout the history of Japanese contemporary music composers have been exploring ways to merge Western-style art music and their original, traditional Japanese music. Although in the past compositions which applied expressions of traditional Japanese music to Western-style music were partly successful, ensembles of Western and Japanese instruments often resulted in a serious mismatch. The starting point of this paper is this experience of Japanese contemporary music. It insists that, while the cause is composers' ignorance of the difference in musical parameters between the two musics, those of electroacoustic music can be compatible with Japanese musical tradition in spite of its background in Western culture, because the most developed genre of Japanese music is timbre-dominant.

This research examines, from the viewpoint of electroacoustic composition, the musical parameters, acoustical structure and sound aesthetics of traditional Japanese music, and explores the compositional strategy of live electronics for these non-Western instruments, applying them to acousmatic composition.

Chapter 1. Introduction

1. 1 Background

In the process of modernisation in the late 19th century, Japan imported Western culture in order to 'civilise' pre-modern Japanese society so that it would be accepted as an equal by Western powers. The Japanese government took the initiative in this transformation and used the newly-established modern education system for the purpose of popularising Western culture. Music was no exception. Until then, Japanese people had not been familiar with Western instruments, melody or rhythm, and they were comfortable with Japanese music, which had different features from Western music[1]. This was changed by the promotion of Western music through the formal education system, by the government. The result was the creation of a "double-layered" music culture, with Western music on top of traditional Japanese music, with no mixing of the two. A century later, these two layers still remained separate and have often been the source of aesthetic problems for Japanese composers, who faced an apparently unbridgeable gap between the two.

In the 1980s, a potential tool in the form of digital technology, emerged to bridge the gap. Electroacoustic music, based on this technology, enabled composers to control acoustic factors in music more freely whereas in acoustic instrumental music, factors such as tuning, pitch and scale were still relatively inflexible. Furthermore, electroacoustic music and traditional Japanese music have similar characteristics. This makes it possible for composers to take elements of traditional Japanese music into electroacoustic music, leading to the possibility of creating a new context for its development in modern Japan.

In this thesis, the argument that the gap between Western music and traditional Japanese music can be bridged by electroacoustic music is tested. The first chapter describes the process of development of contemporary Japanese music and identifies

[1] Mainly 18-19th century western music which has clear measure, regular beat, melody and harmony.

problems which were caused by the transplantation of Western music into Japan in the modernisation drive. In the second chapter, a way to bring the expression of *noh* into the Western-style vocal ensemble with live electronics is explored as the first step. Then this chapter explores a compositional strategy for live electronics for Japanese instruments and examines practical issues revealed through the compositions *Himorogi I, Himorogi II* and *Kaze no Michi*. This chapter examines differences in musical values and musical parameters, notation and other issues such as programming and technology. The third chapter analyses the acoustic structure of traditional Japanese music and extracts the musical essence from it. It explores ways to apply this in a live electronic piece for a Western instrument, and also in acousmatic composition, which does not feature performers. Finally, it examines further possibilities of development of this area.

1.2 The development of Japanese contemporary music with respect to two kinds of approach to traditional Japanese music by composers of Western style music

Modern Japanese music education was started in 1872 just after the Meiji restoration (1868). Under the modernisation policy of the Meiji government, having a good knowledge of Western music was a qualification of the 'modernised' citizen whereas traditional music was regarded as undeveloped and old-fashioned. Pianos became a feature of music rooms in schools and only Western notation was used, and no Japanese instruments were employed.

This policy was continued after the Second World War. Furthermore a decline in traditional Japanese music rapidly followed the War because of the loss of self-confidence suffered by the Japanese when they were defeated. The distortion of this double-layered music culture reached a peak around 1970 when the first post-war generation who had been educated under the extremely westernised curriculum in music, began to work as school teachers, and private piano schools (named 'music

schools') reached the height of popularity among people in general[2]. At the same time, international conferences of non-Western music often took place[3] and Japanese musicologists and composers began to realise the value of their own music. Fumio Koizumi, a musicologist, regards this period as the peak of distortion between rapid modernisation and tradition in Japanese society.

> There are Japanese professional musicians of Western music who do not know about traditional Japanese music at all. What is more shocking is the fact that most school teachers of music have scarcely been given a lecture on Japanese music. (Koizumi, 1968: 106)

The accompaniment instruments employed for compulsory education of music were still piano, organ and guitar. As a result, all Japanese people received music education only through the tuning of equal temperament. This fact, as well as the commercial success of music schools which employed piano and organ for lessons, changed music culture in Japan. In the late 20th century, the musical sense of the Japanese was changed to equal temperament tuning. They felt that subtle expression with microtones or unstable pitch was only the result of detuning or inadequate training, and gained the illusion of Western music being originally their own music[4]. It was not only ordinary people but also musicologists who could not recognise the differences between microtones and sorted them out into approximate notes of equal temperament. Japanese composers were no exception. In fact, they were the most advanced in westernisation and were placed in the social status of 'well-educated citizens'.

As for compositional activities since the Meiji restoration, there had been a constant approach by the musicians of traditional Japanese music to apply musical

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[2] The production of pianos in Japan began around 1910, increased to 48,000/year in 1960, 273,000/year in 1970 and reached its peak at 336,000/year in 1974 (Hiyama, 1977: 173-175).

[3] e.g. International Folk Music Council held in London, 1952.

[4] In 2002 the Japanese government defined a new curriculum in music education. Learning Japanese instruments and music became compulsory in elementary and secondary schools. This may change the musical sense of the Japanese again in the future.

ideas taken from Western music. Michio Miyagi's *Aki no shirabe* (1919) in which he applied canon[5], *Tegoto* (1946) in which he used sonata, rondo, etc. are counted as examples of this movement. Successive generations of younger composers continued these experiments. As well as composing themselves, commissioning new pieces from Western-style composers became popular in the 1950s and the 1960s. This enthusiastic attitude of the musicians of traditional Japanese music produced a good atmosphere for experimentation by composers of Western-style music in the 1960s and the 1970s, who used the instruments and musical expression of traditional Japanese music in their Western-style music composition.

Apart from this movement on the part of traditional Japanese musicians to make good use of Western music, there were two major approaches adopted by Western-style composers to traditional Japanese music during the 130 years since the restoration. These were attempts to create an identity as Japanese composers. The first approach before the Second World War was quite simple. It involved composers borrowing melodies, modes, or rhythmic patterns, mostly from Japanese folk music, for Western-style compositions, usually for Western orchestras[6]. Melodies and rhythmic patterns derived from Japanese folk music were translated into approximate notes in Western notation, were interpreted as equally tempered and harmonised, and performed on Western instruments. This approach to composition was encouraged by several competitions, and a call for orchestral works by Nippon Hoso Kyokai (Japan Broadcasting Corporation) during the 1930s for which it was a condition to apply the melodies of Japanese folk music[7]. A number of orchestral pieces related to Japanese folk music were composed. However, this approach was almost forgotten as trite in the post-war period.

In the second approach, two events seem to have provoked composers' interest in traditional Japanese music. The first event was Toshiro Mayuzumi's symphony

[5] For example, the idea which the preceding melody is followed by other melodies was new.
[6] e.g. Meiro Sugawara's *Akashi-kaikyo* (1939) and Shukichi Mitsukuri's *Basho-kikoshu* (1937) for orchestra.
[7] Between 1936 and 1940 17 such orchestra pieces were premiered and broadcast (Ishida, 2005: 83).

Nirvana of 1957. This piece was conceived from the sound of a bell in a Buddhist temple. The strong male singing chorus in this piece reminded the audience of a Buddhist chant. It 'shocked' other composers and provoked them to reconsider their original musical culture.

The second event was John Cage's visit to Japan in 1962. After the transplantation of Western music, Japan had developed following the music mainstream in Europe, aiming to catch up with it. Japanese musicians of Western music believed almost unconditionally that European music (and that of the USA) was always 'ahead'. Since the Meiji restoration, music introduced from Europe was always 'new'. Harmony, counterpoint, contemporary orchestration techniques, atonality, twelve-tone music, etc. were introduced one after another, and were accepted as the most advanced ideas in music. Japanese composers tried to absorb and digest them all. They were perceived as symbols of modernisation and progress. However, what Cage brought was totally different. His ideas seemed to be nonsense and appeared to destroy music. His visit provoked mayhem. Kuniharu Akiyama, a critic of Japanese contemporary music, confessed:

> His music was quite disparate. It was not at all possible to understand it with our usual approach from the technical viewpoint of 'what's next?' (Akiyama, 1973: 210-211)

There was great confusion and disillusion with the progress of Western music revealed in Cage's music. What Cage thrust at them was the basic question "what is music?" But this question was almost taboo, something that Japanese composers never discussed. Indeed, it was the exact distortion which the Meiji government had caused. Here, another fact about the teaching of Western music in Japan should be noted. Shuji Isawa, the first director of The Music Study Committee[8] who played a vital role in music education in the early Meiji period advised the Minister of

[8] This is called *Ongaku Torishirabe Gakari* established in 1879 in order to research music generally and explore how national music and music in Japan should be developed. Isawa was the first director.

Education in 1879 on its establishment as follows:

> About the musicians who would create the new 'national music', although they should in principle be required to be advanced in both the music theory and practical technique, we have neither enough time nor talent to meet the unlimited world of music. Therefore, first of all we should concentrate on learning the practical technique of music. Regarding learning theory, it should be started many years later. (Isawa quoted in Dan, 1999: 191)

Unfortunately, this 'advice' was not superseded. Given that Western music was imported mainly from Germany, the music education system was copied from there, as well. Musical colleges which emulated the system of *Musikhochschule* were established, but musicology courses at universities were almost ignored.

> In European countries it is quite normal that musicology courses, music theory courses, or philosophical courses such as music aesthetics are established in universities, but in Japan there are no such courses in universities whereas musical colleges teach only practical technique. (Takeuchi, 1996: 128)

This background, together with the fact that the concept of what music education is was barely introduced, convinced Japanese musicians that music is not for studying, but for rote learning and practice, and they did not even have an opportunity to question the definition of 'music'. Music was not discussed. They would never suppose that the definition of 'music', which was given 'as it was', could be questioned. They were puzzled to face what Cage showed as 'new', because it was rather a traditional expression or idea in Japan which Japanese composers of Western music disregarded and had discarded as out-dated or 'not their music'.

Thus, for Japanese composers, to face Cage's music meant exploring their own way in contemporary music. It seemed, however, quite risky to cope with. After Cage's visit, an inclination towards conservatism or conventionalism prevailed. Some composers adhered to the twelve-tone, or music-series technique, ignoring

Cage. Some began to study Japanese instruments which they had never touched, or sought their roots in Japanese lyricism, such as *wabi, sabi*[9]. Another attitude also began to appear among the younger generation, such as Takemitsu, Ichiyanagi and others. They regarded Japanese instruments as sound materials for their Western-style concept of music. Akiyama has analysed the difference between these composers' ideas and the existing approach as follows:

> The recent approach to Japanese instruments by new composers is not like that of nationalist music, but a free way as if they are refinding the charm which Japanese instruments have kept secret and which we have totally forgotten about..... It came into existence beyond the contrast of Western and Japanese. Contemporary music after The Second World War decomposed the expressive concept based on equal temperament, passed through twelve tone music which regards all tones as impartial, and already started the new concept which regards all kinds of tones as capable of being treated as 'musical structure'. (Akiyama, 1973: 229)[10]

Another critic, Akimichi Takeda, was rather skeptical. He questioned whether, if composers use Japanese instruments only as sound materials, parametrically separating them from their traditional means of expression or idiom, there was any meaning to using them[11].

However, this attitude to composition is likely to become a new tradition. An article about the 'competition of composition for Japanese instruments' by the new National Theatre (Tokyo) in 1998 reported on the sterility of creativity, criticising that more than half the pieces competing for the prize were written in the style of 'traditional' contemporary music which treated tones in a fragmented way and that there were scarcely any original ideas.

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[9] *Wabi* is translated as 'taste for the simple and sombre'. *Sabi* is translated as 'tranquility' or 'serenity' (Luminous Japanese-English dictionary, Kenkyusha, 2001). However, as there are no English terms with such an approximate definition these are difficult terms to translate.

[10] 'Musical structure' may imply *Tonordnung*. (Stockhausen, 1969: 17-23.)

[11] Takeda, 1980: 116. This book is a collection of his articles written for *Ongaku Geijutsu* during 1966-1980.

> If the 67 pieces that did not pass through to the second stage were written in a similar way, the future would be grey (it is unlikely that something new is created from the encounter of Japanese and Western music) (Narabe, 1998: 39).

1.3 The problem of combining these two types of music

This section discusses problems such as tuning, pitch and volume which are revealed when Japanese composers of contemporary music use instruments from an altogether different music culture. The purpose is to demonstrate the futility of using such instruments without any specific compositional idea being applied to them, and to imply, paradoxically, the possibilities opened up by electroacoustic music, which is quite flexible in the treatment of the musical parameters mentioned.

Western music is basically strict in tuning and pitch. In instrumental expression, a clean and stable tone has traditionally been the ideal until *avant-garde* experiments broke with this. On the other hand, Japanese instruments were developed to play unstable, 'unclean' tones. These groups of instruments obviously have different aesthetics, and their timbre cannot be modified so that they can achieve a better blend or balance. Western instruments can play 'virtuoso', fast, brilliant passages, whereas most Japanese instruments have not been developed to play in this manner. In a piece composed for such instruments to play together, such as piano and shakuhachi, the shakuhachi will play in an unstable fashion with microtones or with subtle *portamenti*, or *muraiki* (noise expression) whereas the piano plays virtuoso passages in equal temperament. The piano will probably require the shakuhachi to adjust into rough equal temperament tuning, as it cannot play microtones or subtle movements in pitch. However, if it appears out of character to require the piano to adjust its tuning to microtones, it should also be ridiculous for the shakuhachi to adjust to equal temperament tuning.

In the case of an ensemble of a biwa and a violin another problem arises. While the violin was developed to play in a large reverberant space, the biwa was not, and so it is impossible to play them together with a good balance of sound intensity. In *November Steps* by Takemitsu when the orchestra begins to play *pizzicato*, the biwa seems to produce only plucking noises, because the decay, its most important expression, is obstructed by the orchestral sound[12]. Takemitsu intended this piece as a double concerto for shakuhachi and biwa, creating a contrast between Western orchestral instruments and Japanese instruments. However, without amplification it is almost impossible for them to balance well with the orchestra as the biwa's sound appears vivid only to an audience listening to it from a short distance away. The sound of the biwa cannot reach the audience further away[13]. There exists a poor balance even between the two Japanese instruments, because the shakuhachi was developed to be played outside whereas the biwa was developed to be played in a small room of a wooden and paper-made Japanese house. Thus, this piece does not contrast two musical worlds. Instead, three isolated parts compete with each other from beginning to end.

Numerous pieces were composed as part of this second approach to traditional Japanese music. These pieces could be classified into three types:

- compositions in which the idiom of Japanese instruments is applied to Western instruments to enlarge their expression[14];
- compositions in which Japanese instruments are put into a Western music context such as in 'parametric composition' [15];

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[12] e.g. Bar 25-28 on the score of *November Steps*.

[13] This point has been remarked upon by biwa players. Some players use their original larger size biwas for contemporary music today. Traditional instruments are changing as a result of the significant change of the acoustic environment in Japan.

[14] e.g. Kazuo Fukushima's *Mei* for solo flute, 1962.

[15] e.g. Mareo Ishiketa's *Mokushi for solo koto*, 1972, and Yoshiro Irino's *Music for two kotos*, 1957.

- compositions that create ensembles of Japanese instruments and Western instruments together[16].

Most pieces of the second and the third types[17] revealed a great mismatch of timbral aesthetics and tuning which remained an unresolved issue. What they expected of Japanese instruments was only to use them as new sound material which they could treat in a parametric way or for twelve-tone composition. The problem with this attitude was that it did not address the deep relation between tuning and timbre of instruments and musical context. Not every tone is impartial in Japanese instruments and to treat them equally in a parametrical (e.g. serial) way like Western modern instruments is not only impossible, but also unmusical[18]. Even in such parametric compositions Japanese instruments do not feature strongly[19]. There is research which proves how closely the timbre of instruments and music itself are related. Andreas Gutzwiller and Gerald Bennett (Gutzwiller and Bennett, 1991), who investigated the timbre of the shakuhachi, reported how this instrument should be 'musically' sampled. According to them, Western instruments reach a plateau several hundred milliseconds after the attack or rising of tone, but the shakuhachi never becomes stable. This complex sound is exactly what the shakuhachi players aim to achieve *ichion jobutsu* [to become Buddha in a single tone], meaning to attain enlightenment. They analysed the timbre of the shakuhachi based on their unique observation named 'tone cell', which is a basic unit of shakuhachi music. They

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[16] e.g. Masanori Fujita's *Van Allen* for koto and marimba, 1978, and Toshi Ichiyanagi's *Music for living process* for shakuhachi, harp, percussion, electric violin and piano, 1973.

[17] There are many pieces which have not been reissued after the change from LP to CD. Obtaining sources nowadays is very difficult, but Tokyo Bunka Kaikan Library has a good collection.

[18] The composer Shin'ichiro Ikebe confessed that he made a great effort to regard traditional Japanese instruments as sounding objects in the same way as other instruments such as Western and ethnic instruments, but it was not easy (Ikebe, 1974: 34-42).

[19] The critic Kazushi Ishida in his report of the "Tradition and *avant-garde*" World Concert Tour sponsored by the Japan Foundation, that in the concert originally planned, *avant-garde* music was overwhelmed by traditional Japanese music (Ishida, 1974: 85-86).

pointed out that to cut out tones of the shakuhachi and make a sample using a Western unit of music is illogical as its music is not structured in such a way.

In the examination of biwa single tones, a close complementary relation between the timbre of the biwa and vocal sound was observed. The spectrum of the biwa sound showed that the frequency ranges in which energy is concentrated never overlapped with the main vocal formants. Also, a dramatic descent of about an eighth tone just after the attack, and a complicated change of order of the partial tone strength were observed in a biwa plucked sound. In terms of the relation between timbre and tuning, William Sethares analysed the spectra of *Gamelan* percussion instruments and the intervals of the Pelog and the Slendro scales, and reported as follows:

> The nonharmonic spectra of certain instruments of the gamelan are related to the unusual intervals of the pelog and slendro scales in much the same way that the harmonic spectra of instruments in the Western tradition is related to the Western diatonic scale (Sethares, 1998: 165).

And also,

> The slendro scale can be viewed as a result of the spectrum of the bonang in combination with a harmonic sound, while the pelog scale can be (slightly less surely) viewed as resulting from a combination of the spectrum of the saron and a harmonic sound. Thus, gamelan scales exploit the unique features of the spectra of the nonharmonic instruments of which they are composed, yet retain a basic compatibility with harmonic sounds like the voice (Sethares, 1998: 187).

Another example which indicates the cause of mismatch is the relation between sound and timing. An interview with shakuhachi master Ernst Gunnar Linder carried out for this research, revealed the enormous elasticity in 'counting time', which has a close relation with timbre[20].

[20] Interview 14th March 2003, Tokyo, about the notation and counting in Shakuhachi solo music.

Thus, the strange mismatch or lack of balance and unnatural impression of a number of the pieces composed using this second experimental approach (such as Takemitsu's *November Steps*) are caused by the composers' insensitivity to the characteristics and effects of such musical factors. If composers have no ideas for new contexts to relate the properties which belong to totally different music worlds, they will not be able to create an effective contrast. It is impossible to create well-organised music when composers do not know about the characteristics of the medium which they intend to use. The piece would only be likely to show a lack of coherence. They must find the common elements between the two music worlds.

1.4 The characteristics of traditional Japanese music

Although *noh, biwa* music and *shomyo* [Buddhist chant] are nowadays recognised as music, Isawa (see 1.1) believed that there were only two kinds of Japanese music.

> In Japan there are two kinds of music, namely, *gagaku* [court music] and *zokkyoku* [secular music]. The former is too advanced in its musical structure for common people to learn and the latter has a vulgar character. (Isawa quoted in Ishii and Shiobara, 2001: 4).

This section discusses the definition of 'music' and the characteristics of traditional Japanese music and instruments in order to find out the reason for Isawa's misunderstanding, which is the cause of the tangled situation in Japanese music today and the mismatching in the second experimental period.

Eishi Kikkawa, a musicologist, has reported that there was no Japanese term which had the approximate definition of European 'music' until the introduction of Western music in the Meiji period (Kikkawa, 1980). The translation of the word 'music', *ongaku*, which the Japanese use nowadays with the same definition as

European 'music', originally meant only instrumental music imported from ancient China and Korea[21] until around the 7th century, or the music that simulated this style. As the Japanese did not have any indigenous instrumental music the vocal/instrumental music classification almost coincided with the Japanese/imported music classification. Although the Meiji government applied this term to name 'the new national music', gradually it came to mean only imported music again, this time Western music, and Japanese music slipped away from the frame of definition.

Nowadays, there are newer classifications within traditional Japanese music such as the theatre/non-theatre classification, or the one based on instruments such as shamisen music, or biwa music. However, here a compositional classification can be suggested by the author. From this viewpoint traditional Japanese music (in this case folk music is included) could be classified in three groups. Firstly, there is a kind of music such as folk music which is constructed of simple melodies or rhythmic patterns. In other words, it is melody-dominant or rhythm-dominant music. Another kind is the music which is strictly sophisticated in timbre, resonance and *ma*[22]. We could call this timbre-dominant music. The third kind of music is imported music called *gagaku,* which has a clear music theory and structure, and a concept of chord. It is played with absolute pitch like Western music. There is also music which does not fall within any of these three classes but still the classification is useful for grouping Japanese instruments with similar characteristics. Knowing the characteristics of traditional Japanese music is also helpful. Kikkawa has pointed out four tendencies: single tone-dominant, resonance-dominant, noise-dominant and vocal-dominant, and concludes that they are based on an attitude of respecting nature

[21] Originally these had text but because of language difference this was subsequently omitted.
[22] *Ma* is one of the most difficult terms to translate because the appropriate word does not exist in English. Some dictionaries define it as 'interval', 'short pause', 'timing' and 'time'. William Malm translated *ma* as 'space between events' (Malm, 1986: 42). This seems a closer translation, but the 'interval' and 'space' in English sound rather practical and physical whereas *ma* implies psychological effect or influences as well as practical interval or space between things or events that exist.

(namely, through *shintoism* and *zen*)[23].

A term for Japanese vocal music certainly exists. *Utamai* is the word and it originally meant song and dance. If this word is used, then the term *ongaku* cannot be used. Rather, the word *mononone* which originally meant sound, is used as its pairing. These words indicate the basic Japanese musical distinction, which is:

- music which is played using the human body directly - *utamai* (song and dance)
- music which is not uttered from the body directly - *mononone* (sound and instrumental sound in the narrow sense)

Japanese composition must be investigated in order to explain why two kinds of music were distinguished so strictly. As for the term 'composition', it is called *fushi-tsuke* or *te-tsuke* in traditional Japanese music. *Fushi* means 'melody' and *te* means 'instrument' (or sometimes the playing of instruments). The word *tsuke*, which means 'add', implies that there is an object to be added. In the case of *fushi-tsuke* the object is text, so it means 'add melody to a text'[24]. The second method of composition, *te-tsuke*, means 'accompany' and what is accompanied is vocal. The term 'melody' already has a certain image of western music, but the idea of *fushi-tsuke*, 'add melody', does not mean the same as 'melody' composition but rather 'intone' especially in story-telling music.

Texts are the core of music as the musical structure is subordinated to the literary structure. Therefore, 'composition' in the sense of 'to compose music' has not existed in traditional Japanese music as it is not 'composed' in the manner of Western music.

Not only the definition of music, but also the concept of composition was quite

[23] Kikkawa, 1979: 189-222.
[24] These terms are specifically used in vocal music.

new for the Japanese after the Meiji period. This point has been a major issue among composers in Japanese contemporary music. Since Japanese instruments have been developed at the top of the vocal and literary context, when Japanese composers have tried to create a new instrumental music getting rid of texts, there has been no structural heritage to support it. Some composers of the older generation made good use of the structure of *noh* or *gagaku*. However, as a result of abandoning original Japanese music, for most composers in the second half of the 20th century, *noh* and *gagaku* were 'not their music' any more. This seems to be the reason why they had to start their compositions based on the concepts of Western music.

Also, there is the difficulty of notation for complex sounds and expression of instruments or voices as they are too 'unstable' for precise notation. Written notes are neither actual music, nor actual sound. In traditional Japanese music, a particular singing method is used for teaching instruments. Notation is used just to suggest how it should be played. What is notated depends on the kind of music or instrument and almost every kind of music and instrument has its own notation. This may be because what is regarded as important is different depending on the instrument, but what is common is that these notations do not indicate exact pitch or duration themselves, but fingering or movement of phrases. They work as 'loose frames' for the music. The music has been passed from mouth to mouth, and hand to hand as a living thing. This seems to be another reason why there were no professional composers. In the Japanese tradition, music means live performance, and a creator is equal to a player.

Regarding the attitude of listening to music, Nomura has pointed out that the Japanese tend to listen to nature sounds as 'nature music', listened to in the same way as the music created by humans (Nomura, 1995). This attitude can be summarised in three points (Kikkawa, 1980; Takeuchi, 1996; The Acoustical Society of Japan, 1997):

- listening to nature sounds such as the wind, rain, or sea as music and sometimes as an ensemble of nature sounds and sounds performed by humans. It seems that they did not think it important whether the sound was played by a human or occurred in nature;
- enjoying listening to insects' chirping or frogs' croaking as music. The Japanese also enjoy bird song, but birds such as the cuckoo were preferred to 'good singers' such as the canary;
- creating devices to make noises in order to enjoy them using natural energy such as wind or water.

These tendencies seem to be fundamental to the Japanese definition of music which shows a different concept compared with the European definition. Through this observation, and also from the term *mononone*, which originally meant 'sound', it can be inferred that the traditional (pre-Meiji) Japanese had a custom of listening to environmental sounds and instrumental music almost in the same way, and enjoyed how they sounded at every moment. In other words, they did not find (or try to find) any structural meanings in a certain 'cut out' time, even if it was instrumental music. Before the Meiji period, this attitude was closely combined with a respect for nature. What exists in nature is considered the best creation.

However, what should be remarked on is how this attitude is revealed in Japanese 'computer music'[25]. Although this is developed from pop music, 'techno' and free jazz, its attitude to music seems exactly the same as that observed above.

> They want to work directly for the ear, not for the hidden processes of sound creation. In this light, they enjoy rediscovering and listening to the Western classics of *musique concrète* and electronic music of the 1950s and 1960s, giving birth to a listening movement entitled '*onkyo-ha*' ('fans of the acoustic movement', in an approximate translation)" (Loubet, 2000: 19-32).

[25] Japan's "classical" electroacoustic music is a frail and a small enclave.

They pick up and sample 'little morsels of reusable acoustic objects here and there' for their *collage*. Loubet goes on to say that they are 'influenced' by Stockhausen, or other composers of early electronic music. They are not specifically educated in music and create their sound world relying on their sense of hearing. They listen to electronic music such as Stockhausen as an acoustic phenomenon without learning its compositional ideas or plans, the same as their ancestors in listening to environmental sound.

Although it cannot be regarded as 'art' music, this trend in the 1990s appears quite curious when we think about the fact that electronic music in the 1950s and 1960s almost failed to take root among composers and the audience in Japanese contemporary music, and electroacoustic music has almost no history in Japan.

Thus, traditional Japanese music was developed mostly in sound. The complexity in timbre was exactly what it pursued. The four tendencies mentioned by Kikkawa can be summarised with the word 'timbre'. Shakuhachi players pursue complex and unstable timbre. Stability, or regularity of repetition such as vibrato with a regular cycle is avoided as it is too simple. In vocal music too, such as in *noh* music, the ideal voice is an old man's hoarse voice. A clear brilliant tenor is considered undesirable. A good example of pursuing timbral complexity is a noise device called *sawari,* which is attached to plucked instruments such as the shamisen or the biwa. This device is not attached to the gaku-biwa, is used in *gagaku*, which is imported music from China. While the frets of the gaku-biwa are thin and delicate, and are attached around the short neck, the frets on the satsuma-biwa are thick and awkward, and are placed at long distances from each other on its long neck. This means that the frets of the gaku-biwa are constructed to play exact pitch and those of the satsuma-biwa are not. In fact, the thickness of frets was determined for the deliberate creation of noise (*sawari*). According to biwa players, if a player wishes to be a professional, he must master adjusting the *sawari* noise in the right way and as it

is extremely delicate and difficult to adjust, amateur players cannot do it by themselves. A biwa maker explains the noise device of the chikuzen-biwa, another kind of biwa which also has a *sawari* device as follows:

> The side of the fret towards the body of the instrument is to create noise in the first half of resonance while the side of fret towards the head is to create noise in the second half. One scrub with a piece of glass has a crucial influence on noise (Ando, 1979: 140).

According to the biwa player Shiotaka, *sawari* noise that goes on too long is also not good. Biwa players seem to have a certain ideal for the length of resonance as well as the timbre and this is related to the sense of *ma*[26].

To observe the relationship between the length of resonance and *ma*, we need to note that, according to Backus, the optimum reverberation time for auditoriums, if they are music halls, is from about 1.5 to 2.0 seconds.

> Too much absorption will make it impossible for musicians to obtain a satisfactory sound intensity and so this condition must be avoided; the hall will be too 'dead'.

Also,

> The shorter the reverberation time in an auditorium the greater the absorption, and the lower the sound intensity that a given source can produce (Backus, 1977: 170-171).

From this point of view it can be observed that acoustic circumstances in traditional Japanese houses are not adequate for Western musicians. The reverberation in these traditional houses is extremely short as they are made of wood and paper with few walls and floors covered with rush mats. Such materials work as

[26] Interview on 8th February 2002, Tokyo.

absorption materials.

Another reason for short reverberation is the climate. Japan is in what is called the subtropical zone or Asian monsoon area where there is high precipitation. Many reports have been made by musicians about how this climate affects the sound of their instruments. Most musicians describe the effect literally as sound being heavy, unclear and 'dead' in Japan whereas it is light, clear and 'live' in Europe. (However, recent 'progress' in architecture has resulted in a great change in the condition of Japanese houses.) The acoustic condition of Japanese music means that sounds die away extremely quickly. Very shortly after a musician stops playing, the sound of the music stops.

The length of resonance of the instrument must influence the *ma* of biwa music as short resonance makes the music sound fragmented and makes playing unmusical, while resonance that is too long disturbs the vocal part. Biwa musicians concentrate on timbral complexity in order to obtain 'density' of sound, as a substitute for sound intensity, and a long decay instead of relying on the reverberation of rooms.

1.5 Comparison between Western conventional music, Japanese traditional music and electroacoutic music

The comparison between Western conventional 'art' music and traditional Japanese music shows clearly that there exist some unbridgeable sonic factors.

Western conventional music	sonic factors	traditional Japanese music
uniform	timbre	non-uniform
strict/fixed	pitch	loose/flexible/unstable
avoid/minimised	noise	very important
important/developed	structure	expression
supposed relatively long and rich	reverberation	not 'composed' /loose cannot be expected

Electroacoustic music has developed from acoustic factors which discard melody-dominant or metre-rhythm-dominant characteristics. For instance, Pierre Schaeffer classified the sound materials in *Symphonie pour un homme seul* (Symphony for a Man Alone), as follows:

- Human sounds (various aspects of breathing, vocal fragments, shouting, humming, whistled tunes)
- Non-human sounds (footsteps, knocking on doors, percussion, prepared piano, orchestral instruments) (Manning, 2002: 25)

In his composition musical sound does not mean only the use of instrumental or vocal sounds any more. Music includes noises as much as other conventional sound materials. A comparison of these classifications and those of pre-westernised Japan mentioned above, indicates similarities that are not found between the latter and conventional Western music.

Timbre-dominant music in the genres of traditional Japanese music possesses musical parameters compatible with electroacoustic music. It is quite strict with regard to timbral factors but lenient in pitch or melody, and basically non-metric or quite free from pulse. Noise or unpitched sounds are the most important musical elements. Every moment of a timbral event and its consequences, from the attack to the end of resonance in a single-tone, is important. This sense of listening is quite similar to that for electroacoustic composition.

The electroacoustic composer Wilfried Jentzsch considers that the process of working in electroacoustic composition has two main stages. According to him, the first stage, the micro-composition stage, is a fine process with original sound material (including recording and acoustic analysis) to create material sounds to be used in the subsequent stage. The second stage is structural composition with a space component. How to relate these two stages closely, naturally and musically is the most important issue in the creation of a well-organised piece[26]. Applying this distinction, creating a single-tone in traditional Japanese music is quite similar to micro-composition.

Nowadays, the space of performance can be separated as a third stage, as composers are much more conscious about the acoustical factors in an auditorium.

[26] Lectures at *Musikhochschule*, Dresden, 1998-2000.

1st stage	2nd stage	3rd stage
Internal elements	Structure / form , etc	Acoustical factors in auditorium
W C M Single tone is basically considered as a stable element.	**Conventional composition with acoustic instruments. The organisation of a piece is very important. Notation prescriptive of performance.**	'Live'/acoustic environment of auditorium is expected.
E A M **Micro composition**	**Structuring through sound. Plan to organise a piece. Not (usually) notated.**	**Space composition**
T J M **The issue of creating a complex single tone. Fine nuances in timbre, pitch, and dynamics are important.**	Dominated by literal narrative structure (flexible metre/lenient constraints structure). Notation not prescriptive of performance.	Acoustically 'dead' space. Enjoyment of instrumental music with natural sounds.

Figure 1. 1: The comparison of the composition process between electroacoustic music, Western conventional music and traditional Japanese music.

Figure1.1 shows a rough image of the three stages of the composition process in electroacoustic music (EAM) compared with Western conventional music (WCM) and traditional Japanese music (timbre-dominant) (TJM). The emphasised stages (in bold) are much more developed or important in the music. Western conventional music and timbre-dominant traditional Japanese music have no points of contact with each other in their compositional processes. However in relating to electroacoustic music, TJM can have much in common as they both involve points of contact in

stages of composition. Western conventional music has been developed in the second stage on the assumption that musical elements notated with 5-line notation are stable whereas traditional Japanese music regards all musical elements as unstable.

Using Japanese instruments in electroacoustic pieces will not necessarily cause mismatching, which was a great problem in Japanese contemporary music within the context of parametric composition, as electroacoustic music does not regard the musical elements of Western conventional music as fixed units. Japanese instruments could be played in live electronic music with their own tuning and scales in which microtones are very much included. The difficulty of volume balance could be solved by amplification and it is also possible to develop the musical idea including the third stage of composition using reverberation, or more actively, space-composition.

Not only could there be a practical link, such as using Japanese instruments in performance, but it would also be possible to use their sound as material for acousmatic composition. In live electronic composition, concepts of traditional Japanese music could also be applied. In traditional Japanese music, players avoid adjusting the timing exactly to each other (heterophonic expression in time is preferred), regarding it as a simple and naive expression. Flexibility in metre is considered important as the sound is complex and unstable. The stiff sense of timing and metre in Western music could be exchanged for the idea of a lenient metric frame. The sense of *ma*, 'interval or space between events with psychological effect', could be applicable within live electronics as a way to achieve flexibility.

Traditional Japanese music cannot be written exactly because it is 'live'. 'Not paper composition but actual sound' is the basic attitude of electroacoustic composers, too. Music relating both types means not only a new style in electroacoustic music, but also a new genre in traditional Japanese music.

Chapter 2. Composition with live electronics in relation to traditional Japanese music

2.1 *Steine, Stimme und Sterne*: an application of the expression of *noh* music in the context of Western style music

This work was the result of a commission from the state of Saxony, Germany for a work for 16 voices and electronics.

As the first step the vocal expressions of *noh* music were extracted and applied to the choral part in the context of a Western style ensemble. They are:

- *portamento* which is heard in the *kakegoe* shout by the drum players;
- *vibrato* called *nabiki* which is heard in *noh* singing;
- *glottis* voice;
- rough sound heard in *tsuyogin,* strong-style singing.

Singers of traditional Western-style music are not able to duplicate these actual vocal productions and sounds. However, they are requested to use as similar a vocal production as possible.

2.1.1 Structure

The piece consists of two elements: voices and sounds of stones. There is also a contrast between vocal ensemble as real voices and the narration played back from the computer. 'Voice' and 'stone', the chosen materials, have totally different sound characteristics from each other.

The text for the voice is constructed in two parts. The first half is constructed from astronomic data derived from astronomical encyclopaedias. These data refer to two stars, Altair and Vega, which are, according to an old Japanese folktale, lovers

separated by the river of heaven. These astronomic data narrated through loudspeakers are later cut into syllables and spoken by the choir in random patterns. The second half of the text is part of an old Japanese poem. The vowels u, e, i, a and o, which are comprehended in the text are sung by the choir, at first individually, then combined with the consonants of the original words to make the whole sentence at the end. The pitches for the vocal parts are defined by the partials derived from analysis of the stone sound. These pitches appear at first as fragments, then as a chord, and eventually as a long heterophonic melody sung with expression based on Japanese *noh*-singing.

At the beginning the two elements produce a contrast between the clear and brilliant high-frequency sounds of stones and the voices. The stone sound is then gradually transformed 'nearer to the *noh* voice' being processed in various ways. The contrast at the end transfers to that between the voice (which keeps the same sound aesthetics) and the processed stone-sounds which have 'dirty' and dark characteristics. For this process vowels are used as data for formant filtering. The transformation reaches almost the crossing-over-point finally creating a complex morphing sound, 'stone-voice'. The text is as follows:

Altair...flying eagle. Aquila's brightest star
Magnitude 0.8 (nought point eight)
At the distance of thirteen light years
Vega...alpha-Lyre
Standard star from magnitude scale 0 (nought) point
Two meteor showers emanate from Lyre
In twelve thousand years Vega will become the Pole Star
Waretemo sueni awan tozo
(Although we are separated now, surely we can meet again in the future!)

2.1.2 Sound processing and the methods for performance

Throughout the composition of live electronic pieces in this research there was a conflict between preciseness of intended expression for pre-processed sounds and flexibility in performance. The extent to which the timbral expression of sounds can be defined and the extent to which the computer part can adjust to the instrumental part flexibly was often a problem. In this piece the pre-processed sounds were required to have precise timbral expression in detail as much as *noh* singing has.

However, as a fixed 'tape' accompanying a performance often leads to unmusical results, the idea of a 'sliding door structure' which is inspired by William Malm's observation on *noh* music (Malm, 1986: 42-43) was applied to the computer part. The pre-prepared sound files triggered by the operator[1] are programmed to start within a certain loose space of time, so that the musical timings can have a degree of flexibility.

2.2 The aesthetic background of Japanese art

Japanese art generally has three stages of expression, called 真 (*Shin*), 行(*Gyoh*), and 草 (*Soh*), which refer to the relationship between image and background. On the first level, *Shin*, the image, is the main entity to be expressed, whereas the background is there in order to set it off. On the second level, *Gyoh*, image and background have equal weight. In European terms pictures by M. C. Escher would be suitable examples of this level of expression. The entity which dominates, image or background, depends on the viewer. On the third level, *Soh*, the image is present but is not the main element. Thus we perceive confusion; the background assumes the main role while the image has the role of background. They have merely swapped identities. However, it should be noted that background cannot exist independently, except through the presence of image.

[1] Ideally the programme should be triggered by the conductor.

Most Japanese arts, such as *noh* and calligraphy, for example, pursue the third level as the ultimate form of expression. Where this occurs, images are simplified and highly concentrated. A singular and compact entity is portrayed in order to offset 'nothingness' or 'emptiness', namely, '*ma*' (Konparu, 1980: 78-81). Zeami, the great performer who heightened *noh* as an art form wrote in 1424 in his theory book *Kakyo,* for performance: 'the moment of doing nothing is interesting'. His words are often quoted as the spirit of *noh* (Zeami edited by Tanaka, 2002: 144).

Thus, Japanese arts have mainly to do with existence and nothingness or emptiness. When we compare both Japanese and Western forms of expression in art, and if we use the figure 'zero' to indicate nothingness as we would when registering an audio signal, the ratio of existence to nothingness would be as follows:

In Japanese art:

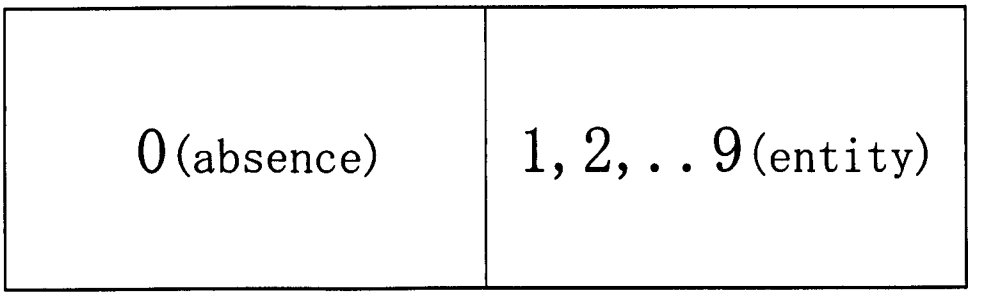

Figure 2.1: Entity and absence in Japanese art.

In Japanese art the ratio of absence (as zero) to existence (as positive numbers) remains constant. No matter what it consists of, existence is seen simply as 'existence'. What the Japanese are concerned with above all is not the relation between one existence and another, but that between existence and absence.

In Western art :

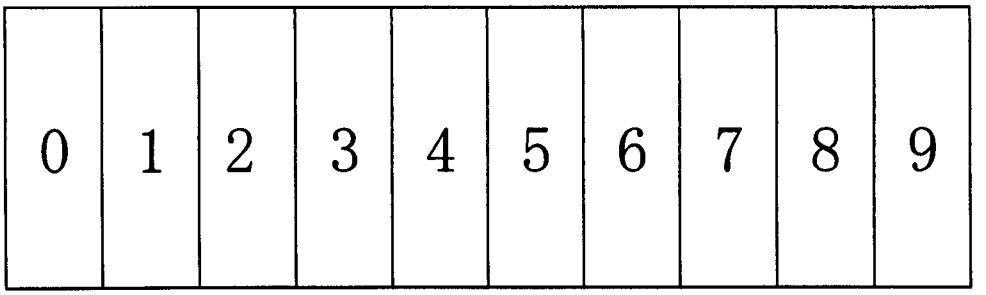

Figure 2.2: Entity and absence in Western art.

In Western art the most vital distinction is that between separate entities. How to structure entities is important. Zero is regarded as one entity amongst many, and is treated with the same weight as others.

2.3 The reason for choosing satsuma-biwa and shakuhachi for the compositions of *Himorogi I* and *II*

Through investigation of pieces of Japanese contemporary music which include Japanese instruments, the fact that most pieces are composed for koto, shakuhachi, or *gagaku* instruments such as sho is revealed. In other words, the history of more than a century of attempting to relate Japanese music to Western music has taken place, in fact, mostly using only several modified instruments. Since the koto is a kind of zither, it was westernised ('modernised') quickly by increasing the number of strings in order to make it possible to play semi tones and by exchanging the material of strings from silk to nylon, whereas the shakuhachi was modified by increasing the number of tone-holes from five to seven or more. (Ever since, both traditional and modified models have been used in both types of music. Musicians seem to make proper use of them depending on the piece.) Regarding *gagaku* instruments, the tuning was originally chromatic with absolute pitch and it should be

easier for composers to link these instruments with Western music. The process of modification of Japanese instruments suggests that to play chromatic scales with agility became necessary. In most pieces, instruments from both kinds of music were deliberately chosen so that the pieces include the instruments which are flexible in pitch, such as koto and violin, or shakuhachi and strings[2].

However, there are also combinations such as koto and organ, koto and orchestra, or shakuhachi and harp which seem clearly to suppose that Japanese instruments can adjust to Western tuning[3]. According to the compositional classification of traditional Japanese music mentioned in the first chapter, it becomes clear that the instruments above, apart from the shakuhachi, belong to melody-dominant music, or imported music, *gagaku.*

The attempt to use instruments belonging to the third category, timbre-dominant music, such as the biwa or the futozao (shamisen) is still barely seen. This fact suggests that they did not match with the context of Western contemporary composition and that composers could hardly find ideas to bridge the two musical worlds. However, the core of traditional Japanese music is the delicate expression of acoustic factors such as timbre, resonance and noise, which are mostly pursued in timbre-dominant music. Therefore, the most natural way to bridge the gap between traditional Japanese music and Western music is through timbre-dominant music and electroacoustic music. In the composition of *Himorogi I* and *II*, the possibility that Japanese instruments can appear vividly in the context of electroacoustic music was tested.

As to the shakuhachi, although this dexterous instrument nowadays has a large and various repertoire, only the *honkyoku*[4] pieces were focused on as they are essential to traditional shakuhachi music.

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[2] e.g. Maki Ishii's *Zansho no Toki* for koto and violin (1978), Ryohei Hirose's *Compositions for 3 shakuhachis, string quartet and percussion* (1964-69).

[3] Masao Homma's *Sokyohensei* for amplified koto and organ (1984), Makoto Shinohara's *Kyudo B* for shakuhachi and harp (1973), Joji Yuasa's *Kacho-fugetsu* for koto and orchestra (1967), Toshi Ichiyanagi's *origin* for koto and chamber orchestra (1989).

[4] Solo music of shakuhachi.

2.4 Composition of *Himorogi I* (satsuma-biwa and live electronics)

2.4.1 Instrumental characteristics, musical parameters and notation

With regard to the instrumental characteristics of the satsuma-biwa some remarkable points should be noted. Firstly, although it corresponds to a similar Western string instrument, the lute, there is no intention of playing melodies or chords. On the satsuma-biwa the frets stand out and the player pushes down between them to create certain pitches by stretching the string (refer to the picture of the biwa in the score of *Himorogi I*). Also, because of substantial stretching and plucking during normal playing, the instrument becomes detuned quite easily. As the interval by stretching reaches to almost a minor third from the original fret pitch at some positions, no basic scale exists. Actually, the biwa has neither a fixed tuning nor any definite scale. Even in decay the pitch is always changing, accompanied by timbral change.

Secondly, the five silk strings (the fourth and the fifth work as doubled strings) have different roles from each other, not in pitch but in timbral expression. Which string to play depends on the tone colour or expression required. For example, both the first and the second string are tuned to the same D on the Shiotaka model, but are used for different purposes. The first string has a thick heavy attack sound, whereas the second has not. The latter is, however, rich in timbral expression with its long decay, whereas the decay of the former is very short. As another example, the extreme timbral difference though the same pitch between the third string with fret 5 and the fourth string with fret 2 can be mentioned (page 5 in the score of *Himorogi I*). These could be swapped if composers minded only about pitch. However, from the aspect of timbre the former has a strong, intensive character, whereas the latter has a bright and open character, and one cannot substitute one for the other.

Thus, the important issues, when composing for this instrument are as follows: -

- composers cannot expect exact pitch. In other words, it is not suitable for melodic, harmonic, *music series* or other parametric composition in which exact pitches have an important role;
- timbre in decay always changes, but it is possible to suggest the approximate character of the timbre by notating the string-number and method of attack;
- fixing musical timing is not desirable, as biwa players usually decide musical timing, which contributes to *ma,* in response to timbral expression as it occurs from note to note. In other words, to set the musical timing in beat, measure, or duration causes a loss of musicality in performance;
- composers cannot expect movement with agility for the left hand, but there is plentiful scope for developing new techniques for the right hand with the plectrum.

On the other hand, the following can be defined:

- the position of the fret (this does not mean fixing pitch);
- articulation (e.g. up/down of plectrum, with/without plectrum attack, plucking with plectrum/finger, etc);
- dynamics (as the biwa has also a percussive character, its dynamic range is quite wide. It must also be noted that dynamics are closely related to the mode of attack);
- approximate pitch (relating to a position of fret and stretching called *shime*);
- string number (relating to timbral expression);
- timbral types which the player intends to be sounded.

The above observations highlight the contrast with Western musical structure. Faced with this, we could define a suitable notation for the biwa, taking into account the following constraints:

- the 5-line stave is not suitable, as its aim is to define the exact pitches to be sounded;
- tempo, metre and note values are not suitable, as they define the exact length or timing to be sounded.

These definitions for suitable notation suggest that the biwa tablature is a better choice than 5-line notation. However, when a new playing technique, expression, clear rhythm and timing are required, the following additional suggestions are helpful.

- approximate tempo, given by symbols such as those invented for this score;
- conventional symbols for dynamics are suitable, though adding some more steps between *ppp* to vanishing point of hearing;
- there is a need to invent new symbols for new techniques.

These factors can be added to biwa tablature notation.

2.4.2 Compositional Plan

Regarding the biwa as a solo instrument (not an accompaniment of vocal music), the role of the computer is designed to produce the surroundings of the biwa. This is intended to symbolise natural Japanese environmental sounds, past or historical facts such as that the biwa has been played mainly in Japanese houses, stereotypes such as the biwa as accompaniment instrument for story-telling, or a superstition that archaic things are possessed by spirits. The role of the computer is, therefore, not an extension of the instrument, nor an ensemble partner who exists in the same dimension as the instrument, to cooperate with it or defy it. The relation between them is rather similar to that between music and environmental sound for the Japanese in former times. For this reason the sound of cicadas which can be heard in

Japan during the summer was used in *Himorogi I.* In Japan this insect reminds people of close and hot summer days (or nights).

2.4.2.1 Structure

There are two main factors used to structure the biwa part. They are:

- what does the biwa play? (string/fret, etc.)
- how does the biwa play? (plucking/rubbing,etc.)

The first structural factor is derived from the spectrum of the lowest string of the biwa open D (actual pitch D#). As, unlike Western instruments, the biwa has a complex and unstable partial tone structure, the spectrum of the tone was analysed every 40 millisecond and the average of the strength in dB of each partial was calculated. As the biwa single tone has several formants in it, the partials form groups according to their strength of resonance. The partials up to the thirteenth in order of strength can be classified into four groups as shown below.

strong ----------weak resonance

Eb :	D	(Bb)	F	E	F++	C+	B	Ab	G	G++	F+	A
(absolute pitch)												
D :	**C#(A)**		**E**	**Eb**	**F+**	**B+**	**Bb**	**G**	**F#**	**G+**	**E+**	**G#**
(played note)												

Figure 2.3: Partial tone series derived from tone D (absolute pitch D#) of the first string of the satsuma-biwa. (A) can be inserted at any place in the order.
(+ quarter tone ++ three-quarter tone)

This series is applied to melodic elements in the piece, not to define exact

pitches but to 'suggest' intended pitches to play. For example, the partials appearing weakly in the spectrum constitute the tone groups A and B, and those appearing strongly constitute the tone group C1 and C2 (refer to the score of *Himorogi I* pp6-8)[5].

The second factor to structure the biwa part refers to several traditional biwa masterpieces. Japanese composers of Western contemporary music have not experimented with this and applied the biwa according to their own demands of originality in a Western style. However, this was not successful, since the biwa did not appear "iki-iki to"[6]. Because of this background, analysis of several traditional masterpieces was undertaken. Unlike *noh*, the structure of biwa traditional music has not been analysed. The reason seems to be that exsisting analytical methods were not suitable or that a method has not been developed. As the biwa is a timbre-dominant instrument its music should be analysed acoustically. In other words, only an acoustical-compositional analysis can clarify the structure of such timbre-dominant music. The following is the typical structure heard in biwa masterpieces.

- the music begins with a single tone, often with the open first string to let us listen to one of the most attractive decays of the instrument;
- then it presents a part made up of single tones to let us listen to various timbral expressions of decay;
- according to the progress of the text (traditional pieces are storytelling music with biwa as accompaniment), the biwa moves gradually or suddenly into technical expression. In traditional pieces this part is played as an accompaniment to warriors' battle scenes. The musical tension is heightened through the dramatic and declamatory style of the virtuoso player;

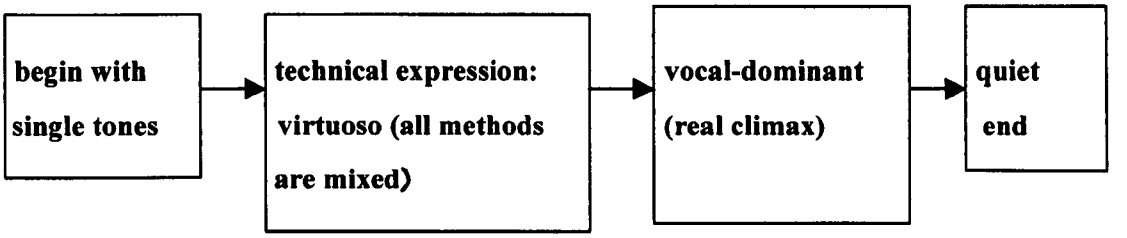
[5] Modifications considering the instability of actual biwa sound were made: in part A (page 6 of the score) G+ is included in G and G# and F+ of the first half group is notated as F and F#.
[6] An adequate translation of this term was not found in English. This term includes some meanings such as "impressively", "vividly", "flexibly", "free-willing" and "musical".

- after reaching a peak of tension, the music is led quickly into a solo vocal part with a sad and quiet tune accompanied by biwa single tones and extended techniques. This part is the real climax of a piece where players can show their rich vocal expression. However, since the text is Japanese and is sung quietly, and also usually this part occupies almost half of the piece, players have difficulty in keeping an audience who does not speak Japanese captivated[7].

Referring to this traditional structure, *Himorogi I* is an experiment to develop the latter more timbre-compositionally. Biwa masterpieces are composed not as an ensemble for voice and biwa, but as storytelling music in which the biwa is accompaniment. In other words, the music context and progression is dependent on the development of the story. Considering this, *Himorogi I* was structured to develop in its acoustic tension, and a variety of playing techniques was applied as musical values to support the progression. The piece begins with a single tone of open D as in traditional pieces, then this leads to a part made up of single tones with various timbral expressions and delicate nuances of decay. However, unlike traditional pieces, once it moves to technical expression, it does not go back to single tone expression (as technical expression can be considered here as 'many tone' expression). Technical playing is classified into note groups for the 'playing method' (refer to the score mark C2). As for the group D, invented playing methods are used. This part is designed as a contrast to the old ways of playing which symbolise the past. The music in *Himorogi I* develops further electro-acoustically as a substitute for the vocal story-telling. Morphing of the sounds of the biwa player's singing voice, biwa sound and cicadas was also used (refer to Figure 2.4).

[7] Interview with Shiotaka, 18.05.2003.

Typical structure of traditional biwa masterpiece



The structure of *Himorogi I*

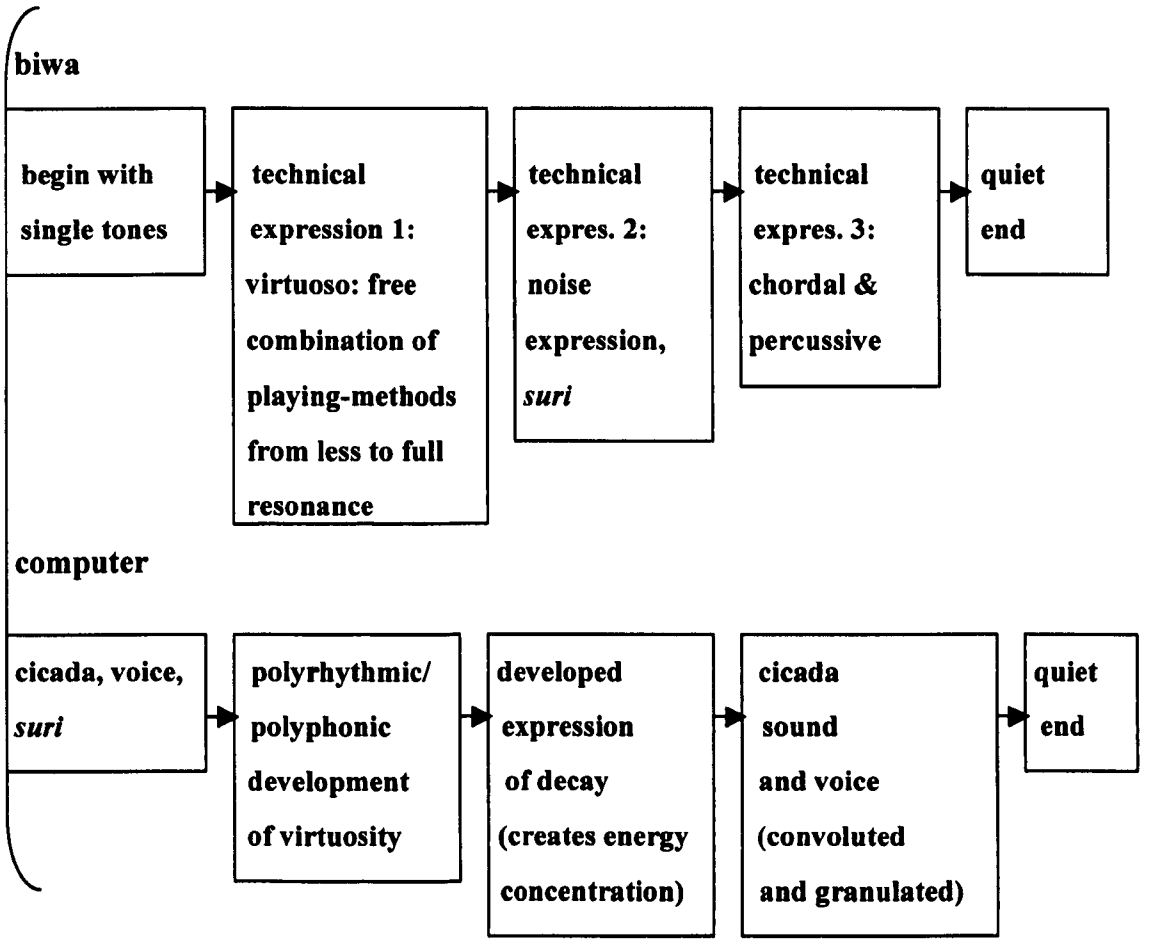


Figure 2.4: Comparison of structures of traditional biwa piece and *Himorogi I.*

2.4.2.2 Time and rhythm

Other factors such as pulse and metre do not exist. Instead of these, *ma* and technical expression are applied as musical values and the typical Japanese rhythm called *sutebyoshi*[8] is applied with variations. Tempo is quite elastic as it reflects every decay of the biwa. Figure 2.5.1 gives one of the typical patterns and Figure 2.5.2 is another example with increase of *vibrato* accompanied by *portamenti* and timbral changes. Figure 2.5.3 is a combination with *suri*[9]. Figure 2.5.4 is a very extended *sutebyoshi* which is also often seen in traditional Japanese music. Every pattern of *sutebyoshi* is impossible to decompose into smaller parts. An experiment with a multi-channel system is suggested to show the possibilities in polyphonic/polyrhythmic development through *ma* and *sutebyoshi*. Since each part is constituted from discrete timing of biwa events and *ma* and, with the help of the location of the loudspeaker, each part sounds independently.

2.4.3 Sound processing and programming

2.4.3.1 Programming with Max/MSP

In *Himorogi I* the computer part is to be operated not by the biwa player but by a separate operator. Musical timings are decided by both player and computer operator. But strictly defined timings are not required. For example, instructions might include "any time during the decay", or "any time during this part", or "after hearing A, begin B", etc. The parameters of the computer part are programmed as accessibly as possible to cope with the elastic time scale of the biwa. All sound files are able to be controlled independently in initiation, volume and other parameters such as speed, flange, or panorama. Sound files are slightly varied from their

[8] A single note is repeated by finger tapping at first slowly, then accelerated to a rapid speed. The tapping quickly slows down, ending the pattern with a single, strong tap (Blasdel, 1988: 50).
[9] A technique of biwa play. Scrubbing strings with plectrum rapidly from side to side.

original sound which is read into a buffer to be played with timbral modification flexibly. These sound files constitute several 'sound-file groups' which are advanced by programme change keys during the performance.

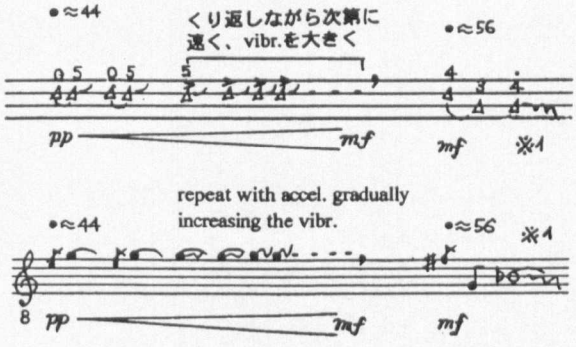


Figure 2.5.1: *Sutebyoshi* in *Himorogi I.* Example 1.

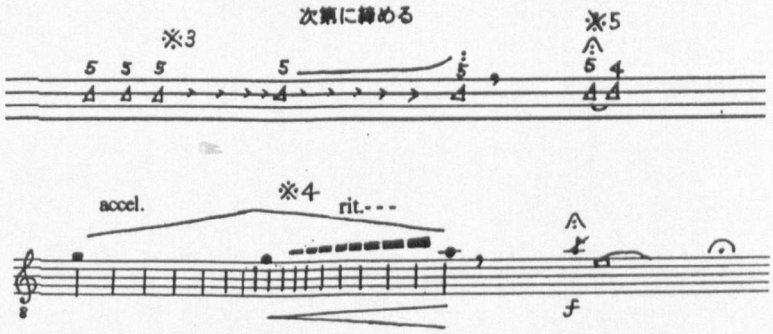


Figure 2.5.2: *Sutebyoshi* in *Himorogi I.* Example 2.

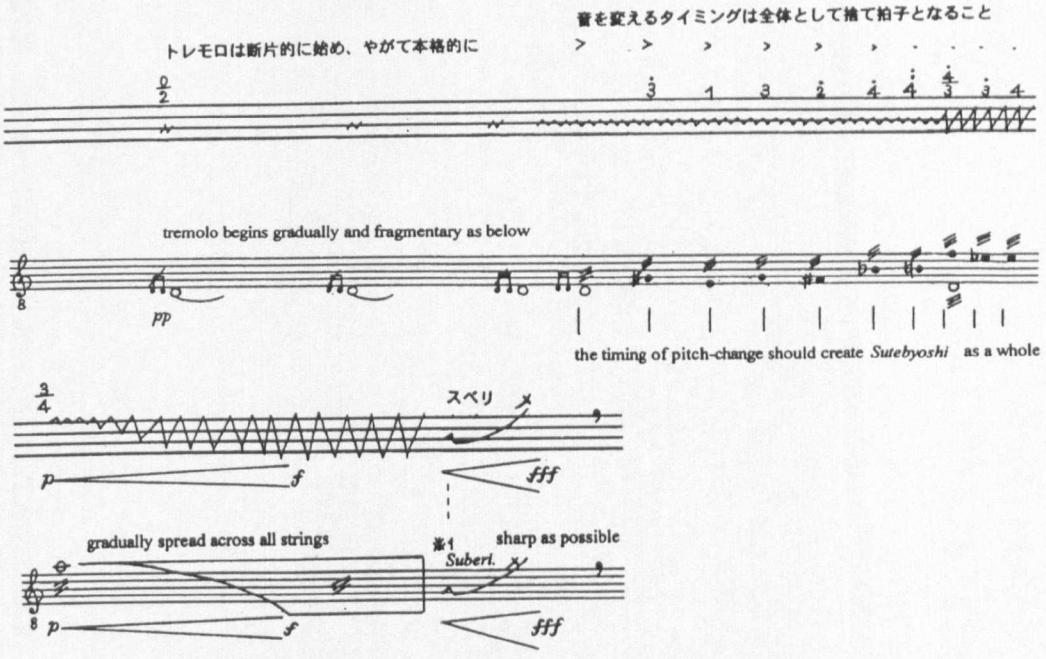


Figure 2.5.3: *Sutebyoshi* in *Himorogi I.* Example 3.

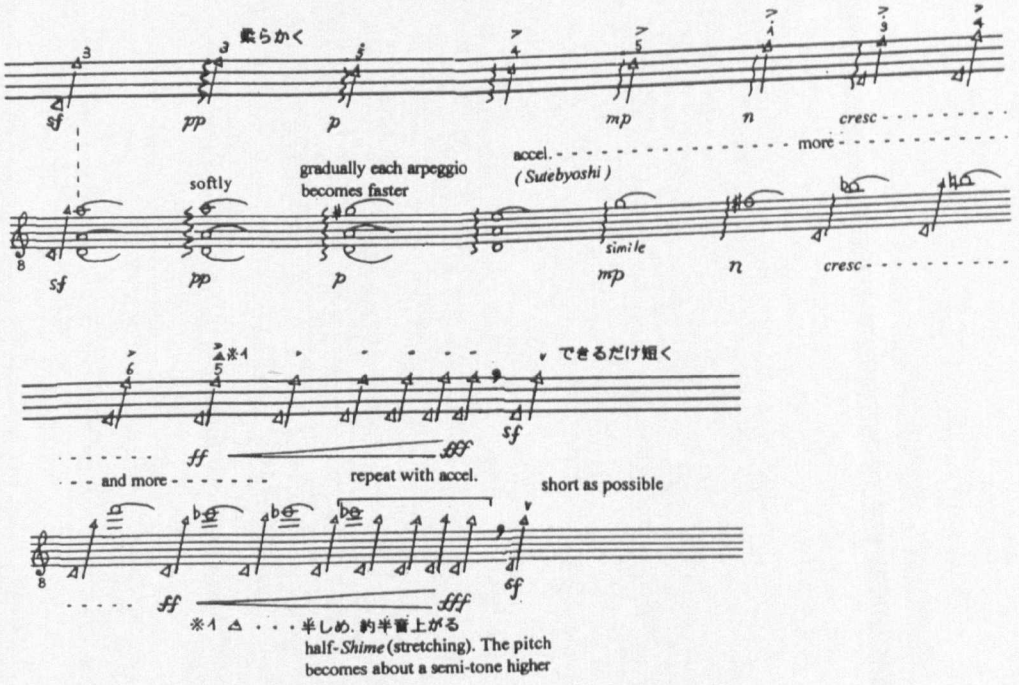


Figure 2.5.4: *Sutebyoshi* in *Himorogi I.* Example 4.

2.4.3.2 Processing of sound materials

All following *ma* in the sound materials are regarded as parts of the biwa sounds. If a processed sound has still its original shape, *ma* remains as well. The most important point is to observe carefully what happens to the sound through the processing selected. Below are observations about some functions and their effects when they are used in electroacoustic music with Japanese instruments or electroacoustic music using the musical parameters of traditional Japanese music.

- reverse:

  This function destroys the original relation between sound and *ma* totally. In *Himorogi I* this function was used mainly to create *crescendi*, which did not exist in the sound material, using a biwa single tone;

- delay:

  This obstructs decay of the biwa significantly. Most delays are to be set with delay time in milli-seconds with maximum value up to several seconds. However, a treatment appropriate to biwa music is a decay and following *ma* which reaches often more than 8-10 seconds, and is also 'elastic'. Therefore, in *Himorogi I* delay was used as in Figure 2.6;

- granulation:

  Apart from the purpose of creating totally different expression, this function is not effective as it breaks delicate nuance in decays. However, with noise sounds vivid processed sounds could be produced. In *Himorogi I* this function was mainly used for *suri* and cicada sounds as both sounds have a 'fragmented' character. To use granular functions, the 'fuzzy' parameter is very important. The values must be changing continually at any moment so that the process can produce instability or irregularity in movement. In other words, straight increase or decrease of values, or regular repetitions and mechanical patterns which do not exist in nature blend poorly with Japanese instruments;

- flange:

Throughout the piece, this function is used to create an increased density in frequencies, namely, formants, which are also seen in the spectrum of the biwa.

- Convolution:

Finally the cicada sounds were convoluted with the human voice;

- formant filter:

This function was occasionally used to process the extremely stretched biwa decay. Among the processing functions, this seems to be effective in creating sounds which can match with the sound of Japanese instruments;

- location:

In *Himorogi I* the multi-channel system is regarded as 4 stereo pairs. They were set as pairs 2&4, 6&8, 1&3, 5&7 as in Figure 2.7. Panorama movement is used only for processed sounds. If it is used for unprocessed sounds, applying simple delay, it gives a strange impression, as if the biwa player were walking around whilst playing. (The biwa is usually played sitting). As for the processed sounds, panorama movement was useful. For example, it was used with biwa *suri* in making a cross fade with the cicada sound. They appear together at first in side loudspeakers, then only *suri* moves to the front and converges on the real biwa *suri*.

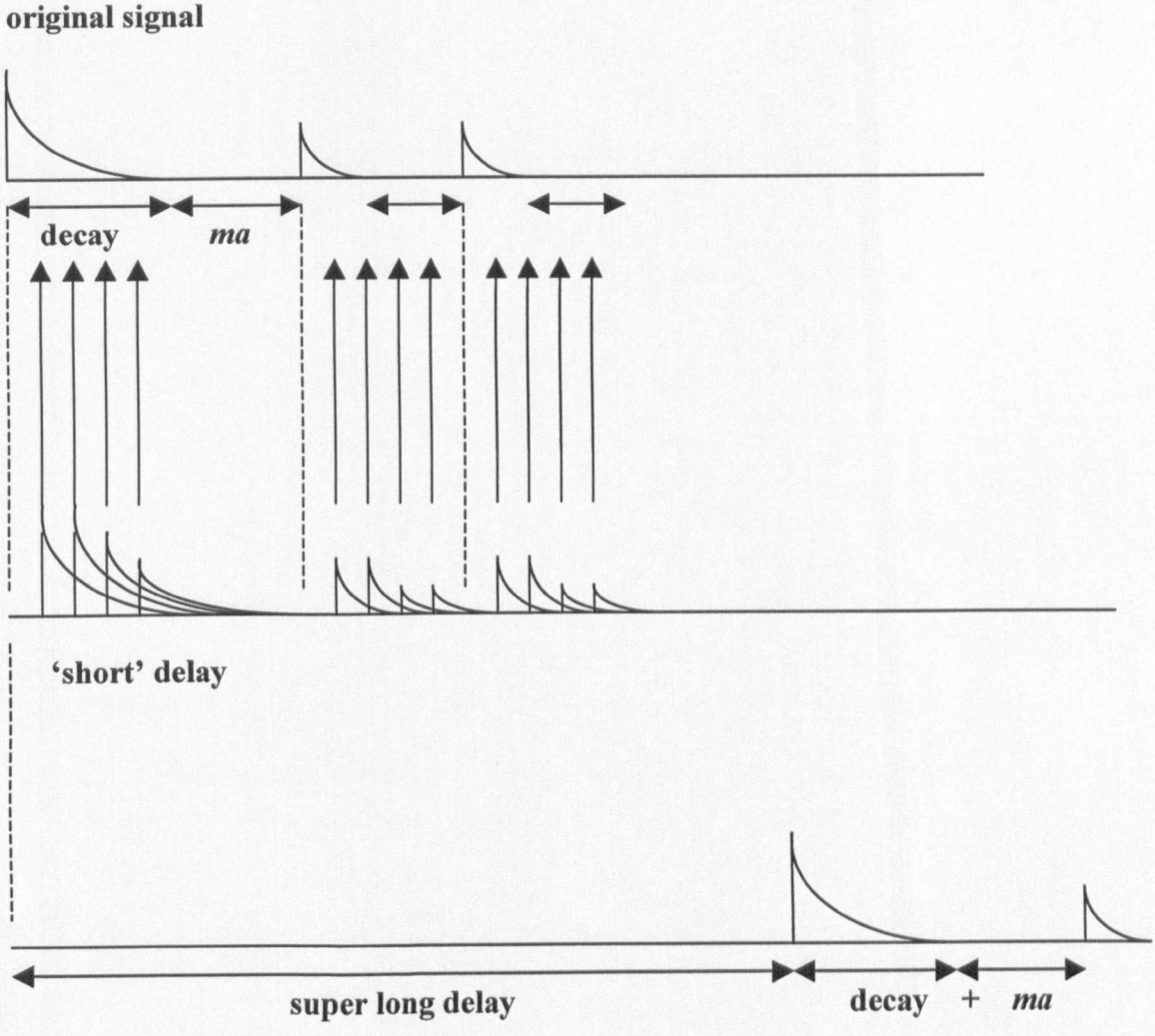


Figure 2.6: Suitable delay for *Himorogi I.* The first reflection must be set at least after the decay and *ma* of the original signal. As the decay of the biwa takes about 3 sec. and the following *ma* also last several seconds a delay shorter than 6-7 sec. would obstruct the timbral expression of the original signal. If there is feedback, the intervals between delays should be set to be irregular.

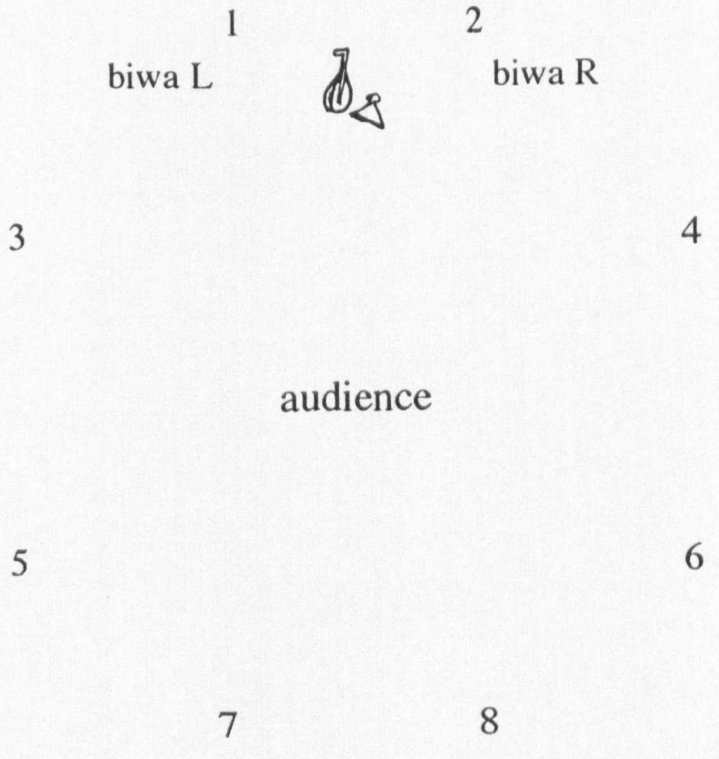


Figure 2.7: Positioning of loudspeakers and playback channels for *Himorogi I.*

2.5 The Composition of *Himorogi II* (shakuhachi and live electronics)

2.5.1 Instrumental characteristics, musical parameters and notation

Unlike the biwa, the shakuhachi is a rather 'dexterous' instrument which has agility and a great range of dynamics. But because of this skillfulness it is quite easy to fall into the trap of 'flute-like' expression. Composers should ponder on what it is that makes the shakuhachi shakuhachi-like. Historically, the 7 tone-hole shakuhachi was invented in the Meiji period, but with the much older 5 tone-hole instrument composers should expect a more characteristic sound and style.

There are three main factors which produce shakuhachi characteristics. The first consists of various timbral expressions which are produced by fingering techniques and variations in the head-angle, called *meri/kari*[10] technique. The second factor comprises delicately expressive micro-tonal *portamenti*, which arise through the use of the above technique. The third factor, which is somewhat more easily overlooked than the other two, is the selection of a wide variety of ornaments such as *oshi*, *uchi*, or *atari*, which give phrases clear and vivid accents. The important and unimportant performance indicators in shakuhachi music are as follows:

[10] *Meri-kari* is the technique of lightening and darkening the timbre as well as making the pitch higher and lower by altering the head angle.

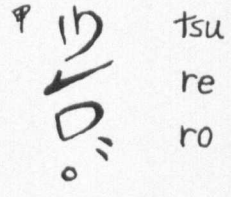
Important indicators	Unimportant indicators
suggesting the kind of timbre needed (namely, fingering)	fixing exact pitch
suggesting which grace notes are needed (if there is an expressive need)	fixing the timing or length, or prescribing precise metre
suggesting the kind of *portamenti*	fixing dynamics

Also natural movement of the neck and the head is an important factor. If necessary, composers can add dots as symbols for counting but it should be noted that counting in shakuhachi music is elastic.

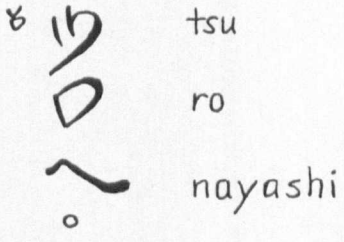
The example on the next page gives transcriptions, in 5-line notation, of *tatefu* which are typical notations of Japanese Western-style contemporary music for the shakuhachi. As composers of Western-style music are not good at writing in *tatefu*, and also as they believe precise notation is the rule of good composition, this kind of 'improved' notation became general. However, if we compare the list above with the scores, it becomes clear that five lines, notes and dynamic symbols are unnecessary, and that the most important symbols, hieroglyphics to express timbral expressions, are removed (refer Figure 2.8).

The scores a. and b. written in the 5-line staves are transcriptions of *tatefu* A. and B. The symbol ツ (*tsu*) can be transcribed as the series of notes marked as '*tsu*' in a., but the same symbol in B. is transcribed as the series of notes marked as '*tsu*' in b. In the second example, the symbol ロ (*ro*) is transcribed as a minim duration as it has dots attached, but these dots do not always mean an exact quaver length in exact counting. They are elastic.

A.

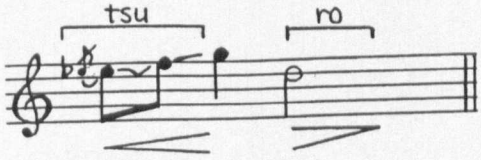


B.



transcriptions

a.



b.

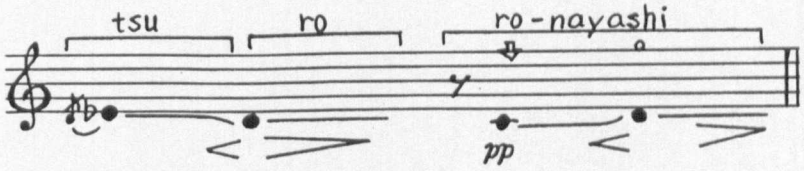


Figure 2.8: Shakuhachi notation and transcription.

Another ロ (ro) in B. is transcribed as a black note marked as '*ro*' in b. To write notes only with heads may be a better transcription than a., but the duration of '*ro*' is not necessarily the same as '*tsu*', which is also written as a black note. Another example which reveals the difference between the two notations is へ (*nayashi*). This suggests how to repeat a previous note with variation. Usually *nayashi* begins with lowered pitch by *meri* at an offbeat, then slides back to its original pitch on a main beat by slow *portamento*. In *nayashi*, both notes, lowered and original, are not necessarily the same length, and the quater rest before *nayashi* is not necessarily this length. (For Japanese musicians it just implies that *nayashi* begins at an offbeat, but if a quater rest is written, it generally means a precise rest).

Also the pitch of the lowered note is not always the same. As a whole, the score A. and B. could be played as given in the transcriptions, but not always. Thus, these examples show that the two notations are not compatible as they have different musical interpretations. Writing in 5-line notation causes stiffness in performance, and it even causes confusion as if ツ and ロ were separable into the elements of 5-line notation such as semi-tones.

The other factors, the symbols for *portamenti* and ornaments also exist in *tatefu.* As for the types of vibrato, players prefer to decide on these spontaneously, since they are deeply related to the timbral expression of each tone.

Thus, this 'developed' notation, 5-line notation applied to Japanese music or Japanese instruments, is intended to note more 'precisely', and this 'precision' is substantially to define values within the parameters of Western music, ignoring the nature of shakuhachi music.

For these reasons the score of *Himorogi II* was written in *tatefu.* This traditional notation turned out to be the ideal notation for shakuhachi. For a shakuhachi player who prefers *tatefu,* the score is available to read vertically, with line sequence from right to left, and for the computer operator it is possible to write horizontally as in Western notation.

2.5.2 Compositional plan

The aesthetics which regard *tohne* (sound in distance) as the most tasteful and elegant is not only found in traditional Japanese music, but also in the general type of sound preferred, such as temple bells. This type of discourse can be more developed through spatialisation in electroacoustic music. This composition starts from this idea. It aims to create a virtual space in which the audience could feel as if they were in a field in ancient Japan (not in an actual concert hall) as the shakuhachi was historically played outdoors. The idea that three virtual shakuhachi players gradually approach the real player was used for creating a fantasy.

Then, according to this fantasy, sound materials were spatialised with the multi-channel system using filtering to create virtual distances for each player. This progression in spatialisation gives an actual framework to the piece.

The following issues were intended to be the focus for the work:

- musical parameters and time scale:
  Application of the musical parameters in traditional shakuhachi music, *honkyoku*, to this composition. For this purpose the typical phrases of *honkyoku*, which also appear in *Shin no Kyorei* were used.
- Inclusion of historical background, episodes, or legends. Here, several facts about *komusoh,* and well-known legends and fictions about *ninja* helped to develop the fantasy;
- rhythmic factors:
  As with the *biwa*, tempo, pulse and metre were left free. For this purpose, *tatefu* was used. For the end of the piece heterophony, typical of rhythmic expression in ensembles of traditional Japanese music, was used. The beginning and the end are structured according to *sutebyoshi* proportions using the transposed sound of wind blowing through the instrument;

- pitch:

  This is also unstable. The pitch becomes somewhat sharper during the course of a performance. However, in traditional Japanese music it is not necessarily considered to be 'detuned'. As absolute pitch is not used apart from in *gagaku* players are quite generous with detuning. Also, in shakuhachi music players use various microtones through changes of head-angle. Therefore, it does not make sense to define pitch.

  As for the computer part, the pitches of the three virtual players' instruments are deliberately detuned from each other. Since *komusoh* (Buddhist wandering priests) regarded the shakuhachi as a religious tool for mental training, the idea of adjusting tuning to playing in ensemble would not have applied;

- tuning of modal intervals:

  To talk about this issue would not make sense as so many fine gradations of pitches are included. It might be possible to sort out these microtones into certain intervals such as semitones, but the important nuances exist only in the original pitches.

2.5.3 Processing and programming

2.5.3.1 Programming with Max/MSP

In *Himorogi II* sound processing was mainly carried out through spatialisation. The Max/MSP programme works as a 'frame' to trigger the pre-processed sound files.

This piece is constituted from several parts separated by *ma* between them. Each part, programmed as a patcher, contains several sound files. These are variations of phrases in the shakuhachi part. As the *tatefu* shakuhachi score only suggests what should be played, every performance has a different expression as a result. The programme is to be started by the shakuhachi player himself through an initiation

device making use of an audio signal through a microphone. This sensor is in place to let the player concentrate on his/her performance. The three virtual players have their own musical timings. In principle they do not try to adjust to the real performer's timing. Apart from the several phrases at the end of the piece, they are not playing as an ensemble but just 'replying' with loose timing. The real player is able to start phrases with shorter or longer *ma* (however, nothing about these timings is suggested exactly), but he/she cannot decide *ma* between other players' phrases.

2.5.3.2 Processing of sound material

- pitch shift:
  Pitch shift, both without and with time correction, changes considerably the relationship between timbral expression and *ma*. However, this process was used on purpose in *Himorogi II* with quite a small value. The phrases played by three virtual players are originally taken from the sound material played by a real player. These phrases differ slightly in pitch, timbre, and musical timing in order that they might be distinguished from each other. Small values of less than a semitone, such as 25 cents, 35 cents, etc. were used:
- time stretching /compression:
  As well as pitch shift without time correction, this function changes *ma* and timbral nuance;
- normalisation:
  As both timbral expression and *ma* include loudness, this process was only used lightly in order to correct the balance. It was specifically used for the original sound material which had a low level (e.g. the breath noise);
- filtering:
  Filtering might change or obstruct timbral nuance. However, in *Himorogi II* filters were used to create virtual distance between the virtual players and the audience. For example, the low pass filters were used for the phrases at the

beginning of the piece, because the phrases were expected to sound as if they were in distance. The filters are gradually opened during the performance and become fully open at the end, as the virtual players approach the real player;

- location:

In *Himorogi II* multi-channel speakers are set as three stereo pairs of 4&6, 3&5, 7&8. Panoramic movement was very much used in order to simulate the three virtual players' wandering routes. Figure 2.9 shows the speaker setting for this piece and the presumed wandering routes of the three virtual players.

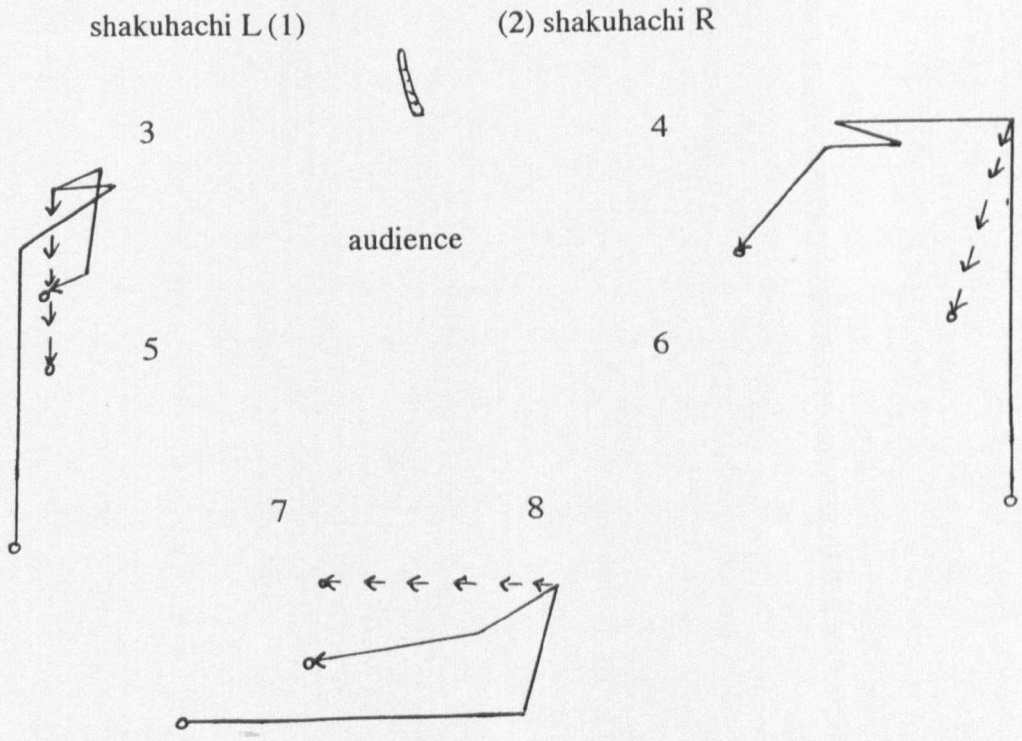


Figure 2.9: Positioning of loudspeakers and playback channels for *Himorogi II* and the routes of the virtual *komusoh*.

2.6 Further observation on shakuhachi notation

The tones which are produced by just opening and closing finger-holes are called 'basic tones' in the shakuhachi whereas other tones produced by using *meri-kari* and kazashiyubi[11]are regarded as derived tones. The latter are notated by adding special symbols to the symbols of basic tones. Therefore, in shakuhachi music, the basic parameter is not the semi-tone, but a certain range of variable sound. In shakuhachi notation the duration of a symbol is not suggested. The 'counting dots' which suggest 'front or back' beat in the score of traditional repertoires may be added, but these 'beats' are elastic and do not work as fixed metre and rhythm. The musical parameter for time is not metric, nor clock time. Each symbol has a certain range of variable duration. Each symbol has two dimensions; the range of timbral variety and the range of duration. Both of these are 'elastic'. Another important factor in shakuhachi music is the ornaments. Ernst Gunnar Linder reported that ornaments have an important role of giving the music different expressions[12]. To distinguish the ornaments from other tones, the latter are called 'root-tones'. There are ornaments which work before or after root-tone events. The former make the following event stand out, and the latter smoothe the exit from the phrase. These ornaments, which are not always written in the score, can be regarded as derived movements of symbols, but not independent. As for the symbols for tones, small circles which suggest *ma* have no boundary in duration.

Similar definitions of symbolisation are ubiquitous in Japanese culture. An observation of *noh* masks as a visual example illustrates this indefinite boundary of symbolisation. *Noh* masks are said to express all kinds of emotion except laughter. They are made to include all the muscle movement of emotion, but none of them appears clearly. *Noh* masks may give the audience a strange impression. They may be seen as both smiling and happy, and sad and sobbing. In fact every emotion is

[11] *Kazashi-yubi* is the technique of lightening and darkening the timbre as well as making the pitch higher and lower by shading or half-holing.
[12] Linder, 1996: 1.

expressed 'half way'. In other words, *noh* masks express 'between' emotions. However, from the viewpoint of performance this symbolisation, which has an unclear boundary, has great possibilities for free interpretation as a performer can develop any of the emotions according to his/her own interpretation.

Thus, it becomes clear that this is a unique idea for symbolisation which leaves the boundary open and is the key for vivid interpretation. The observation of shakuhachi symbols and its flexibility in interpretation could be applied to other instruments by modifying symbols and interpretation rules. First, shakuhachi symbols could be translated into alphabetic symbols. The use of the alphabet instead of 5-line stave is to allow performers to be free from parameters such as metre, exact duration and exact pitch. Each letter used as musical symbol has a range of timbral change similar to the shakuhachi symbols. This change cannot be defined without steps. By using different fonts, different qualities of timbre can be suggested. By using different sizes of font, approximate dynamics can be suggested. Also the small characters can suggest ornaments as below (Figure 2.10).

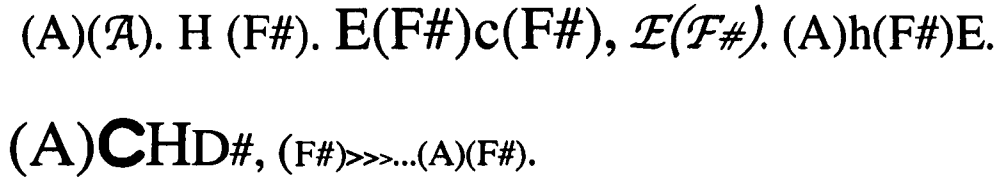


Figure 2.10: An example of alphabetic notation. ( ) means that the pitch can be flexibly changed in the range of a whole-tone, centered on the written pitch.

2.7 Technological issues revealed through the two compositions for Japanese instruments, *Himorogi I* and *II*

In these compositions for Japanese instruments and live electronics sound processing was intended mainly to keep the original shapes and characters of the material sounds. The aim of these compositions was not to create a totally different sound world from the original material, but to find processes which could coexist with the sound world of the original sounds.

However, as Japanese composer Yoshihiro Kanno has pointed out, processing of Japanese instruments can break the original sound world (Kanno, programme note for CD titled *Resounding Sphere III*, FOCD 3449). How to relate the original and processed instrumental sounds should be further investigated: a clear plan and vision of sound processing would be required.

For instance, when using delays, although the value for the first reflection should normally be given before a signal comes in, the ideal delay for these instruments is 'elastic', possibly to be changed during signal processing. To create various relationships between timbral expressions and *ma*, which reflect the subtle nuance of the live play, a process that controls time-stretching/compression separately from pitch transposition is also needed.

2.8 風の道 (*Kaze no Michi* (*Wind Way*)) : a further stage of compositional strategy for shakuhachi and live electronics

2.8.1 Aim of the composition of *Kaze no Michi*

Through the composition of *Himorogi II*, the idea of spatialisation based on the aesthetics of *tohne*, sound in the distance, which belongs to shakuhachi *honkyoku*, was explored. The fact that notation which uses Japanese characters as musical symbols allows flexible musical parameters became clear.

The acoustical structure of shakuhachi *honkyoku*, quiet flowing sounds, *issokuon*, pulses by ornaments and silence, was used. In the second composition for shakuhachi, the internal timbral structure of the flowing sound is to be examined further in order to apply it to computer sound-processing.

To approach this, several characteristics of the timbres were examined. Linder pointed out that composers of Western-style contemporary music prefer to use notes of even resonance (interview on 11 Aug. 2004, Tokyo). For example, for the pitch A flat most composers prefer *chi no meri*, but the Kinko school have a strong preference for *u* [ou], a different fingering for A flat, which has a very special timbre.

Also there are many pieces by Western-style composers which do not suggest any timbre. *Chikurai Gosho* composed by Makoto Moroi in 1964 has been recognised as a masterpiece of contemporary shakuhachi music. Moroi explored ways to bring two different musical worlds, shakuhachi traditional music and Western music, into his piece. Apart from the argument as to whether it is intended, a strange impression often occurs in phrases expressing Western musical ideas. In these phrases the timbre of the shakuhachi becomes suddenly totally flat and loses its delicate nuance. Through these observations it becomes clear that composers of Western-style contemporary music adopt a different aesthetic from that of the traditional shakuhachi.

In other words, shakuhachi traditional music does not consist only of good resonance tones. When only good resonance tones are used, the phrases sound flat and lose their shakuhachi-like flavour. Since the composition *Kaze no Michi* explores the internal structure of shakuhachi *issokuon,* the factors that make shakuhachi timbre 'uneven' should be further examined.

2.8.2 A development of a fingering list based on the timbral expression of the shakuhachi

It is likely that the enormously wide range of timbral expression of the shakuhachi would not have been imported from the continent at the same time as the instrument (Koizumi, 2000: 188-200), but must have been developed through the period during which the shakuhachi was used as a religious tool. The facts which endorse this are:

1. The instruments of the shakuhachi family found on the Asian continent, such as the Chinese *Dong-xiao,* do not have such a wide range of timbral expression as the shakuhachi;
2. Shakuhachi folk music does not have a wide range of timbral expression; the timbre-producing techniques seen in *honkyoku* are not developed so highly in folk styles.

Listening to the full-resonance of the shakuhachi without any technique such as *meri-kari* and *kazashi-yubi*, reveals the fact that the instrument has a bright open timbre. Through this, the fact that the shakuhachi enlarged the range of timbral expression by reducing its resonance using these techniques becomes clear. *Shibui* is an aesthetic term which describes the highest status of things. It is applied not only to art, music and fashion, but also to abstract concepts such as the way of life. This term does not have any approximate equivalent in English, but may be explained by several terms such as 'sober and quiet', 'dark' and 'fading away'. Shakuhachi music, especially *honkyoku*, is based on the same aesthetics.

Section 2.5 investigated the acoustical structure of shakuhachi *honkyoku* and concluded that it is structured at least as much through timbre as through melody. Two different acoustical factors, consisting of quiet flowing sounds and pulses which are given impacts by ornaments, constitute a sequence of sound which, as a

whole, is designed as an entity 'against silence'. This section investigates more details of the acoustical structure of shakuhachi timbre.

The first step in composing *Kaze no Michi* was to invent a new fingering list for the shakuhachi. Although traditional shakuhachi music itself is highly developed in timbre, this is not reflected in existing fingering charts and, strangely enough, it seems that players never considered the idea of classifying and ordering the timbral values of the shakuhachi. Shakuhachi fingering is usually written one-dimensionally in a semi-tonal scale. However, as shakuhachi music is timbre-dominant and has originally no conception of twelve-tones, this description should be changed into a timbre-dominant order. Although timbral change of the shakuhachi is to be played continuously, several timbral states used in *honkyoku* such as *chu-meri* and *meri* could be set as norms in order to compare timbral difference between tones. On the original fingering list (Figure 2.11), these timbral states are classified into six steps and related to the pitch and its notation. This list is, in other words, two dimensional.

However, this list is still not enough to classify shakuhachi tones, because shakuhachi players distinguish the timbre in more detail. Through the interview with Linder, the fact that the shakuhachi has several timbral qualities was revealed. The specific variations revealed through the interview are the following 'pairs':

- airy-focused
- indirect-direct (expressive)
- more-less *shibui*, or *jimi* (sober and quiet) -*hade* (bright and loud)
- gentle-hard
- dark-light (*mei-an*)

Among these qualities of timbral change, the first three types of differentiation are produced by fingering. For example, several tones which have the same pitch as *ri* are:

- *ri*
- *nishigo no ha*
- *ro no meri*

Ri has a clear, strong resonance, whereas *nishigo no ha* is airy, and *ro no meri* has a dark tone. *Ri* normally has a clear focused tone whereas *nishigo no ha* cannot be played clearly and focused. The difference of *indirect-direct* can be heard between *nishigo no ha* and *san no ha*. According to Linder, the former is *direct* whereas the latter is *indirect*. This differentiation seems to be that between good and bad resonance of partial tones. The same difference can be heard between *shigo no ha* and *go no ha*. The quality of timbral change explained by the term *shibui* is heard between *chi no meri* and *u*. Although *chi no meri* is a darkened tone and *u* is a basic tone, *u* has more *shibui* timbre than *chi no meri*. This indicates that the quality of *shibui* is different from the dark-light scale. The last two qualities of timbral change, gentle-hard and dark-light scales, can more or less apply to all basic tones. They seem to be produced by playing techniques other than just fingering.

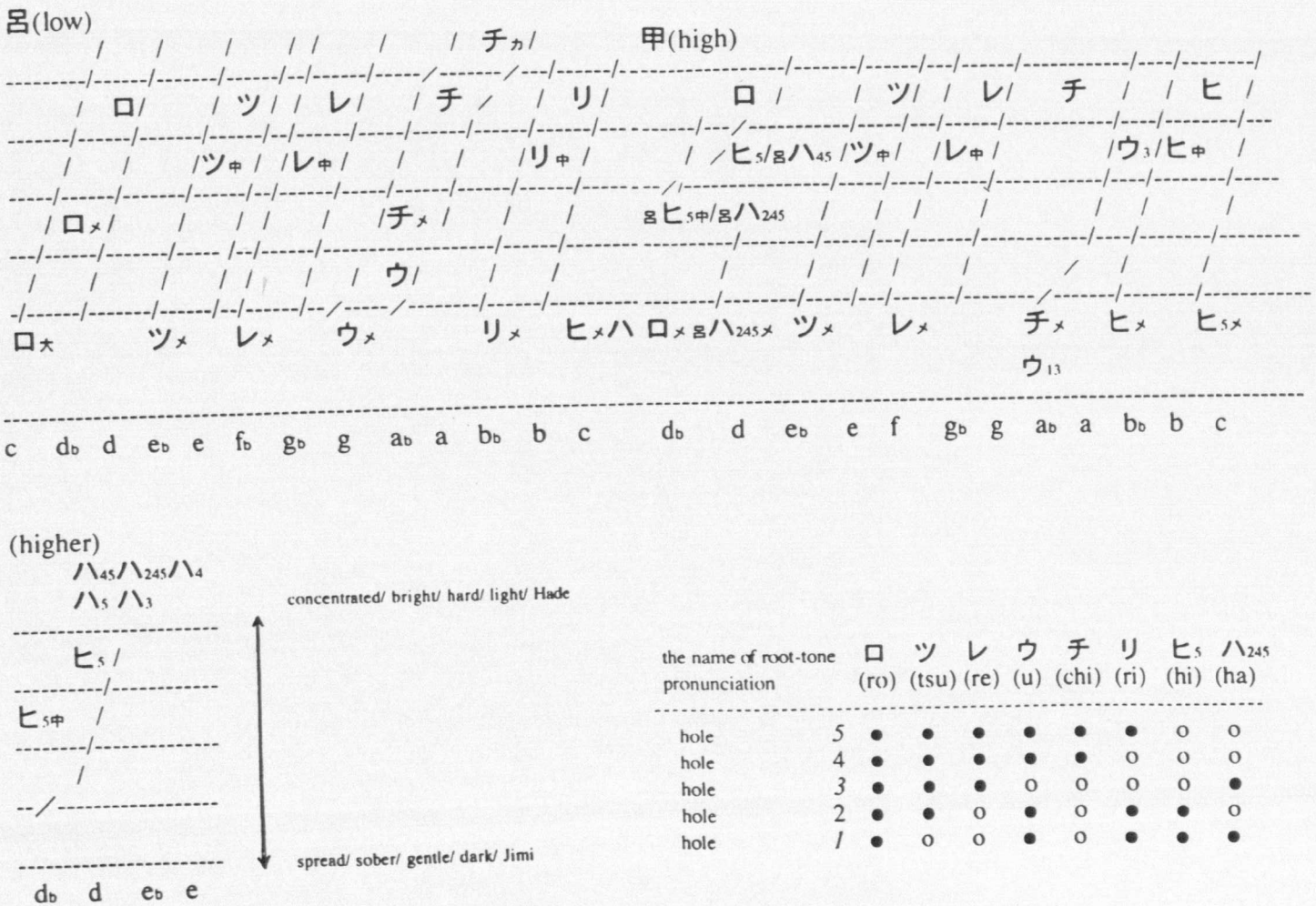


Figure 2.11: Shakuhachi fingering list which includes timbral distinction.

2.8.3 Examination of the specific differentiation of shakuhachi timbre revealed from the viewpoint of electroacoustic composition

The examples of shakuhachi tones explained by Linder were examined from the viewpoint of acoustic sound quality in order to apply the sound aesthetics of the shakuhachi to computer sound processing. The compared examples were:

- *nishigo no ha* and *ri*, and *go no hi* and *ro* for quality varying between airy and focused;
- *nishigo no ha* and *san no ha*, and *shigo no ha* and *go no ha* in the high register for *indirect* and *direct* (expressive) quality;
- *chi no meri* and *u* for more-less *shibui*, or *jimi* (sober and quiet) -*hade* (bright and loud)
- *go no hi* and *ri* for gentle to hard quality
- *ro no meri* to *kari* for dark to light (*mei-an*) quality.

Through this examination, the following acoustical differentiations revealed:

- the airy-focused differentiation can be interpreted as the degree of presence of harmonicity and inharmonicity/noise;
- *indirect-direct* quality can be interpreted as rich-poor resonance, or the relative strengths of partials;
- quality of *shibui* can be interpreted as the structure of partial tones. Comparing *chi no meri* and *u, chi no meri* sounds dark, but not *shibui,* whereas *u* sounds *shibui*. Non-*shibui* tone, *chi no meri,* includes all partial tones from the fundamental up to the sixth partial in Linder's tone, whereas in the *shibui* tone *u* only odd number partial tones, 1, 3, 5, appear. When these odd numbered partial tones decrease in number, or in resonance, the tone sounds more *shibui*. In *u no meri,* the ratio between partial tones/noise component decreases;

- gentle-hard differentiation is produced by the cooperation of two kinds of quality. These are the loudness of a tone itself and the ratio of harmonicity and inharmonicity /noise. The latter is the same quality of timbral change as the airy-focused quality. However, in airy tones such as *nishigo no ha* the noise component is more prominent than in gentle tones;
- dark-light quality is produced by variations in the highest frequency of the partials and noise components. When the frequency of the highest partial tone and noise component is low, the tone sounds dark, whereas when it is high, the tone sounds light. As this change is produced by changing the head-angle the tones with other kinds of quality such as airy *nishigo no ha* have also a range of dark-light timbral change. Namely, there are airy and dark tones, and airy and light tones.

Thus, they are described in the following figure (Figure 2.12).

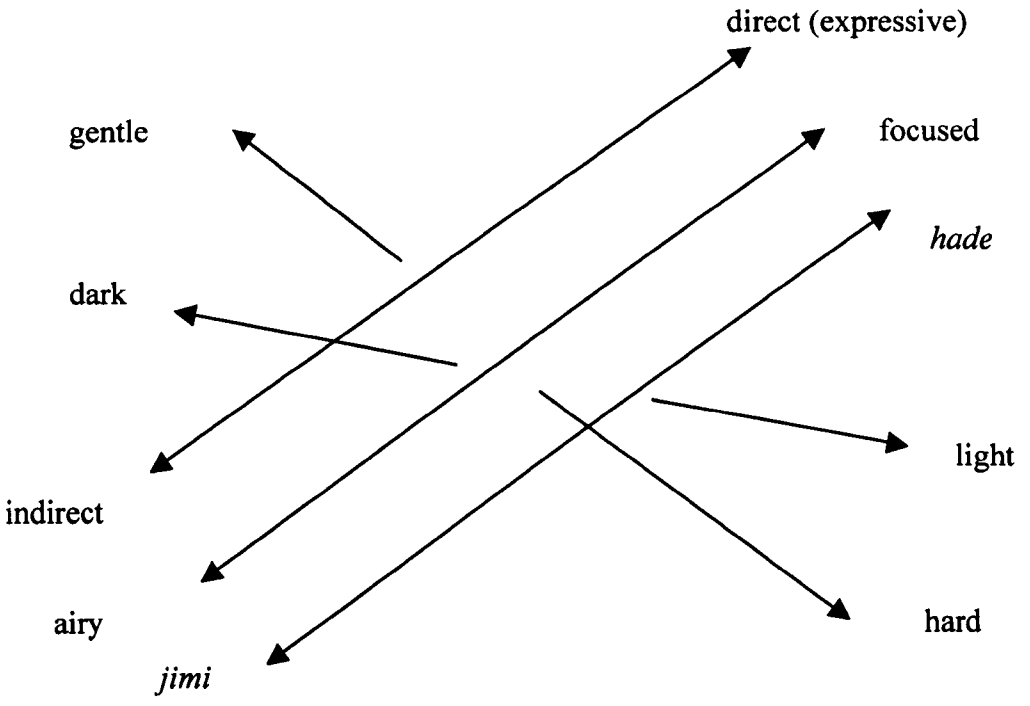


Figure 2.12: The scales of timbral change in the shakuhachi revealed through the interview with Ernst Gunnar Linder.

Thus, through this investigation the fact that the shakuhachi has developed its remarkable expression by increasing the range of resonance towards 'poor' resonance became clear. This is described in Figure 2.13.

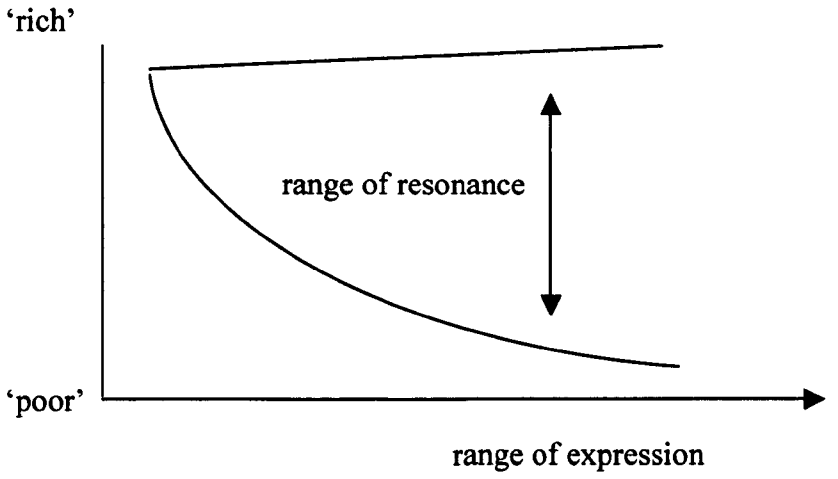


Figure 2.13: The relationship between resonance and expression.

2.8.4 Compositional plan and creating scores

2.8.4.1 The shakuhachi part

In *Kaze no Michi* the shakuhachi part follows the 'history' of timbral development mentioned. The shakuhachi begins to play using phrases with only basic tones, which produce clear and bright timbre, then the tones are darkened till *chu-meri* is reached. At this point the instrument reaches the full range of timbral variation. Following this section, all possible ornaments and special playing techniques such as *muraiki, korokoro* (tremolo technique between tones which have different timbre) and *tamane* are allowed to be used freely, where effective and musical. Then the range of timbral change reduces gradually.

The basic tones of full resonance are omitted, and then airy tones are added. In the final stage, the phrases are played mainly using most *shibui* tones, *u* and *u no*

meri.

Silence, or the absence of sound, which is also considered a sound component, as the antithesis of sound, increases in duration and is used more and more frequently. As a whole, the music progresses towards the highest stage of timbral aesthetics of the shakuhachi.

In order to structure the shakuhachi part described above, three scores were prepared.

Score 1. a 'skeleton' of an example melody made by basic tones:

Since the basic tones make up the common pentatonic scale tones, the beginning phrase may sound like pentatonic folk music. The interpretation of this 'melody' is, however, flexible. The player can add ornaments and change the length of each note at will in each performance. The symbols used are derived from shakuhachi notation. This 'skeleton' melody is also written using Western alphabet. Each *ro, tsu, re, chi,* and *ri* of shakuhachi symbols (*Katakana*) can be interpreted as alphabet symbols D, F, G, A and C. For example, letter D is written for ロ *ro* and F is written for ツ *tsu.* Both kinds of symbol have different ranges as musical parameters. *Katakana* syllables have already certain rules for interpretation in shakuhachi music, whereas alphabet symbols are quite free. For example, shakuhachi *tsu* (F) can be interpreted as *tsu no meri* which has approximately Eb pitch, because it is within the range of interpretation. On the other hand, *chi no meri* has a certain timbre, but the player can choose between the two different fingerings (timbres), *chi no meri* and *u* by interpreting it as Ab. Thus, using both symbols in parallel, the interpretation obtains flexibility both in pitch and timbre.

traditional : ロ *ro* ツ *tsu* レ *re* チ *chi* リ *ri*
shakuhachi
symbols

corresponding : D F G A C
alphabets

- Possible interpretation of ツ *tsu* in pitch:

tsu of *meri* - *chu-meri* - *non- meri*
Eb ◄——————► F

- Possible interpretation of Ab in timbre:

chi no meri / *u*
dark / *shibui*

Figure 2.14: Examples of symbols and their possible range of interpretation.

Score 2. timbre-pitch mode table:

One may choose a timbre-pitch table and modes derived from it which set the ranges of timbral change for each part of the piece. Examining *meri-kari* change, the pitch of a basic tone descends when *meri* increases. The larger the *meri* becomes, the lower the pitch descends. In other words, the timbral change of dark-light quality cannot be separated from pitch whereas other kinds of timbral change are independent from pitch. Comparing the darkness of timbre

of each tone, a two-dimensional mode-table is created. Dark-light timbral change can be classified in at least six stages. Although there are no stages named between basic and *chu-meri* (half-*meri*) tones, and *chu- meri* and *meri* (full-*meri*) tones, there should be analogous change both in timbre and pitch between them. These unnamed stages are written in by using micro- intervals in order to let them 'exist' clearly. Mapping this full range of the timbre-pitch change table as the basic mode, other modes were derived from this. The range of timbre begins with only basic tones, increases till the half-range, *chu-meri*, and then increases till the full range. This is then eroded towards a less resonant stage. The basic tones are omitted and only darkened tone stages remain. As for the different scales of timbral change, the airy quality is to be added when the full resonance tones are omitted. Then in the final stage the player should make phrases with *shibui* tones mainly. The 'skeleton of the theme melody' working with these modes gives the performer a chance to invent combinations of tones which are not usually heard in traditional pieces.

Score 3. a schematic score:

This describes whole compositional progression including the relation between the instrument and computer. The performer should 'embed' the modes and 'theme melody skeleton' mentioned above in each part of the piece suggested.

2.8.4.2 The computer part

The computer part is not an extension of the instrument, but is rather designed as 'environment'. The sound material is environmental sound recorded at Shinjuku train station, Tokyo. The following functions for sound processing were planned referring to the parameters of timbral change in the shakuhachi sound mentioned.

- FFT filters which divide frequencies between 0 and 20000 Hz into 512

bandpass filters as designed by Nobuyasu Sakonda (Sakonda, 2003: 683);
- spectrum-noise decomposition programme which separates sound and noise components. The programme is controlled by the sound/noise threshold parameter;
- inverse phase programme which works with the playback speed controller;
- sound file playback speed controller with normal phase;

The computer part begins with the pre-processed environmental sound mentioned above. At the beginning of the piece the sound material is sent to the FFT filters which are at first all closed and are to be opened one by one. As each filter has quite a narrow band, the processed sound is at first extremely filtered. The sound regains its entire 'shape' when the filters are gradually opened, but this processed sound has a monaural image.

In shakuhachi sound dark-light quality is produced by variations in the highest frequency of the partials and noise components. This change can be straightforwardly interpreted as filtering. However, in the actual sound processed by FFT filters the dark-light change is not so interesting as it sounds too simple. Also, the speciality of this FFT filter programme is setting the cut-off frequency, but with the flexibility that every individual filter of approximately 40 Hz bandwidth is able to work independently. In other words it can draw any kinds of filter-shape during sound processing.

The monaural image cross-fades with the stereo image when the shakuhachi begins to play. The stereo image coincides with the full-timbral range of the shakuhachi. It is the entire entity and not filtered yet.

The airy-focused differentiation can be interpreted as the ratio of harmonicity and inharmonicity/noise as explained above. This quality can be implemented in the computer by means of a decomposition programme such as *Diphone*[13].

[13] *Diphone* is a programme developed by IRCAM.

The idea to programme a real-time decomposition function in Max/MSP was discussed between the author and Prof. Wilfried Jentzsch during 2003-2004. This discussion resulted in some Max/MSP programmes such as 'Noise Sculptor' by the author, and 'Spectrum-Noise Decomposition' by the Studio für Elektronische Musik Dresden. For *Kaze no Michi* the Spectrum-Noise Decomposition was further developed and used with permission. In performance this programme is to be started by means of a musical sign from the shakuhachi *muraiki* at the beginning of the third section, where the shakuhachi uses the whole range of timbral expression.

By reducing the speed of playback of the sound-file, the density of the noise components reduces and 'pitch' descends. When the speed of the playback reaches the value 0.07 (1.0 is original speed), the non-processed sound of the noise components sneaks in. As the speed of the playback is also 0.07 and it has an inverse phase, it sounds quite low and far away. Changing the playback speed of the sound-file in reverse phase produces a wind like sound which corresponds to *unoru,* the most tasteful tone in shakuhachi sound.

3. An exploration of the sound aesthetics and acoustical structure of traditional Japanese music as applied to electroacoustic music

3.1 An application for a Western instrument: 東方へ! (*Higashi-e!* (*Nach Osten!*)) for renaissance tenor recorder and live electronics

3.1.1 The three stages of sound aesthetics of traditional Japanese music and their examination from the viewpoint of electroacoustic composition

Traditional Japanese music can be classified into three types from the viewpoint that it has developed towards timbral expression. Japanese society until the *Meiji restoration* (1868) was hierarchical. The highest class in society consisted of loyal families and aristocrats called *Kuge*, then the warrior class, and below them citizens such as peasants, merchants and other working classes. Even the lowest poor warriors were regarded as higher in status than rich merchants. Buddhist monks were secluded from the world, but could be regarded as being almost on the same level as the warrior class in term of education. Also there was another class, *Eta-Hinin,* which was not included even as part of the working class. These people were not regarded as human.

Each class developed its own music and there was no common music[1]. *Gagaku* (court music) was only for the aristocracy and was not accessible to other classes such as the merchant class. *Noh* and biwa music were the music for the warrior class, while both *nagauta* (which accompanied *kabuki*) and *gidayu* (which accompanied *bunraku*) were entertainment for ordinary people. These kinds of music were neither exchanged nor played together. Aristocratic people never played shamisen music, since it was regarded as vulgar. People of every class played only

[1] This classification was the reason why the Japanese government of the *Meiji* period represented by Isawa's activity (see chapter 1) needed to create 'national music' as a 'common' music.

their own music and the music of each class was not interchangeable. Every kind of music had its own aesthetic values and it is quite difficult to find common characteristics between them.

From the viewpoint of acoustical structure traditional Japanese music can be classified in three additive stages of development.

1. Japanese music developed in subtle timbral expression associated with *portamenti,* and rich inharmonicity remained (*gagaku*);
2. Timbral expression was developed further, adopting silence as a sound factor, and with timbre becoming more complex (*noh*);
3. This sound world was further developed, adopting noise as a part of timbral expression (*gidayu*).

However, this hierarchy was abolished after the Meiji restoration (1868) and the boundary between these musics as hierarchic symbols was very much weakened, and also composers of modern Western-style music in Japan often juxtaposed elements of all kinds of traditional Japanese music, ignoring both this historical background and the differences in sound aesthetics.

The differences in sound aesthetics among these three styles of music can be examined through acoustical factors such as harmonicity, inharmonicity, noise (non-periodic) components and silence.

In comparing these three kinds of music, the fact that *gagaku* has neither a preference for a noise element nor long silences is notable. In fact, this court music dates from much earlier than the emergence of Japanese Buddhism. *Gagaku* is largely developed through subtle nuances of heterophony, not in dramatic and noisy expression like *gidayu*. For example, unlike the other types of biwa, the biwa of the *gagaku* ensemble does not produce *sawari* noise. *Gagaku* is quite an elegant and sophisticated aristocratic music. It does not have an acoustical structure with extreme contrasts between impulses, such as the flowing quiet phrases and silence which we

can hear in *noh*. One could say that the dynamic range of expression in *noh* music is expanded from silence to impulse. In *gidayu* music we hear all these factors, and in addition we hear a noisiness which does not exist in *noh*.

Another comparison is in vocal production. The voice of *gidayu* is quite harsh and even husky, as is the sound of futozao (an instrument resembling the shamisen). Indeed, the difference in vocal aesthetics between *noh* and *gidayu* represents the difference in overall aesthetics between these two kinds of music. The aesthetics of *gidayu* could be termed anti-*noh*, although both *noh* and *gidayu* may sound harsh to European ears. *Noh* has also a strong singing style known as *tsuyogin*, which almost loses a sense of clear pitch, but we have to note that it was developed considerably later, in the *Edo* era (1603-1868).

Thus, the development of sound aesthetics in traditional Japanese music can be described in acoustic terms as follows:

1. traditional Japanese music has developed first in inharmonicity and intended detuning;
2. it has developed more in timbre changes, and adopted silence as an important factor;
3. noise and distortion have been developed as modes of sound expression.

3.1.2 The renaissance tenor recorder as the instrument for 東方へ！ (*Higashi-e!* (*Nach Osten!*))

The first impression of the timbre of the renaissance tenor recorder is soft and warm. Acoustically it does not include frequencies higher than around 6000 Hz. Especially in less resonant notes the number of partials drops to only 2 or 3. On the other hand, the modern flute has a brilliant and hard timbre, and shows a clear harmonic structure in its spectrum, which would be difficult to combine with the aesthetics of Japanese traditional music. Considering these facts, the renaissance

tenor recorder was chosen as the solo instrument.

The timbre of the renaissance tenor recorder is not 'aligned' to good resonance tones whereas the modern recorder has nearly equal resonance for any note. According to the recorder player Ulrike Volkhardt[2], the notes can be classified into 'good notes' and 'bad notes'. For bad notes, the resonance is remarkably decreased and, because of this, these notes have not been used in conventional music[3]. These bad notes can, however, easily produce multiphonics. Applying these three types, 'good notes', 'bad notes' and 'multiphonics', to structure the instrument part in terms of timbre, the piece explores ways to relate to the three acoustical stages of traditional Japanese music discussed above.

3.1.3 The compositional plan

The piece is planned as a semi-structured composition in three parts. The first part is inspired by the acoustical structure of *gagaku*, the second part is inspired by *gidayu* and the third part is inspired by *noh*. The main characteristics of *gagaku* are:

- modulated melody without any dramatic progression;
- high frequency harmonica-like background sound played by the sho[4];
- much *portamenti* and heterophony.

In *Higashi-e!* these factors are modified and symbolised. The sho as background sound to the hichiriki[5] is saturated with inharmonicities. However, as the background

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[2] Professor of the recorder course at Folkwang Hochschule Essen, Germany. *Higashi-e! (Nach Osten!)* was commissioned by Ulrike Volkhardt.

[3] Interview 9th September 2004.

[4] The sho is a panpipe-like instrument used in *gagaku*. Unlike other Japanese instruments only the sho plays chords.

[5] The hichiriki is double reed instrument used in *gagaku*. Its sound is very loud and stands out among other *gagaku* instruments.

for the tenor recorder, such a 'noisy' sound masks the live solo part as the partial tones of the tenor recorder are quite few and the highest frequency reaches only around 6000 Hz. Considering the combination of the sho and the hichiriki from the viewpoint of acoustical structure, a harmony of sine tones was chosen for the background sound of the tenor recorder. As the aim of this composition is not the simulation or direct quotation of the sound of *gagaku*, but extracting and generalising it in the context of live-electronics with a Western instrument, sound characteristics of *gagaku* are laid out in an abstract way. The harmony by sine tones corresponds to the *portamenti* played by performers to create heterophony, which was originally produced in *gagaku* by the ryuteki[6] and the hichiriki. The 'noisy' role of the sho is provided by frequency-modulated sound, but not as 'thick' as the sho harmony.

The second part refers to *gidayu*, which represents the third stage of development of the sound aesthetics mentioned. The basic instrumentation of *gidayu* is a duo of a male storyteller and a large shamisen, the futozao. As a performance is about 2 hours long or more, several storytellers and futozao players share scenes, but the basic relationship between the two is always the same. '*Tsukazu, hanarezu*' is the motto of *gidayu* music. This means, 'not to stick too close, but not to go far away'. They play unison, heterophony and totally different melody and rhythm. This variation of musical dialogue produces the tension of *gidayu* music.

In the second part the sound of the recorder is sent to the Noise Sculptor[7] programme in Max/MSP. The peak frequencies up to 16th in the spectrum are picked up every 16 milliseconds and applied as the central frequency values of multifilters which sculpt white noise. By live operation of the computer part, the sculpted white noise is given subtle or more variable delay, or immediate response, and also a rough shape in frequency range using a biquad filter, which is also controllable live. These parameters of operation work together to produce various nuances of musical

[6] The ryuteki is a kind of flute used in *gagaku*.

[7] Noise Sculptor is a sound processing programme in Max/MSP designed by the author in 2004.

relationship between the two.

The third part refers to shakuhachi and *noh* music as representatives of the second stage of the aesthetics mentioned. The music begins with breath noise of the instrumentalist which is to be developed to a pitch. Then it leads to some improvisation of shakuhachi-like phrases. From the second half the music adopts *noh*-like expression. The phrases include rather *noh*-like ornaments and *portamenti*. A high, sharp overblown phrase which is derived from a *hishigi*[8] phrase in *noh* music is required at the end of this part. The computer part plays sound-files preprocessed from recorder sounds. Playback speeds and volumes are controlled in real time. The sounds in the first half refer to the sound of the shakujo[9] which is a metal instrument used for Buddhist ceremonies and by pilgrims. The sounds in the second half, a low roar, refer to the aesthetics of *noh* and *shomyo*.

3.2 An exploration of the creation of 'organic' sound world: *Summer Grasses* (acousmatic music)

Compositional aim

The sound described in Japanese by the terms *katai* (hard), *kitsui* (hard and sharp) and *surudoi* (sharp) refer to the high-middle frequencies which give a sharp and hard impression, and are not preferred. This type of sound can be described overall by the term *kinzokuteki* which means 'metallic'- not necessarily an actual metal sound, but meaning 'uncomfortable and offensive'. Sharp sounds are also used in traditional Japanese music, but not for their timbral expression. They are played only to give occasional short impact. The Japanese seem to feel these impulses as 'not metallic'.

This composition mainly aimed:

[8] *Hishigi* is a high and loud melodic phrase played by the *noh*-flute in *noh* music.
[9] The shakujo is a stick which has several metal rings on its top.

- to examine what *kinzokuteki* means. For this purpose, choose metallic sounds (produced by metal material) and 'metallised' sounds (whose material is not always metal, but sounds metallic) were chosen, and ways of making them coexist with 'organic' sounds were explored;
- to examine whether *ma* can be created without performers.

For the first aim the characteristics of the *kinzokuteki* sound was clarified as follows:

***kinzokuteki* sound**	**metallic sound**	**non-metallic sound**	**metallised sound**
Includes sharp and loud high frequencies especially around 7-8000 Hz.	Not always includes sharp and loud high frequencies.	Can include sharp and loud high frequencies.	Includes sharp and loud high frequencies around 7-8000 Hz.
Includes continual extreme variation of amplitude.	Not always includes continual extreme variation of amplitude.	Not always includes continual extreme variation of amplitude.	Includes extreme variation of amplitude.
Includes regularity in behaviour which gives the impression of machinery.	Does not include such regularity.	Does not include such regularity.	Can include such regularity.

Figure 3.1: Comparison of characteristics between *kinzokuteki*, metallic, non-metallic and metallised sounds.

The expression *kinzokuteki* which is translated as 'metallic' in English does not necessarily refer to actual metallic sound, but seems to originate in the fact that some metallic sounds include high frequencies and can be produced by scraping metal objects. The examination also concluded that *kinzokuteki* is not quite an antonym of 'organic'. In other words, even the sounds produced by metal can be Japanese-like

and can have an organic character. This means they can co-exist with other organic sounds. The sounds which give the impression of being 'metallised' have rich and loud high frequencies and continual extreme variation of amplitude. This has a rather closer affinity with the sound described.

The material

Several kinds of 'metallic' sounds and 'organic' sounds were chosen:

1. Metallic sounds:
   - two recordings of the noise of scraping knives which have mainly the character of 'sharpness';
   - two recordings of the noise of a metal spring toy, 'tom-boy', which have mainly a continual variation of amplitude;
   - a metallised sound caused by time stretching;
   - a metallised cicada sound made by granular synthesis.

2. 'Organic' sounds:
   - A mixed insect sound which was applied as data for a formant filter;
   - 'Silence' played as *ma* recorded in a performance of *Himorogi II,* which includes a metallic noise.

Sound processing

1. Formant filter with insects' formants:

   To create subtlety and to reduce the frequency range as mentioned; The insects from which formant data were derived are all found in Japan. The insects for which formants have been tested are:

- Blue *matsumushi* cricket
- *Bell-ringing* cricket
- *Tsuzuresase* cricket
- Large cricket
- *Cogon* cricket
- *Winged Bush* cricket
- Fruit cricket
- Giant katydid
- Wood katydid

The effective formants which are applied to the composition *Summer Grasses* are:

- Blue *Matsumushi* cricket
- *Bell-ringing* cricket
- *Tsuzuresase* cricket
- Large cricket
- *Winged Bush* cricket

2. Time compression and higher pitch shift without time correction:

   Mainly to create subtlety in behaviour such as subtle fluttering-like sounds of tiny insects. The sound materials were not chosen because of their original characteristics, but because they were likely to be adequate for creating the imagined sounds through processing. The sound materials used for this purpose consist of a recording of insects' sound and a recording of the sound of continually scraped knives.

3. Sound analysis/resynthesis by *Diphone*:

   Mainly to create a more complex irregularity of granular sounds. The

sound material used for this is a long recorded 'silence' of *Himorogi II.* This 'silence' actually includes many subtle percussive noises and ambient noises.

On the other hand, avoided sound processes were:

1. Time-stretching:

   Through the analysis mentioned, it was concluded that time-stretching has a 'sound-metallising' function.

2. Granular synthesis:

   This function cuts sounds into fragments and breaks the flow of sounds. Also the detail of the material is lost.

3. Delay:

   The use of delay risks breaking the flow in which the decay of a sound leads to *ma.*

To create *ma,* the dynamic expression of Japanese traditional music was applied. The dynamic expression of less than *ppppp* as far as the vanishing point of hearing and sharp pulses to *fff* make an acoustic contrast which can also be heard in Japanese traditional music. In other words, this acoustical contrast is common in the structure of Japanese traditional music.

Spatialisation and localisation

The typical traditional space design seen in *kabuki* theatre was applied. The idea is to set a stage not only to the front, like a framed picture, but also using sides to rear so that the performance space includes the audience and the performance could be received more immediately. In some *kabuki* scenes, actors

perform both on the left and right side-stages simultaneously. The scene to be watched depends on the decision of the audience.

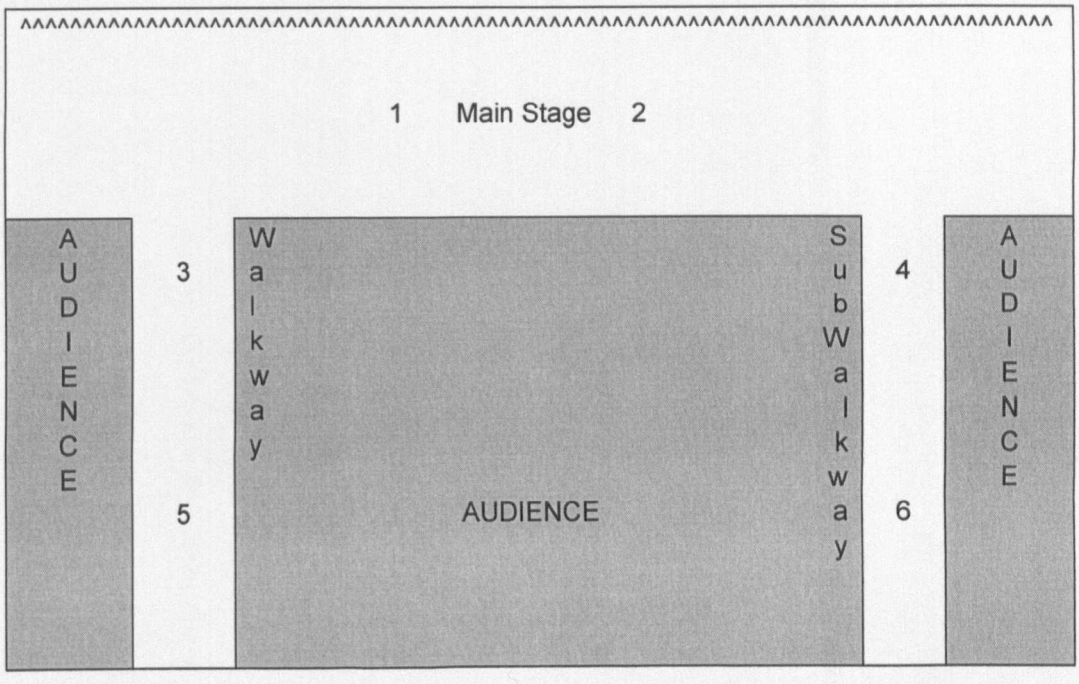


Figure 3.2: *Kabuki* auditorium and loudspeaker setting for *Summer Grasses.*

In the piece *Summer Grasses*, a multi-loudspeaker system with 6 channels is used in order to produce a similar space to the *kabuki* theatre. Here the speakers are used as stereo pairs of 1- 2, 3- 4, 5- 6 as in Figure 3.6 and also in free combinations such as 1- 3, 1- 4, or 2- 3, 2- 4, or 2- 4- 3, etc.

A well-known old picture drawn by Hiroshige Ando titled *A Picture of Listening to the Insects*, a well-known old short *haiku* by Basho Matsuo and an appreciation of Japanese swords which were produced as art-crafts helped to create a

fantasy of insects and a metal sound world. An English translation of this poem (by David Cobb) is:

> Summer Grasses...
> traces of dreams
> of ancient warriors
> (Cobb.D., 2002)

Conclusion

This thesis focuses on the possibility of composing electroacoustic music that relates to some of the main genres of traditional Japanese music. These genres, *noh*, biwa and shakuhachi music, are defined as timbre-dominant music and their musical characteristics were examined from the viewpoint of electroacoustic composition.

Chapter 1 begins its argument by introducing the distortion between Japanese and imported Western music in Japan which was also partly experienced by the author. This chapter examined the characteristics of conventional Western music and traditional Japanese music, and explored the possibility of bridging these two through the medium of electroacoustic music. Chapter 2 discussed practical issues such as differences between musical parameters and notations of traditional Japanese music and Western conventional music and examines suitable and unsuitable sound processing for traditional Japanese instruments. Chapter 3 extracted the aesthetics of timbre and sound structure of timbre-dominant traditional Japanese music. These were applied to a live electronic composition for a Western instrument, the renaissance tenor recorder, and an acousmatic composition.

During the research, findings converged into two main areas: timbre and *ma*. The first area concerns aesthetics and musical parameters in timbre and sound structure. This area is an investigation of little-known musical scales and parameters of Japanese instruments, and music corresponding to their notations which appear to influence the flexibility of their performance together with an exploration of flexibility in the computer part. In this investigation the most developed aspect of Japanese music was concluded to be timbre-dominant. Finding significant timbral parameters seemed to be essential for any compositional strategy to structure the music. The research concluded that this strategy based on timbral scales and flexible parameters contributes to composition using live electronics to allow vivid and strong musical statements.

Distinguishing subtle differences and setting parameters in timbre might also give modern Western instruments an opportunity to develop playing technique. Modern Western instrument makers have enlarged the range of expression by achieving louder resonance, by producing both higher- and lower-registered instruments, and have designed instruments in order to achieve timbral consistency across the full range. At the same time, composers and performers have invented new extended techniques. This tendency to extend territory and equalise tone quality reflects the sound aesthetics of 19th- to 20th- century Western music.

As for Japanese instrumental development, until the importation of Western music this was directed towards the internal structure of timbre. However, the Japanese forgot such delicate expression in contemporary music by employing the parameters of Western music, which treat every tone equally. Castellengo and Fabre (1994: 217-237) point out how the Western transverse flute has developed the expression of breath noise and is getting closer to the shakuhachi in modern pieces, but they also point out that this application has been limited to breath noise and that no other techniques in timbral expression have been adopted. The background of this phenomenon could be that Japanese musicians' interest at the time was only focused on how to 'develop' their techniques in the same way as Western composers[1], and also that composers of Western-style music did not realise that the internal structure of timbre was an essential component of Japanese traditional music. However, this research concludes that there is great potential for instrumental expression in the exploration of internal structure in timbre. Indeed, modern instruments have been 'developed', but this state nowadays is not necessarily the ultimate one. They can develop further by making better use of musical parameters of other instrumental traditions and setting new goals.

The second area, *ma,* concerns musical timing during performance. Throughout the research the question "what is *ma*?" has constantly arisen. This term has been treated in a mysterious oriental sense because there is no term which has

[1] For example, multiphonics on the shakuhachi and chords on the biwa.

the same definition in English. However, as this term is so usually and commonly used and deeply rooted in Japanese culture, and also its usage is vast, even the Japanese cannot explain it easily.

Several usages as well as explanations of this term have been given in music, plays, architecture, literature, drawings, calligraphy, etc. In these explanations *ma* is mostly defined as 'between two things,' 'the distance between things', or 'the interval between two events'. As the Chinese character for this term means precisely 'between', Malm's definition, 'space between events', might also be fundamentally adequate. These definitions and explanations imply that *ma* is 'something' which exists 'in between'. Supposing one takes *ma* as 'emptiness' (as defined by Konparu), this term implies that there is a container in which 'emptiness' exists. 'Something' which the *noh* performer sends as 'nothing' is to be received by the audience as a message of 'nothing exists in a container', namely, 'empty'. This is different from the 'nothing' at the real end of a performance, for example, which the audience should be able to distinguish from 'presented nothingness' by feeling something. To catch the message of 'really nothing (is to be sent any more)', the audience must judge how the two entities, the preceding entity or event and the entity or event which is expected to come, will be related to each other. When the 'between' is too long and the tension decreases, they judge that this is the 'real end (with nothing after it)'.

The following table is a collection of usages of the term *ma*.

Japanese	**direct translation /meaning**	**observation on *ma***
Ma ga yoi (warui) 間が良い	*Ma* is good (bad) /good (bad) timing	Timing (of two things) there are two different time flows
Ma ni awanai 間に合わない	Does not match *ma* /cannot be in time	There are too many events to do before a deadline. *Ma* concerns time and events
Ma ni awaseru 間に合わせる	Substitute something less good for *ma*/ make the best of something	*Ma* seems to need something to be filled
Ma ga nukeru 間が抜ける	*Ma* falls away	*Ma* seems to concern tension
Ma ga aku 間が空く	*Ma* becomes long /long time since something	*Ma* is between two events. When *ma* becomes too long, tension drops
Ma ga tsumaru 間が詰まる	*Ma* becomes too short or narrow /time or space between events becomes short	Time or space between events or things. Tension becomes higher
Ma nobi suru 間延びする	*Ma* is expanded /slow behaviour	When this happens, tension drops
Ma ga nai 間が無い	There is no *ma* /time is not enough	Time to do something. *Ma* concerns time and events in it
Ma giwa 間際	Just before *ma* /just before a particular time	A particular moment in the future

Japanese	**direct translation /meaning**	**observation on *ma***
Ma ga motaanai 間が持たない	Cannot hold *ma*/not fill up all the time	*Ma* needs events to fill it up
Tsukano ma 束の間	A bunch of *ma* /momentary, short-lived	Moment
Matataku ma 瞬く間	*Ma* of a blink /moment of blink	Moment
Atto iu ma あっと言う間	*Ma* during shouting 'Ah!'/moment of shouting 'Ah!'	Moment
Ima 居間	Living room	Space
Tokono ma 床の間	An alcove for display of flower arrangement, etc	Room or space
ma ai o toru 間合いを取る	Take enough *ma*	Space, distance or time between things or events

Table 1 of Conclusion: Usages of the term *ma*.

Although the direct translation does not make sense in English, here it is employed in order to show how the term *ma* is used in conjunction with verbs and adjectives. These usages can be classified into several different meanings of *ma*. These are:

- timing;
- time, period, duration from one particular moment to another moment in the future;
- time which concerns events in it;
- time and frequency of events or density of things which affects tension;
- a particular moment;
- a particular space;
- a particular room.

Through this observation it is inferred that *ma* is a term which concerns time, space and events/things which fill it.

Recognising this, the application of the acoustical structure and sound aesthetics of traditional Japanese music was explored through the composition *Summer Grasses*. The real charm of electroacoustic music may be that of its glorious spectacular sound resounding in a diffusion space. Unlike these 'standard' acousmatics, *Summer Grasses* pursues the high-tensioned air produced by subtlety in timbre and sound, and silence. The intimacy of sound for a receiver is its great concern. Considering the fact that music can first be realised through the stimulation of hearing perception, this point, the intimacy of sound, cannot be ignored. Extracting and applying the essence of traditional Japanese music to acousmatic music provides in this sense a tremendous potential for developing acousmatic music expression.

Several performances of *Summer Grasses* in various venues have revealed

the relationship between time, space and energy of sound as an entity. I originally created a stereo version using Genelec loudspeakers. However, on playing this on ATC loudspeakers it sounded too thin and not powerful enough. It seemed inadequate for a concert hall. Also *ma* appeared too short. For these reasons a new concert version of *Summer Grasses* was created. Some of the feedback from experienced electroacoustic composers present at the concert was as follows:

- (in the concert performance): "ambient noise from the audience prevented me from concentrating on the music";
- "the first time", (listening in the small space of the studio at City University), "I felt the music almost aggressive, but at the concert I felt myself quite safe among the large audience";
- (comparing studio and concert listening): "the second time at the concert, I felt the piece to be shorter."

These impressions seem to imply the following points:

- when the level of ambient noise becomes high, *ma* hardly has any presence;
- among a large audience the presence of *ma* is weakened;
- in a larger space a musical event is felt to be smaller and events are experienced as of shorter duration.

These impressions and experiences above as a whole imply a significant relationship between *ma* as space and *ma* as time. Considering the fact that a performance in a large space is often exaggerated, the relationship between 'space *ma*' and 'time *ma*' could be described as follows:

when 'space *ma*' becomes large, 'time *ma*' needs to be longer.

Ma appears between two events in the field of space and time and what exists in 'between' is tension. Tension is dependent on the distance and duration 'between' the two events and the energy of the events. From the viewpoint of this relationship what to cope with in a performance diffusion will be clear. The time factor has always been fixed in 'tape' pieces, including sound files of computer parts in live electronic pieces, whereas the space (including factors concerning the audience and the temperature) is different at every diffusion. To cope with this change in space factors, composers ideally need to adjust 'events' in order to keep the tension of the music as originally designed. The way in which the energy and 'time *ma*' become controllable at any moment of a diffusion will be a future exploration of the author's research.

Appendices

Appendix 1: Photos of traditional Japanese instruments

1.1: Photo of the satsuma-biwa

1.2: Photo of the shakuhachi

Appendix 2: Analysis of the change of partial tones on a single tone of the satsuma-biwa

2.1: Spectrum of the satsuma-biwa

2.2: Analysis of partial tones of the satsuma-biwa

2.3: A transcription of 2.2 on 5-line notation

(Played by Kazuyuki Shiotaka).

Appendix 3: Spectra of shakuhachi sounds

3.1: *U* and *chi no meri*

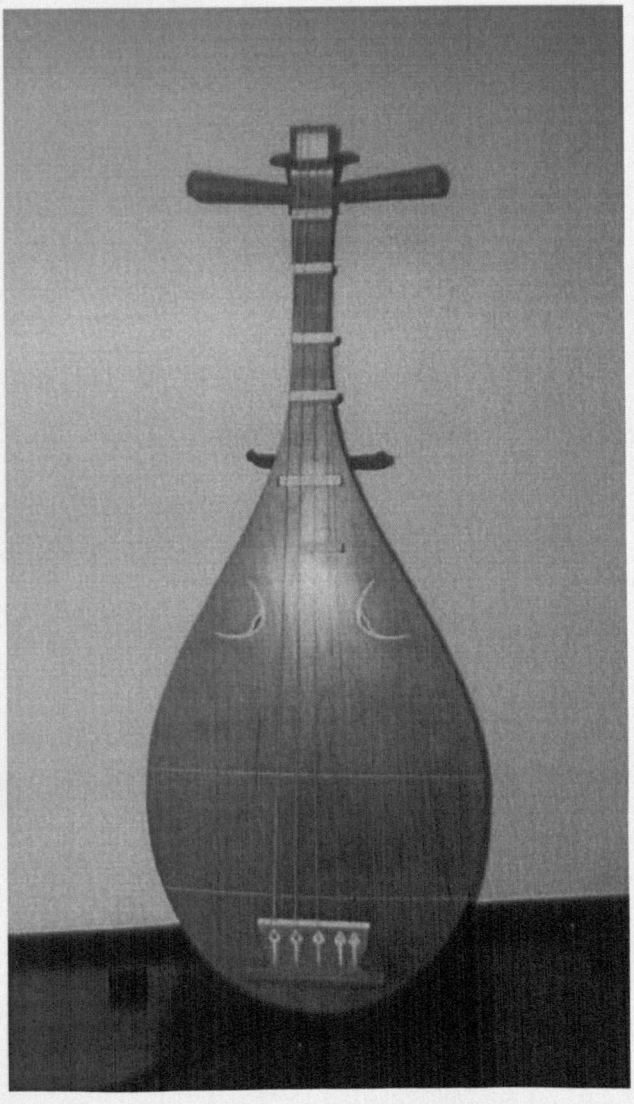
3.2: *Ri-hi5* (*go no hi*) and *ha-ro*

3.3: *Meri* and non-*meri* at *ro*

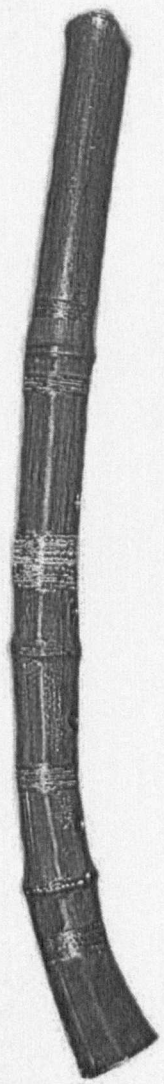
3.4: *Meri* and non-*meri* at *ha245* (*nishigo no ha*)

3.5: *U* no *meri* and the basic tones

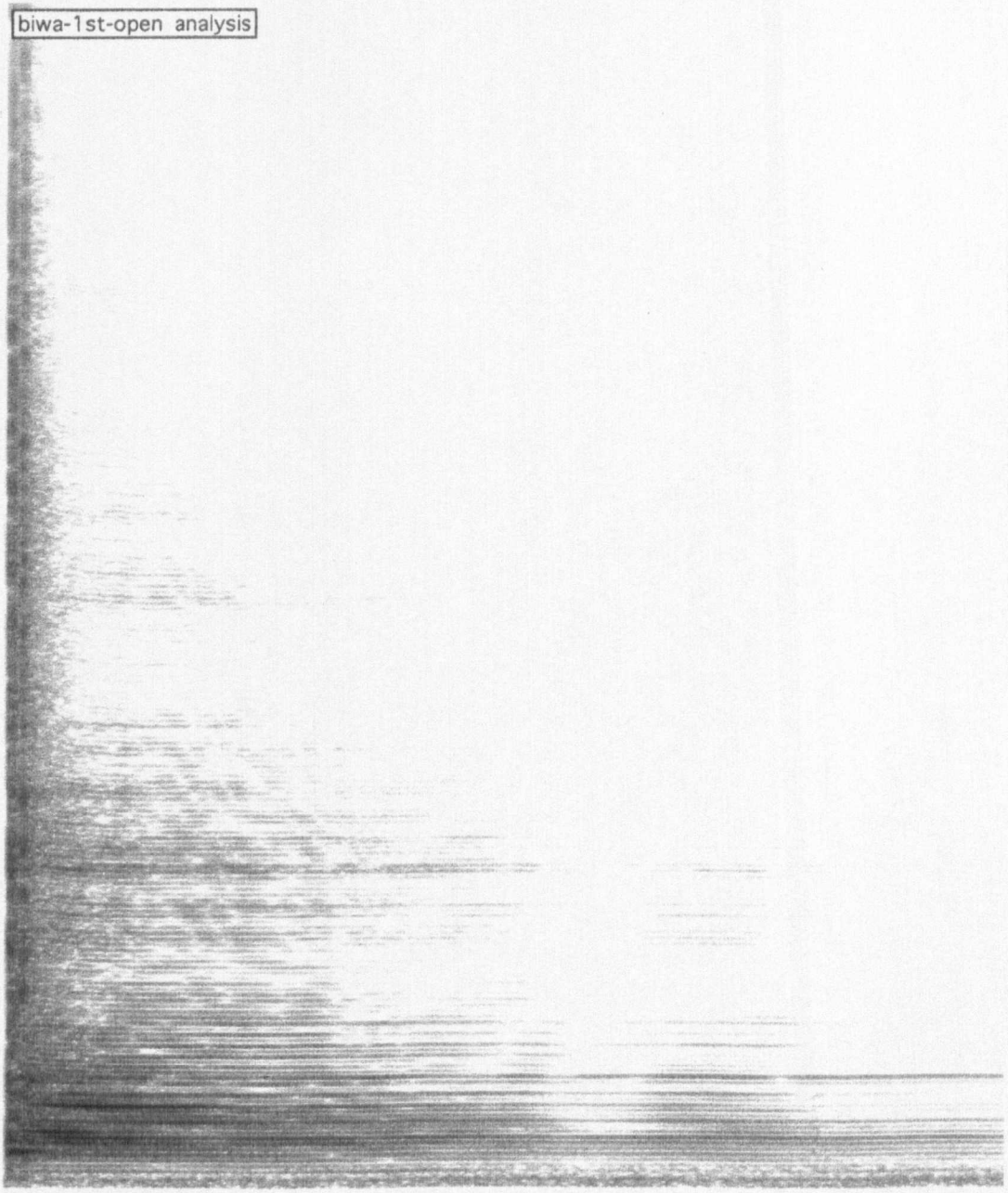
(Played by Ernst Gunnar Linder).



Appendix 1.1: Photo of the satsuma-biwa (Shiotaka model).



Appendix 1.2: Photo of the shakuhachi (photo provided by Ernst Gunnar Linder).



Appendix 2.1: Spectrum of the satsuma-biwa (D#).

0.102 - 0.126

	45.757	-39.883
	80.750	-39.776
	121.661	-33.658
	233.306	-33.670
	307.610	-31.130
	385.587	-30.452
	419.461	-26.992
9.	464.168	-15.992
10.	515.110	-17.326
13.	538.142	-17.884
	557.398	-32.537
4.	617.639	-2.169
	652.269	-33.858
3.	695.434	3.231
	734.885	-36.867
1.	775.042	7.491
12.	799.576	-17.872
5.	852.282	-6.625
	886.699	-25.807
6.	926.845	-7.517
	973.860	-36.788
	1007.102	-22.001
	1039.928	-23.419
	1083.689	-24.795
	1118.921	-26.063
2.	1157.179	3.883
8.	1236.076	-13.674
	1262.803	-28.336
	1281.781	-28.316
7.	1308.559	-13.656
	1356.592	-39.363
	1388.800	-27.667
	1437.745	-37.766
14.	1465.324	-18.623
	1495.922	-25.629
	1514.415	-32.832
	1541.905	-19.920
	1565.136	-20.742
	1596.139	-38.927
11.	1622.874	-17.803
	1654.558	-33.220
	1700.381	-21.503
	1775.610	-21.997
	1821.859	-37.142
	1854.229	-31.580
	1933.509	-26.647
	1972.990	-39.424
	2008.133	-24.969
	2084.451	-29.649
	2120.873	-37.234
	2159.002	-31.228
	2167.064	-32.034
	2245.306	-20.466
	2269.492	-35.686
	2315.260	-32.921
	2392.766	-35.343
	2409.286	-32.960
	2469.174	-36.370
	2552.552	-37.651
	2613.615	-38.911
	2648.584	-39.760
	2678.192	-38.770
	2707.801	-39.724
	2782.604	-35.019
	2858.532	-39.597
	3009.265	-38.909
	3169.079	-36.999
	3275.742	-38.795
	3325.916	-38.444
	3411.084	-33.378
	3468.249	-34.480
	3550.798	-32.564
	3596.045	-39.727
	3625.645	-38.474
	3708.118	-35.031
	3782.593	-26.864
	3854.443	-39.226
	3942.558	-35.528
	4016.805	-32.032
	4179.576	-34.853
	4249.244	-35.984
	4331.138	-27.717
	4396.903	-20.767
	4443.927	-38.821
	4468.635	-37.382
	4487.026	-38.315
	4511.207	-39.393
	4556.126	-26.580
	4626.947	-38.427
	4704.576	-32.844
	4750.750	-38.922
	4786.166	-34.233
	4864.513	-33.084
	5013.029	-33.036
	5102.021	-35.234
	5168.551	-34.648
	5248.718	-39.885
	5395.206	-36.855
	5414.507	-35.727
	5474.824	-35.703
	5553.005	-36.417

0.138 - 0.158

	24.865	-37.102
	80.653	-34.785
	121.139	-31.906
	148.041	-39.312
	231.098	-28.100
	307.594	-28.182
	383.074	-26.373
	417.951	-30.390
11.	461.407	-13.358
	514.236	-20.037
9.	539.683	-12.459
4.	615.754	1.154
	654.522	-30.331
	670.188	-24.096
3.	693.657	7.232
	730.957	-34.412
2.	773.173	8.116
6.	847.341	-6.154
5.	922.651	-5.482
	1008.418	-24.144
	1038.775	-25.259
	1088.035	-21.974
1.	1154.289	9.830
8.	1231.099	-9.416
	1268.587	-29.523
7.	1310.181	-6.931
	1385.119	-23.650
10.	1461.614	-13.301
	1483.315	-23.035
	1509.606	-31.638
13.	1536.287	-15.833
	1565.102	-24.680
	1588.152	-38.293
12.	1619.028	-14.821
	1690.009	-23.089
	1729.540	-38.023
	1771.868	-18.724
	1795.331	-36.654
	1814.312	-37.302
	1841.072	-33.745
	1870.393	-35.023
	1931.877	-22.793
	1999.745	-26.130
	2081.747	-23.237
	2124.794	-35.827
	2151.647	-23.934
	2226.346	-27.908
	2245.642	-25.999
	2312.587	-35.691
	2406.875	-35.884
	2457.651	-36.150
	2619.126	-36.029
	2688.187	-32.636
	2863.916	-39.037
	3001.145	-33.447
	3081.917	-39.320
	3165.381	-39.441
	3385.639	-31.566
	3470.156	-30.127
	3539.627	-31.271
	3625.631	-38.907
	3691.470	-32.263
	3773.251	-22.668
	3849.060	-39.519
	3919.408	-29.915
	3940.803	-36.929
	4000.990	-29.828
	4024.019	-37.002
	4163.983	-37.408
	4182.825	-39.637
	4227.572	-31.865
	4308.730	-24.647
	4389.761	-15.453
	4450.251	-32.856
	4476.026	-34.573
	4536.464	-30.681
	4557.436	-30.141
	4614.611	-28.318
	4694.761	-29.963
	4734.599	-38.587
	4780.646	-36.062
	4845.813	-36.241
	5002.615	-29.770
	5101.687	-37.266
	5166.229	-30.598
	5392.801	-33.179
	5425.740	-38.398
	5451.647	-35.529
	5476.724	-34.621
	5535.961	-35.117
	6002.380	-38.972

0.170 - 0.190

	24.210	-38.887
	51.130	-39.142
	78.078	-37.614
	106.303	-38.059
	129.018	-37.479
	153.457	-38.763
	228.909	-25.911
	306.877	-28.239
	383.788	-24.262
	411.777	-38.521
12.	458.899	-13.912
	513.182	-27.909
8.	538.005	-11.867
4.	613.719	0.795
	644.392	-27.040
2.	691.333	5.633
3.	770.746	3.196
9.	847.534	-12.445
	896.286	-34.155
6.	919.099	-6.892
	960.241	-33.456
	1000.846	-21.730
	1039.812	-32.427
	1072.937	-20.068
	1101.556	-31.648
1.	1152.197	12.395
7.	1229.677	-8.814
5.	1306.771	-6.464
	1378.688	-25.778
11.	1457.872	-13.003
10.	1532.620	-12.830
	1555.062	-28.359
	1569.672	-30.984
	1610.504	-20.574
	1684.654	-21.300
	1764.300	-24.612
	1845.156	-28.062
	1926.955	-25.115
	1989.334	-29.472
	2007.660	-32.748
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	2087.616	-32.988
	2147.527	-23.351
	2400.952	-39.914
	2624.324	-38.078
	2685.606	-34.357
	2839.676	-39.304
	2994.630	-34.701
	3069.354	-38.392
	3150.415	-36.770
	3221.921	-39.291
	3296.993	-37.375
	3372.635	-37.501
	3393.280	-34.802
	3451.198	-33.318
	3474.915	-38.001
	3525.773	-31.081
	3685.994	-35.708
	3756.549	-28.188
	3775.476	-32.826
	3912.996	-27.870
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	4295.028	-29.463
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	4370.292	-21.523
	4394.239	-22.871
	4444.889	-25.586
	4525.688	-32.478
	4549.974	-38.332
	4600.543	-30.820
	4672.964	-34.022
	4694.188	-37.300
	4753.827	-38.131
	4842.248	-38.112
	4982.220	-38.475
	5003.776	-34.307
	5139.892	-35.822
	5167.360	-37.755
	5224.503	-38.738
	5367.051	-35.717
	5443.984	-33.275
	5521.745	-35.936

0.202 - 0.232

	71.379	-37.004
	96.664	-35.619
	122.169	-37.631
	229.961	-29.300
	304.588	-32.794
	382.715	-27.532
9.	459.394	-15.407
10.	536.300	-15.721
3.	611.668	-5.214
	653.235	-30.183
	659.721	-30.425
2.	688.623	0.223
4.	768.468	-8.741
	849.123	-19.981
5.	917.104	-10.193
	997.182	-19.710
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1.	1149.187	8.618
7.	1227.229	-13.173
6.	1301.658	-11.746
	1378.704	-29.044
	1454.089	-19.674
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	1606.854	-27.146
	1686.423	-19.925
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	1773.839	-38.606
	1835.784	-27.206
	1924.542	-37.098
	1990.911	-27.164
	2069.360	-26.443
	2144.814	-26.412
	2221.956	-29.509
	2678.200	-39.337
	3142.631	-37.849
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	3369.181	-35.633
	3451.077	-36.503
	3521.551	-37.277
	3750.340	-35.869
	3905.831	-31.627
	4210.932	-37.828
	4286.398	-33.221
	4364.776	-27.573
	4389.447	-35.604
	4440.155	-27.843
	4528.336	-38.169
	4593.025	-32.111
	4670.382	-32.393
	4745.411	-38.799
	5359.073	-38.727
	5436.776	-36.789

0.234 - 0.257

	38.415	-37.173
	73.540	-32.468
	97.642	-28.536
	230.415	-26.695
	304.471	-30.155
	381.378	-25.039
	414.423	-35.574
7.	459.485	-10.938
	500.416	-35.666
8.	536.008	-11.822
3.	610.448	-3.095
	634.659	-29.405
	663.215	-27.574
2.	687.443	2.947
	740.102	-36.577
9.	760.639	-11.995
	775.255	-16.065
	842.509	-17.716
4.	916.704	-5.459
	994.949	-14.603
	1046.988	-37.728
11.	1073.456	-12.493
	1111.535	-32.002
1.	1147.285	11.910
	1192.413	-34.756
10.	1225.396	-12.458
5.	1299.460	-8.569
	1321.729	-35.184
	1378.381	-26.104
	1453.038	-18.878
6.	1530.848	-10.512
	1603.519	-23.770
	1623.111	-30.916
	1682.913	-16.791
	1758.253	-25.364
	1835.287	-21.388
	1926.337	-34.877
	1990.304	-21.121
	2067.967	-22.361
	2144.397	-22.317
	2220.470	-25.842
	2293.891	-35.735
	2368.652	-39.547
	2447.487	-35.660
	2522.070	-39.360
	2677.318	-35.308
	2753.179	-36.897
	2830.959	-35.124
	3138.231	-35.088
	3290.472	-37.191
	3367.299	-31.472
	3445.140	-33.853
	3514.668	-37.331
	3674.102	-38.251
	3743.196	-33.628
	3762.927	-38.721
	3823.465	-36.356
	3902.161	-26.870
	3980.959	-39.293
	4205.808	-36.521
	4226.137	-38.392
	4283.336	-28.919
	4360.291	-23.824
	4389.145	-35.795
	4437.463	-24.755
	4526.186	-37.396
	4591.380	-26.155
	4669.725	-27.412
	4742.286	-35.041
	4816.986	-34.773
	4896.108	-39.204
	4972.162	-37.006
	5354.717	-35.384
	5432.992	-32.520
	6349.567	-38.387

0.269 - 0.297

	45.749	-39.603
	75.527	-37.573
	98.428	-30.717
	128.938	-38.432
	229.750	-28.539
	305.926	-32.941
	380.459	-26.927
7.	458.538	-12.442
	499.447	-37.520
8.	535.095	-12.871
3.	610.580	-4.071
	651.379	-37.938
2.	687.820	2.296
6.	768.298	-10.570
	840.848	-19.507
	888.245	-39.230
4.	915.956	-5.512
10.	993.300	-14.462
11.	1068.002	-15.459
	1095.503	-35.903
	1108.960	-31.743
	1122.278	-22.311
1.	1145.708	10.079
	1181.701	-32.578
	1195.093	-38.525
	1222.350	-18.958
5.	1298.455	-8.553
	1375.763	-30.489
	1448.460	-25.722
	1464.672	-27.654
9.	1526.764	-14.005
	1604.633	-20.671
	1679.682	-18.227
	1759.237	-22.174
	1833.237	-20.134
	1908.749	-36.526
	1987.011	-23.108
	2065.393	-27.448
	2142.756	-27.582
	2218.303	-27.405
	2289.443	-33.369
	2366.865	-33.345
	2444.198	-31.546
	2519.339	-34.923
	2598.803	-34.747
	2676.271	-33.751
	2824.106	-33.493
	3135.733	-38.443
	3286.488	-38.661
	3366.155	-36.409
	3437.226	-38.274
	3515.923	-33.522
	3590.662	-39.133
	3671.411	-39.845
	3747.197	-34.622
	3822.868	-35.290
	3900.196	-29.845
	3978.258	-37.435
	4202.636	-33.813
	4280.694	-29.746
	4356.781	-23.383
	4430.405	-25.162
	4511.318	-38.058
	4588.921	-29.733
	4656.841	-31.717
	4675.042	-33.368
	4740.004	-39.753
	4814.858	-37.854
	4971.469	-38.603
	5197.557	-38.982
	5348.305	-36.490
	5422.619	-32.866
	5496.062	-38.923
	5953.931	-39.941
	6344.206	-39.364

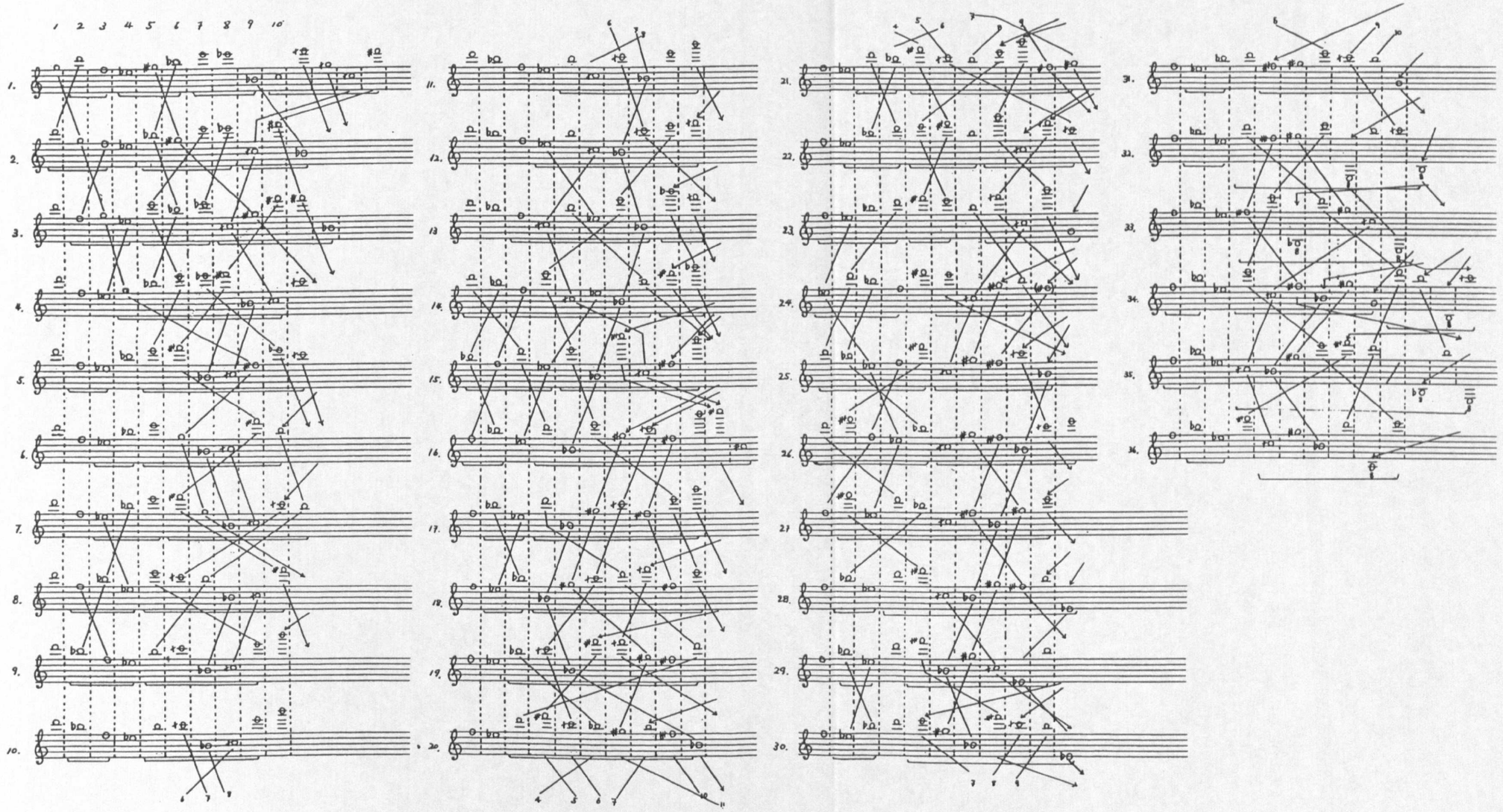
0.309 - 0.337

	78.059	-35.974
	99.588	-37.812
	229.218	-31.485
	304.198	-38.595
	381.297	-27.889
8.	457.540	-16.185
	500.848	-36.823
9.	534.167	-16.348
3.	610.534	-6.579
2.	687.490	-1.421
7.	768.780	-15.077
	840.048	-21.428
	888.245	-39.830
4.	914.611	-8.046
11.	992.028	-16.565
10.	1068.269	-16.509
	1111.539	-34.836
	1121.834	-24.339
1.	1145.062	6.607
	1181.646	-38.813
	1224.882	-24.150
5.	1297.639	-12.121
	1375.429	-38.235
	1455.789	-24.748
6.	1527.679	-14.525
	1603.306	-21.847
	1678.935	-20.169
	1755.977	-26.880
	1832.087	-21.602
	1981.909	-26.179
	2056.960	-35.767
	2075.254	-39.712
	2133.163	-34.137
	2209.878	-38.155
	2291.291	-30.387
	2365.350	-33.544
	2440.722	-33.246
	2518.509	-35.107
	2593.271	-35.017
	2669.082	-35.765
	2822.406	-32.904
	3511.547	-35.269
	3585.278	-39.441
	3738.698	-39.239
	3889.440	-39.524
	4195.777	-36.225
	4285.656	-37.015
	4344.874	-29.345
	4366.830	-36.201
	4424.969	-25.072
	4573.907	-35.774
	4653.727	-33.553
	5340.234	-39.373
	5414.425	-36.871

Appendix 2.2: **Change in the partials (the open first string of the Satsuma-biwa). An example of analysed frequency and amplitude data.**

The order in strength →

period ↓



Appendix 2.3: A transcription of appendix 2.2. The duration of each period is about 30-40 milliseconds.

Appendix 3.1: *U* and *chi no meri.*

Appendix 3.2: *Ri-hi5* (*go no hi*) and *ha-ro*.

Appendix 3.3: *Meri* and non-*meri* at *ro* (left).

Appendix 3.4: *Meri* and non-*meri* at *ha245* (*nishigo no ha*) (right).

Appendix 3.5: *U no meri* as the most tasteful sound of the shakuhachi and the basic tones. Phrases which consist of only basic tones are usually not used in *honkyoku*.

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DVDs

Appendix DVD of *Computer Music Journal* 2004 Winter Vol.28 No.4.

HIROMI ISHII

HIMOROGI II

for

shakuhachi and live electronics

(2003)

For performance

This composition is based on Japanese sound aesthetics which regard *tohne* (sounds in distance) as the most tasteful and elegant. As the *shakuhachi* was historically played out of doors this piece aims to create a virtual space within which the audience might feel as if they were in a field in ancient Japan (not in an actual concert hall). The idea that three virtual wandering Buddhist priests, *Komusoh*, approach gradually to the real performer was used for creating a fantasy. According to this fantasy, sound materials were spatialised and designed for diffusion with a multi-channel system. Panorama movement with spatialisation was very much used in order to simulate three virtual players' wandering routes.

The musical parameters in traditional *shakuhachi* music, *honkyoku*, were applied to this composition. For this purpose the typical phrases of *honkyoku*, which also appear in '*Shin no Kyorei*' were applied. Max/MSP programming works as a 'frame' to trigger the sound files pre-processed. This piece consists of several parts separated by *ma* between them. Each part has several sound files. The sound played by the shakuhachi player is to be sent to the Max/MSP programme. In Max/MSP a sensor-trigger device which makes use of the audio signal triggers each section's patch. This sensor is in place to let the player concentrate on his/her performance. In other words, it is programmed to catch the player's musical timing only through his musical behaviour (not pedaling, or using switches).

The three virtual players have their own musical timings. In principle they do not try to adjust to the real performer's timing. Apart from the several phrases at the end of the piece, they are not playing ensemble but just 'replying' with loose timing. The real player is able to start phrases with shorter or longer *ma* (however, nothing about these timings is suggested exactly), but he/she cannot decide *ma* between the phrases which the other virtual players play.

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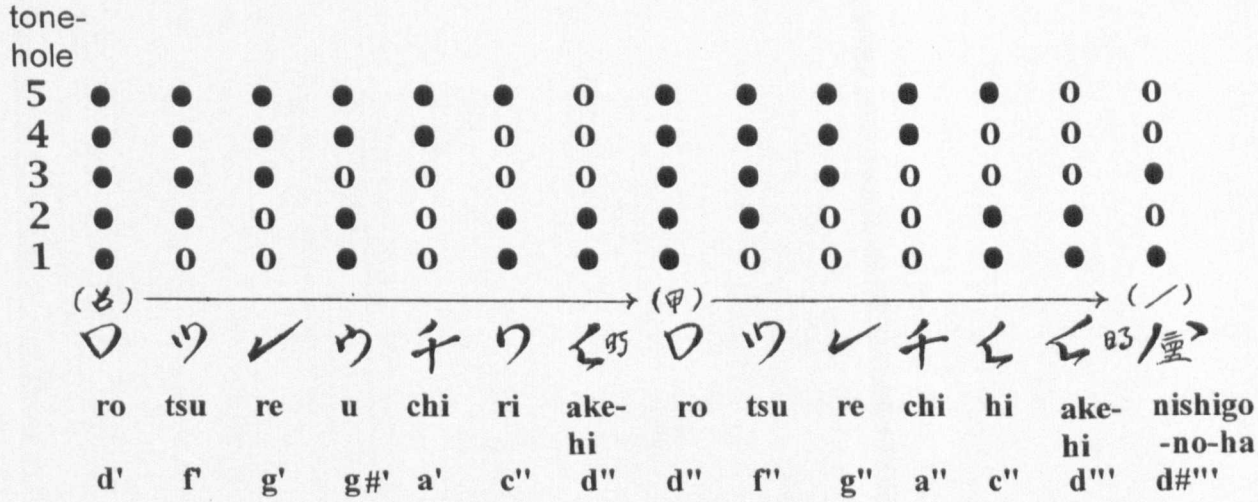
- *Himorogi I I*における尺八の基本音を表わす記号と五線上のおよその音高
the hieroglyphic symbols for basic tones of the shakuhachi used in *Himorogi I I* and the approximate notes in western notation



* 'Ake-hi' is also called 'Go-no-hi' as the 5th tone-hole is opened

- その他の記号
other symbols

メ　メリ・・・・・・・・顎を引いて音を低める
meri　lower the pitch by angling the chin. Timbre becomes dark.

ナヤシ・・・・・・・メリ込んだ音から、ポルタメント風に徐々に音高を上げる
nayashi　gradual portamento-up from the *meri* tone

オシナオシ・・・・・塞いでいる指孔を瞬間的に素早く開けて閉じる
oshinaoshi　open the closed tone-hole and close again quickly

メリ込み、もどす・・顎を引いて音を低め、またもとの音に戻して次の音に移る
merikomi- modosu　lower the pitch by *meri* and higher again before playing the next tone

まる・・・・・・・・・フレーズの終わり
period　end of a phrase

ル・・・・・・・・・打チ/打ツ。開いている第一孔か第二孔を打つように瞬間的に閉じて開ける
ru
uchi/utsu. close the opened tone-hole (1,or2) and open again quickly. Namely, tap the tone-hole

カン・・・・・・・・高いオクターブ
kan
higher octave

ロ、リョ・・・・・・低いオクターブ
ro, ryo
lower octave

ユリ込み・・・・・・ナヤシを繰り返して、次第に細かく揺らす
yurikomi
repeat nayashi and gradually shake the head faster

ラ・・・・・・・・・ハ音の装飾奏法。ロ音に移る際に第二孔を素早く塞いで開ける。
ra
the ornament to Ra. By changing the tone to Ro, close the second tone-hole and open again quickly

アケ（ル）・・・・・孔を開ける。ヒに付されていれば『アケヒ』となり、５孔を開ける。
akeru
' open '. Hi with this symbol, called 'Ake-Hi ', means ' with opening 5 '.

スリ上ゲの消シ・・・音の終わりをポルタメントで上げて柔らかく消す
suriage-no-keshi
heighten the pitch slightly and softly by portamento at the end of a tone

折リ消シ・・・・・・フレーズの終わりに用いられ、音の終わりにメリ込んで（音を下げて）音を消す
orikeshi
note bending. Lower the pitch slightly at the end of a phrase

ムライキ・・・・・・息音をとくに強調する奏法
muraiki
blow a very explosive charge of air into the instrument to create a sound which is part wind and part musical tone

コロコロ・・・・・・特殊な指使いによるトリル。 c"- db", db"-d" のみ可能
korokoro
trill with the special fingering. This is possible only between the tone c"- db", and db"- d"

息ユリ・・・・・・・息ナヤシ。二四五のハを呂と甲で連続交代させる。メリ／カリおよび息によって約長９度音程間の繰り返しをつくる。
ikiyuri
also called *Ikinayashi*. repetition between low and high 'nishigo-no-Ha' (db") and 'Ha' (d#"') to create the interval of about major 9th by the technique of *meri/kari* and breath

カル・・・・・・・カリ。顎をあげて吹く。高めの音高をつくり出す
karu (kari)
Kari. Slightly overblown to produce a higher pitch by increasing the angle of the chin.

二四五のハ・・・・・２、４、５孔を開けるハ
nishigo-no-ha (niyongo-no-ha)
tone 'Ha' by opening the 2, 4 and 5 toneholes*

スリ上ゲ
suriage(portamento-up)

* the name of tone-holes

5 ・・・五 (go)
4 ・・・四 (shi)
3 ・・・三 (san)
2 ・・・二 (ni)
1 ・・・一 (ichi)

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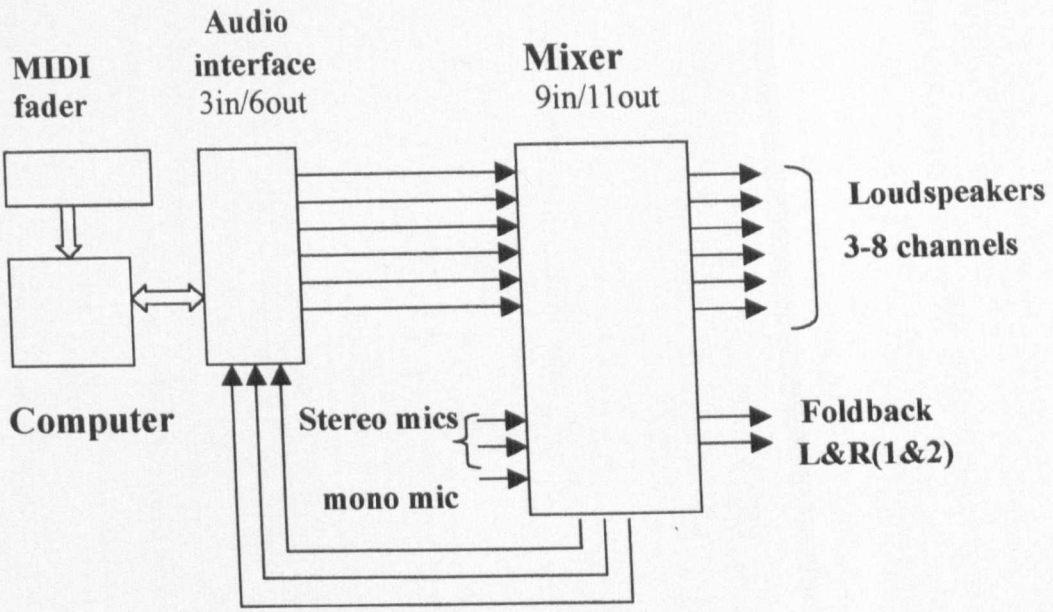


shakuhachi sound from mics (stereo and mono)

System diagram for *Himorogi II*

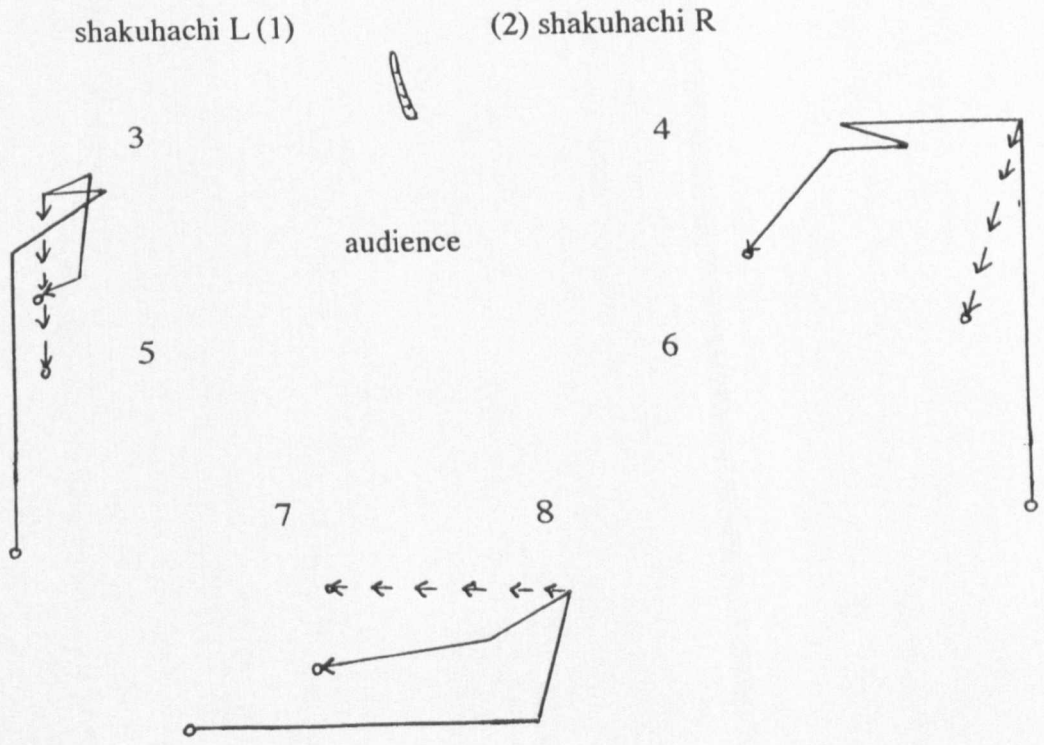
Equipment and software required for performance

Computer : Mac OSX.3.3 or later. Max/MSP 4.5 or later

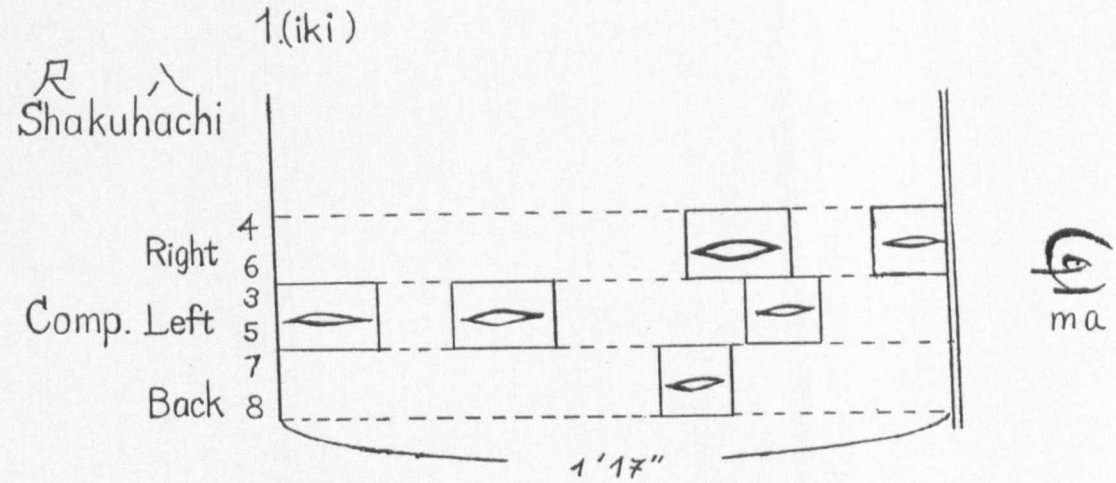
Audio interface with 3in/8out or more

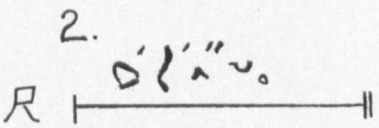
MIDI controller with 4 channels or more fader

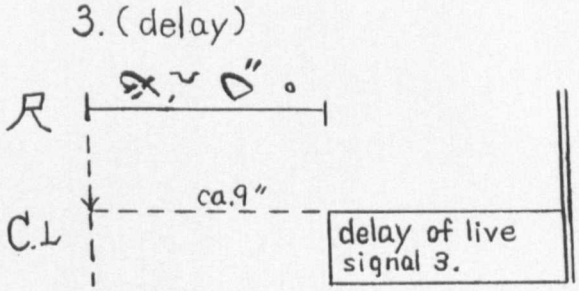
1 extra microphone for Max/MSP 'trigger device'

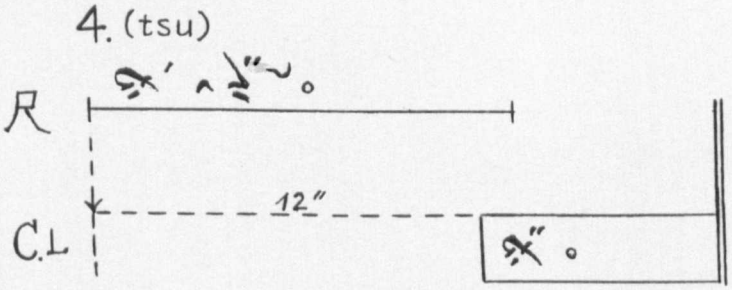


Positioning of loudspeakers and playback channels for *Himorogi II* and the routes of the virtual *komusoh*.



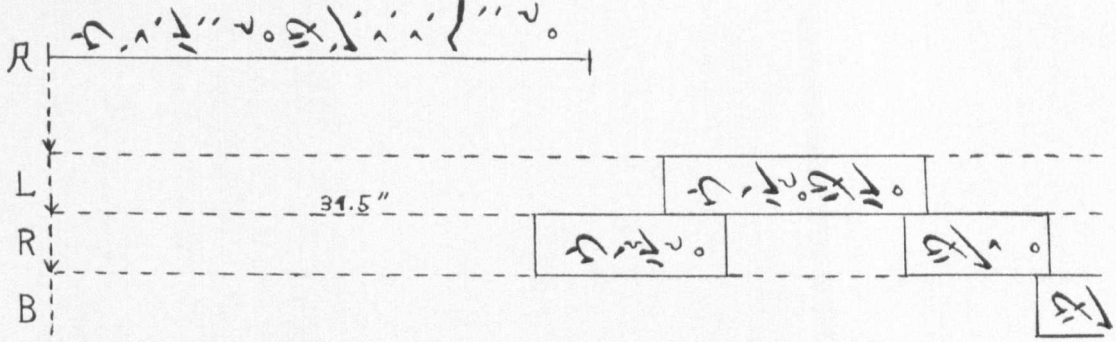


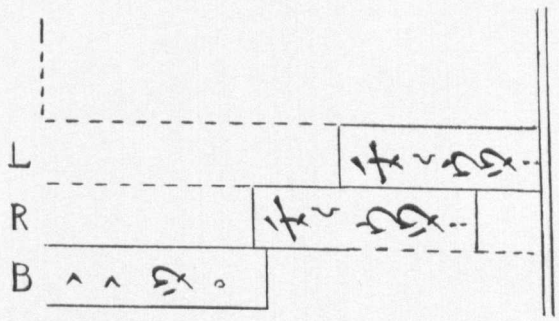




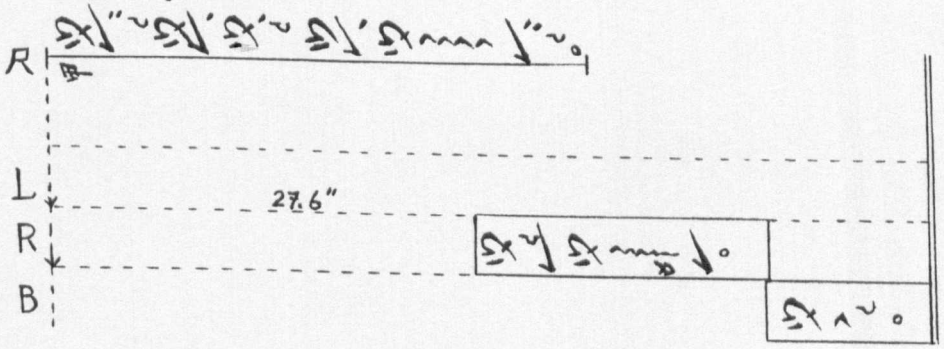
The score is laid out in the normal way. However, the shakuhachi player can rotate it 90° counter-clockwise in order to read the symbols in the normal way.

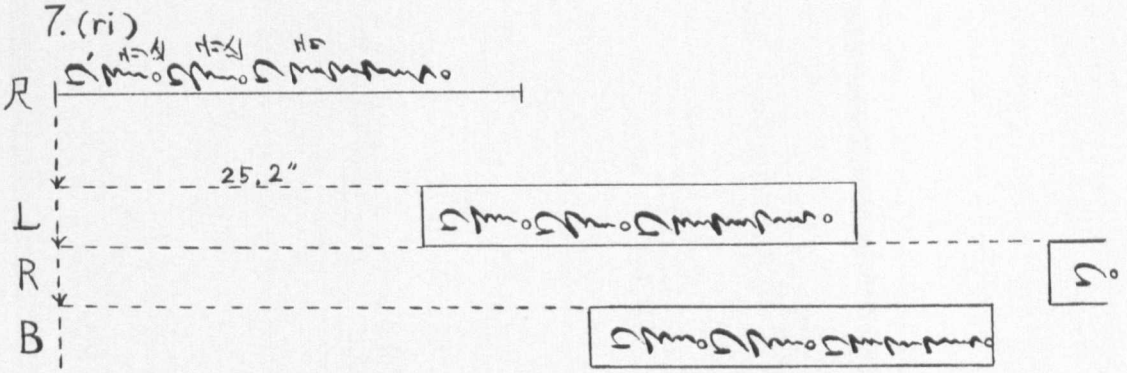
5. (unorus)

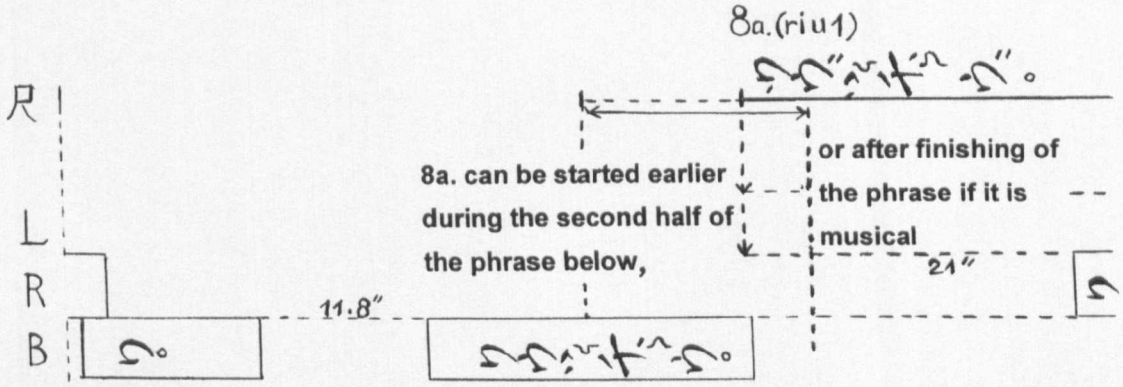


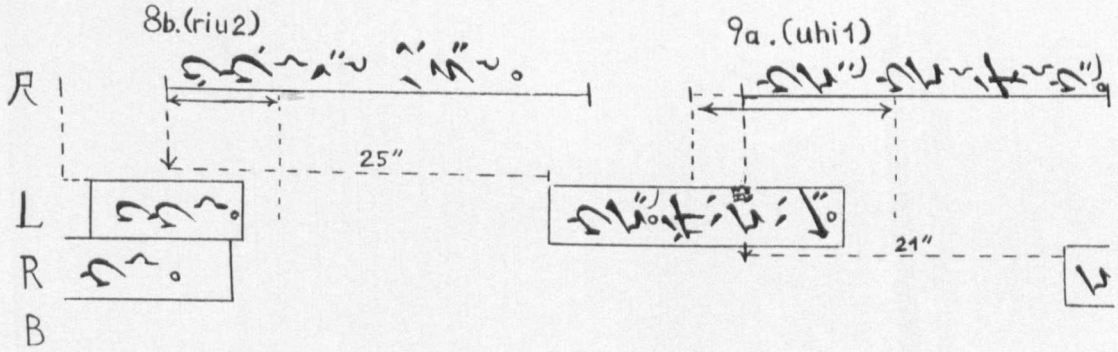


6. (tsure)

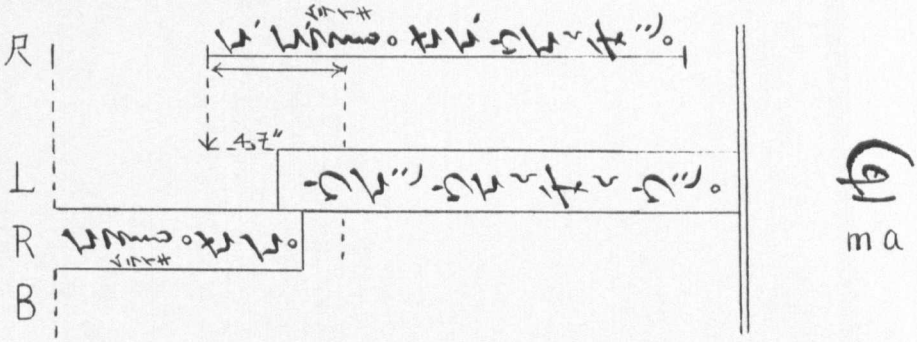



7. (ri)
R
25.2"
L
R
B


8a. (riu1)
R
8a. can be started earlier
during the second half of
the phrase below,
or after finishing of
the phrase if it is
musical
21"
L
R
11.8"
B

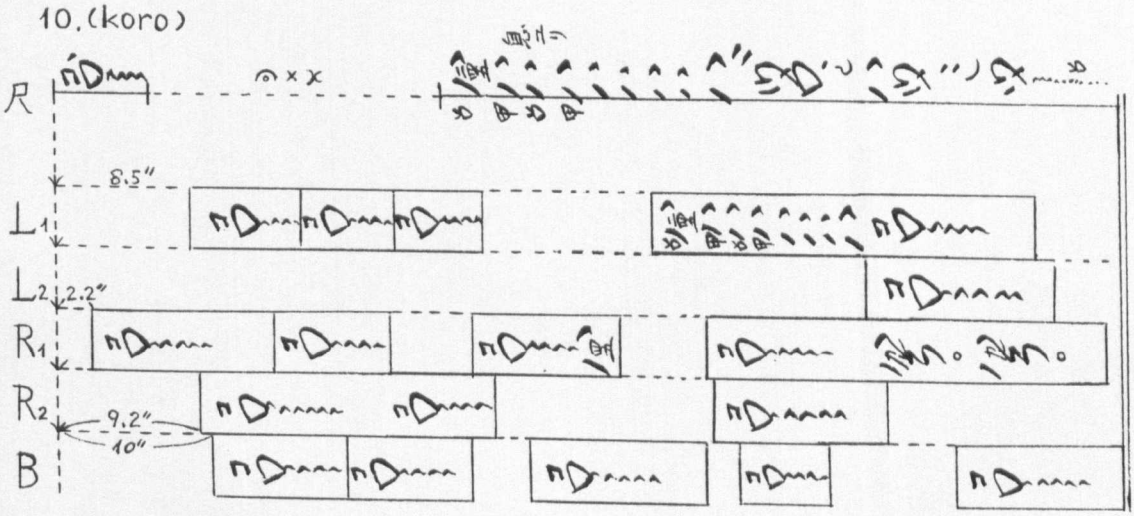

8b. (riu2)
9a. (uhi1)
R
25"
21"
L
R
B

9b. (uhi2)



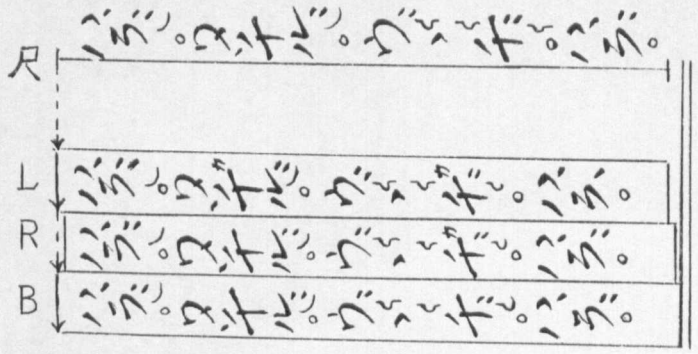
ma

10. (koro)

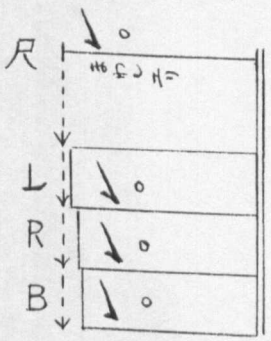


heterophonic - tutti

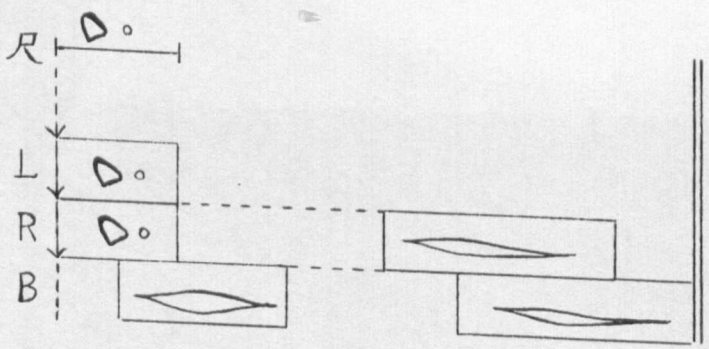
11. (suizen)



12. (mawashiyuri)



13. (ro)



HIROMI ISHII

HIMOROGI I

for

satsuma-biwa and live electronics

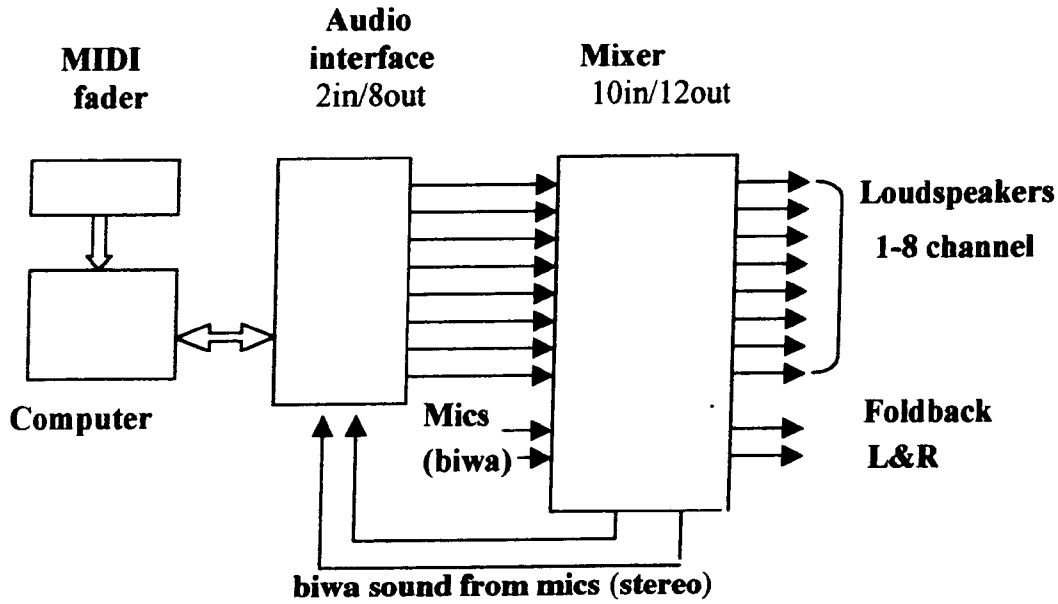
(2003)

For performance

Himorogi I is composed for *satsuma-biwa* and multi-channel live electronics in a line of exploration to relate traditional Japanese music to electroacoustic music. The role of the computer is neither as an extension of the instrument nor as an ensemble partner existing in the same dimension as the instrument. The relation between them is rather similar to that between music and natural environmental sounds for the Japanese in former times. The computer sounds imply and symbolise various legends and folk tales about the *biwa*, the historical fact that the *biwa* has been developed as an accompaniment for story-telling music, and the superstition that archaic things are possessed by spirits. The pre-processed sound materials are to be played by the operator flexibly controlling subtle nuance at their last stages; in timbre, in pitch, in dynamics and in location, corresponding to the instrument's timing and expression during the live performance.

In this piece the musical structure found in several masterpieces of *satsuma-biwa* was developed in the manner of electroacoustic composition. Also the musical parameters are those of *biwa* music. The player is expected to play freely guided only by his musical sense, in the spirit of traditional Japanese *biwa* music, *'ma'*. The free combination play is to be replayed through a multi channel diffusion system with 8 loudspeakers set in a circle. Here, the player should stand face to face with his own past. This is actually the history of the *biwa* itself. Here, the player is required to play something that is quite 'new', but 'biwa-like'.

The title is an old Japanese word which means the sacred place where gods and spirits live.



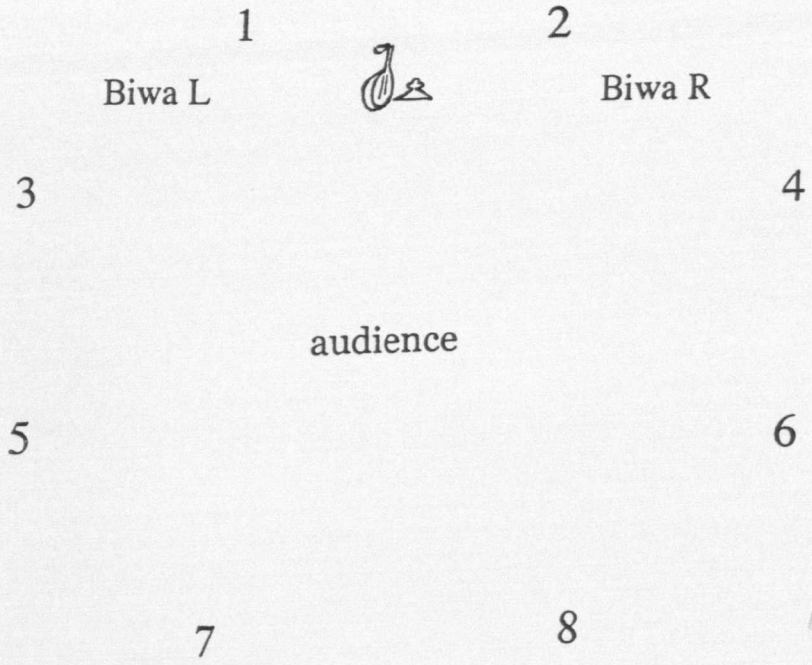
System diagram for *Himorogi I*

Equipment and software required for performance

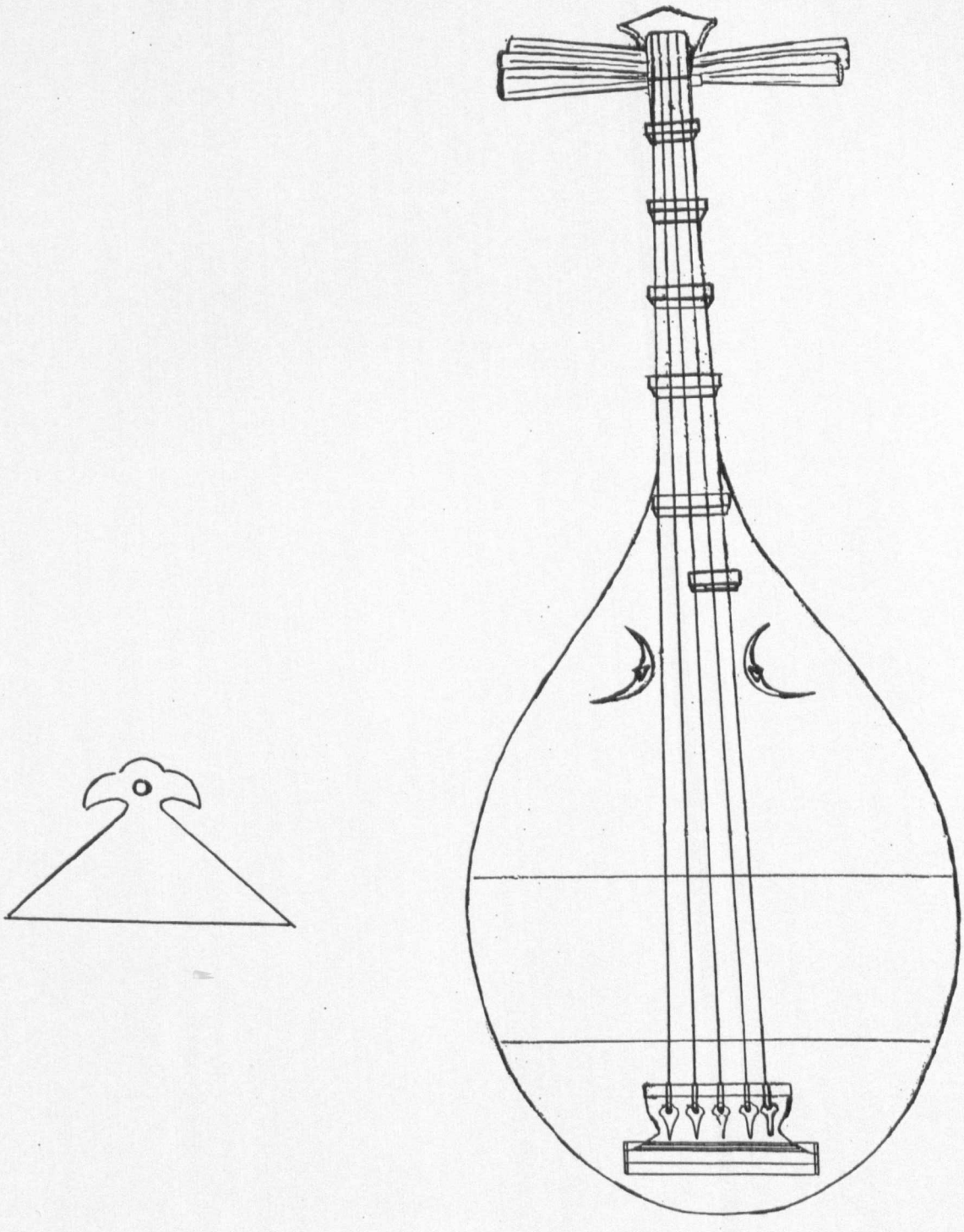
Computer : Mac OSX.3.3 or later. Max/MSP 4.5 or later

Audio interface with 8 out or more

MIDI controller with 16 channels or more fader



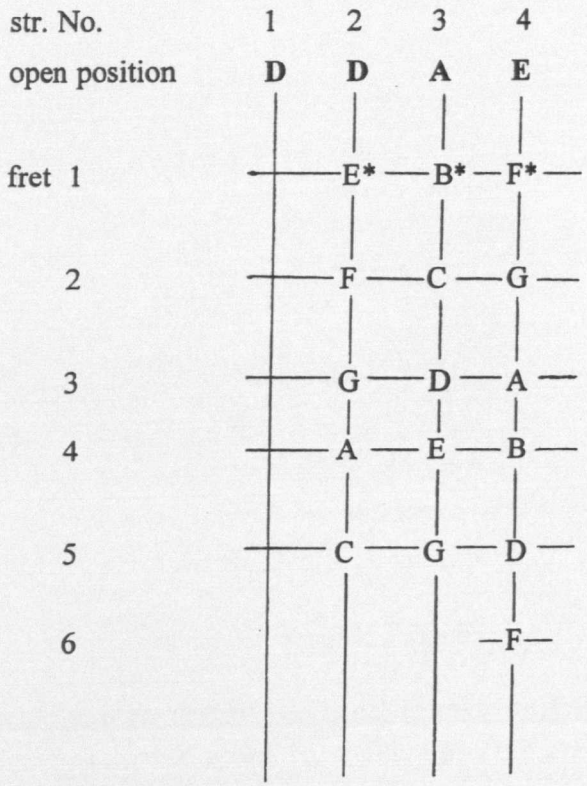
Positioning of loudspeakers and playback channels for *Himorogi I.*



薩摩琵琶と撥 (the satsuma-biwa and plectrum)

塩高モデル(Shiotaka model)

The position of the satsuma-biwa (Shiotaka model)



- the 4th string is double string

- the positions with * have difficulty to create a good resonance

- *Shime* (stretching) has 2 steps. In biwa notation it is notated with dots.

- 1 step of *Shime* on the 1st, 2nd and 3rd string changes the pitch approximately major 2nd higher, and on the 4th string minor 3rd higher.

- to stretch upto the 2nd step between the 3rd and the 4th fret is difficult because these frets are close.

- only the 4th string has the 6th fret

演奏に関する記号・指示（reference)

強弱記号(dynamics)

従来の西洋音楽での記号 : *fff ff f mf - mp p pp ppp -*
(the symbols in conventional
western music)
Himorogi I*の為に開発された記号** : *fff ff f mf* ***n *mp p pp ppp* - - - ***vp***
(the dynamics developed for
Himorogi I)

n - - - neutral. not loud, not soft
vp - - - vanishing point of hearing

拍節、時間に関する記号(symbols for time running)

短い"間" (*Ma*. short)

長い"間" (*Ma*. long)

息を区切る。シンボルの大きさは区切りの大きさを表わす。
(break. the size of the break symbol indicates the length of the break)

平静な時の自然な一呼吸 (a natural breath interval during performance)

この間、指示されたテンポで。(with the *Tempo* suggested)

この間、指示されたテンポをを基本とするが、表情に合わせて速度がゆれてもよい。
(basically with the *Tempo* suggested. *Tempo* can be flexible depending on the musical expression)

指示された速度から次第にはやく。到達する速度及び加速の仕方は、指定がなければ任意。(*accel*. from the *Tempo* suggested. The *Tempo* which should be reached and the type of *accel*. are free when they are not suggested.)

捨て拍子(*Sutebyoshi*. Typical Japanese rhythm. Repeat slowly at first, then accelerate to a rapid speed. Then, slow down quickly (usually end with a single strong note).

琵琶に関する記号(general symbols for *biwa*)

弦の余韻を聞かせる (*laissez vibrer*)

弦の余韻が完全に消えるまで聞かせる (*laissez vibrer* till the absolute end of the decay)

余韻のピッチが上がる（締めによって） (*portamento*-upwards by stretching strings)

余韻のピッチが下がる（ゆるめによって） (*portamento*-downwards by releasing strings)

余韻のあるうちに左薬指でおさえる（ハンマリング・オン） (hammering on)

余韻を活かし、一駒下におりる（プリング・オフ） (pulling off)

りん。人さし指で押さえながら薬指ではじく（*Rin :* pluck with the left hand fourth finger keeping the position with the left hand second finger.)

バチで (with plectrum)

すくいバチで (upstroke with plectrum)

解放弦をバチで (pluck down an open string,then, *laissez vibrer*)

解放弦をすくいバチで(pluck up an open string, then, *laissez vibrer*)

八の字。(*Hachinoji* . a combination of up&down *arpeggio* played with a figure-of-eight motion)

トレモロ(*tremolo*)

 すり (*Suri* : scrubbing strings with plectrum rapidly from side to side)

 すべり(*Suberi* : a single sweep over the strings with plectrum)

 バチ音が入るアルペジオ(*arpeggio* with plectrum attack)

 右親指でひく(with the right thumb)

 左の指でタッピング (tapping with the left fingers)

 指でミュートする（damp with a finger)

 ころし。すりを思いきり強く鋭く弾き切って止める(finishing the *Suri* with a rapid flourish)

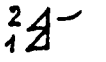
新たに考案された琵琶に関する記号(invented symbols for *biwa*)

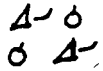

バチのダウンのみ(downstroke only)


ダウンとアップの組み合わせ
(combination of down and upstroke)


トレモロしながらグリッサンドする
(*tremolo* with *glissando*)

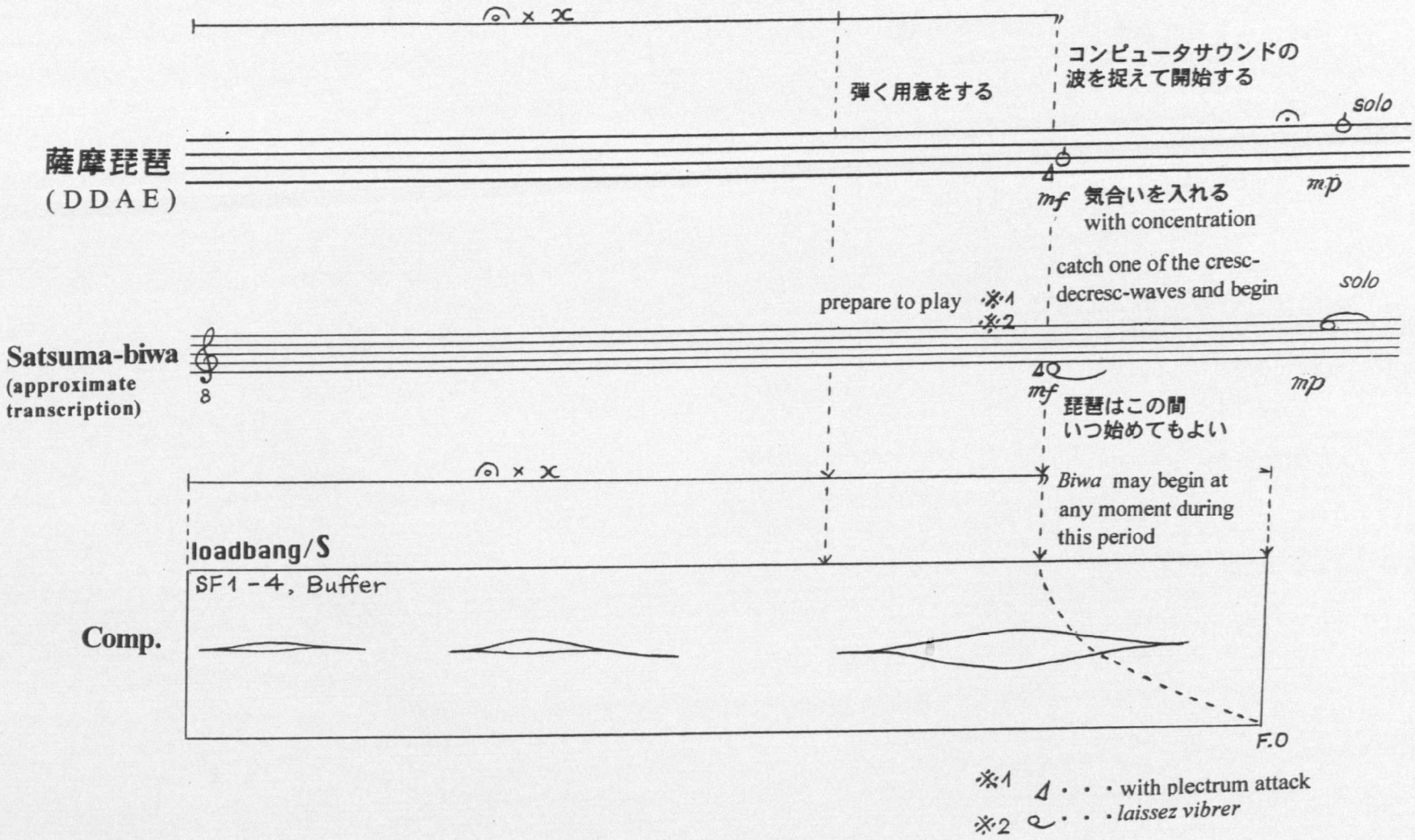

第四弦二本のうち一本を解放、他方をグリッサンドしながら同時にトレモロする(*tremolo* at the 4th strings with *glissando* for one, and open position for another)

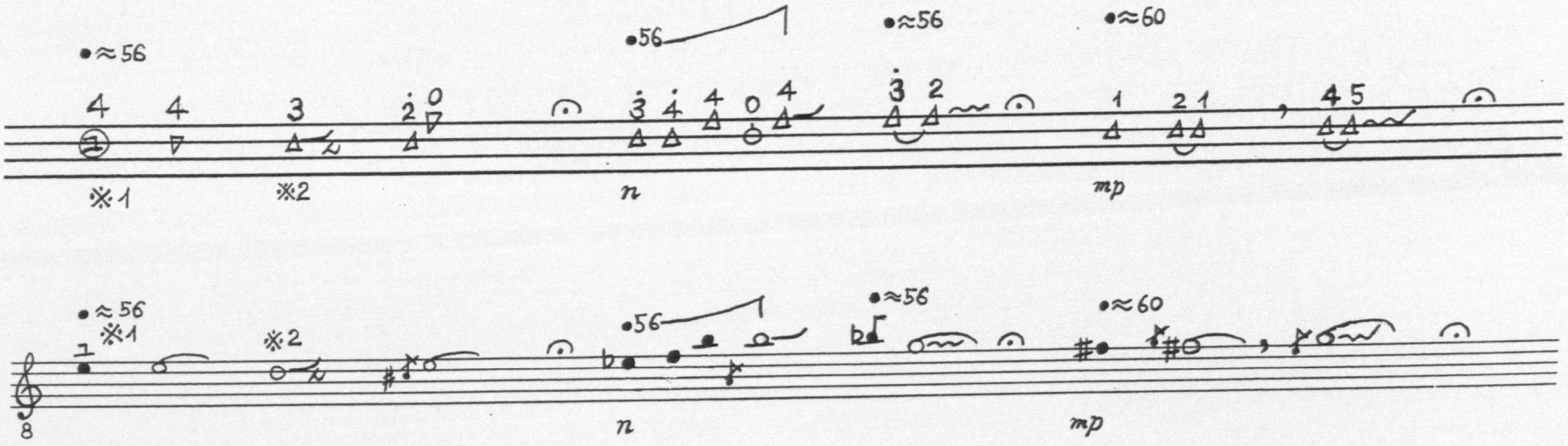

1、2弦を同じポジションで弾き、2だけをポルタメントする(pluck 1&2 at the same position,then *portamento* 2nd only)


解放弦及び隣接する弦を同音高で弾き、押さえた弦だけポルタメントする(pluck an open string and a same-pitched string together,then *portamento*)


ピッチを動かさないトレモロ。余韻を鋭く止める(*tremolo* without pitch-changing, stop resonance sharply)

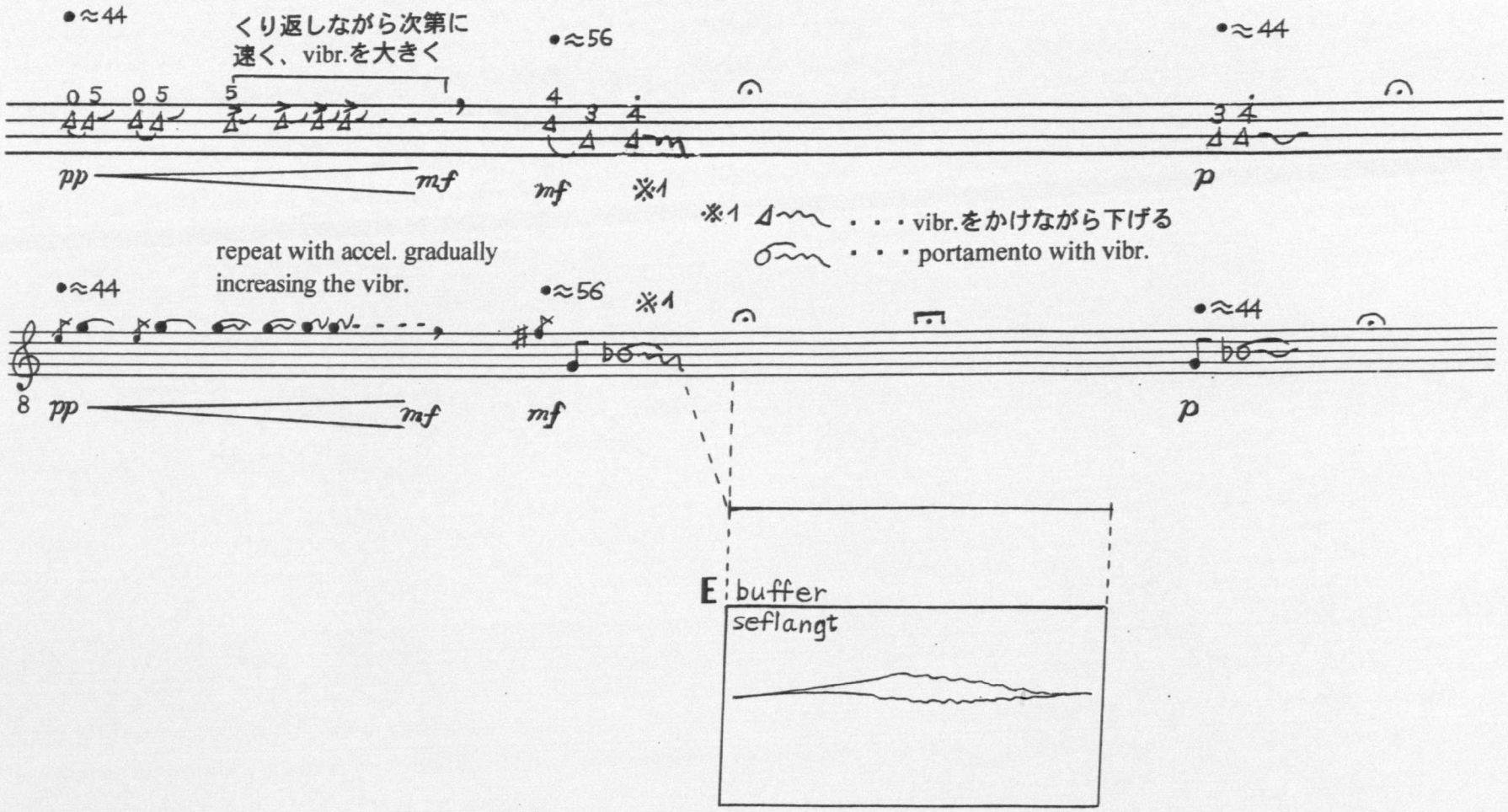

次第に締める(gradual stretch of the string)

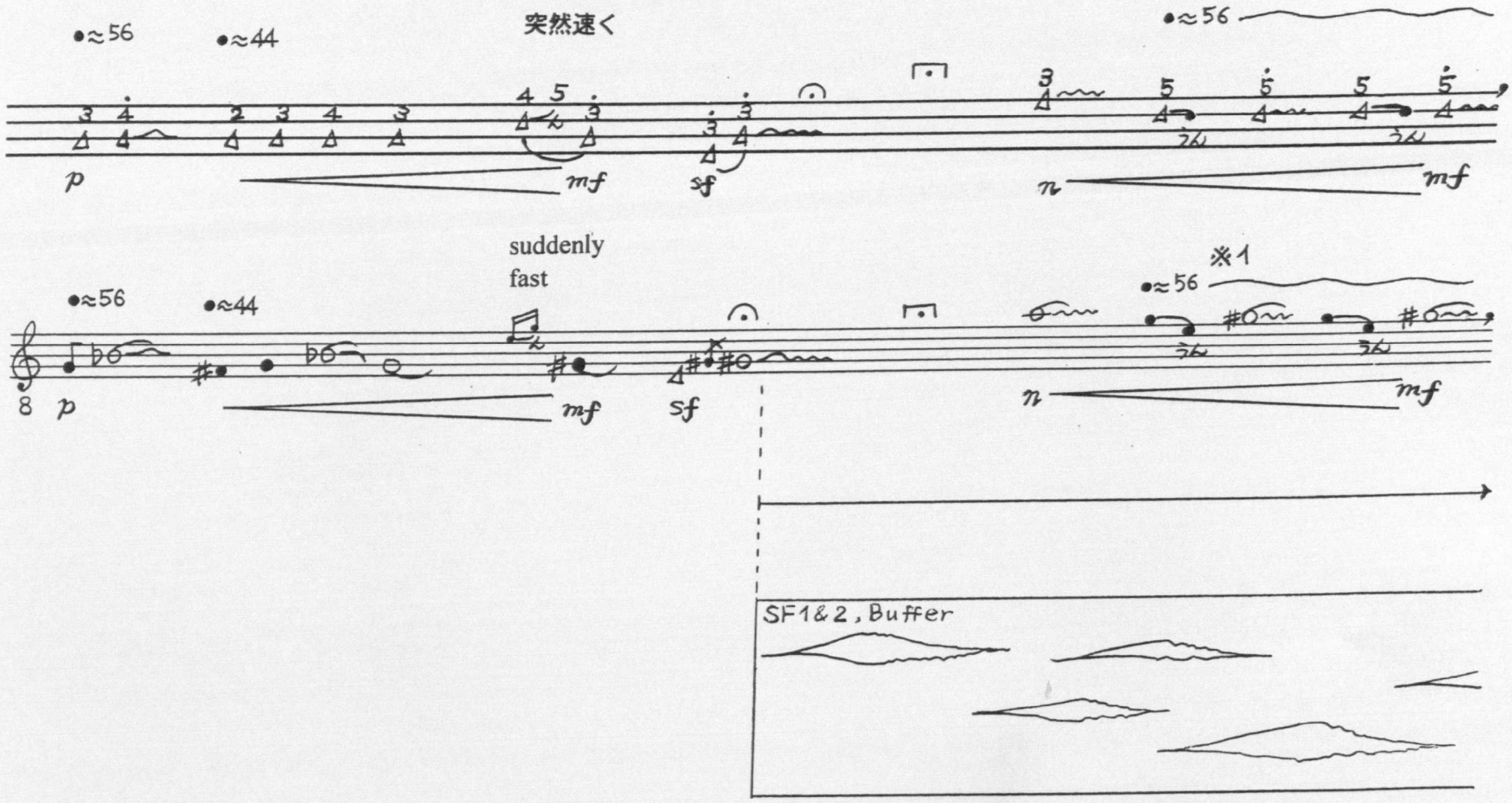

薩摩琵琶
(DDAE)
弾く用意をする
コンピュータサウンドの
波を捉えて開始する
solo
mp
mf
気合いを入れる
with concentration
Satsuma-biwa
(approximate
transcription)
prepare to play
※1
※2
catch one of the cresc-
decresc-waves and begin
solo
mp
mf
琵琶はこの間
いつ始めてもよい
Biwa may begin at
any moment during
this period
loadbang/S
SF1-4, Buffer
Comp.
F.0
※1 ・・・ with plectrum attack
※2 ・・・ laissez vibrer



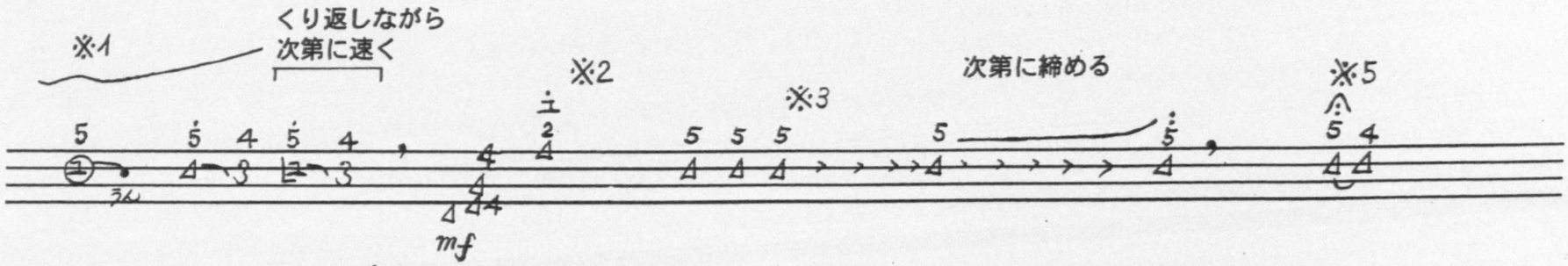
※1 ㊤ ・・・右親指で弾く
ユ ・・・pluck with the right thumb

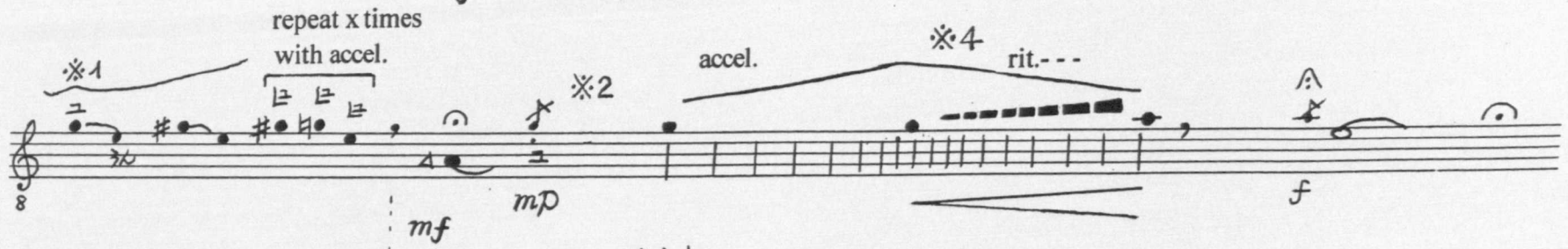
※2 ～ ・・・余韻のあるうちに左薬指で押さえる
・・・hammering on with the left hand fourth finger

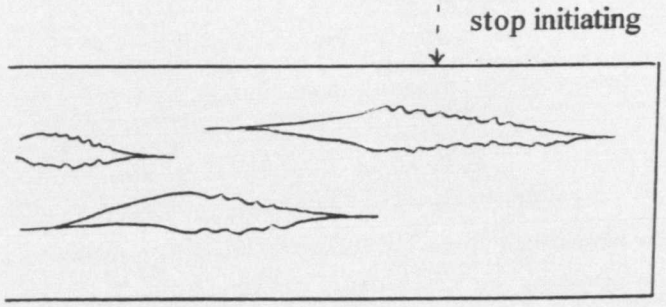

●≈44
くり返しながら次第に
速く、vibr.を大きく
●≈56
●≈44
pp
mf
mf
※1
p
※1 ・・・vibr.をかけながら下げる
・・・portamento with vibr.
repeat with accel. gradually
increasing the vibr.
●≈44
●≈56
※1
●≈44
8
pp
mf
mf
p
E buffer
seflangt



※1 ～ん ・・・余韻を活かし、撥で弾かず一齣下におりる
one position(fret) down during the decay







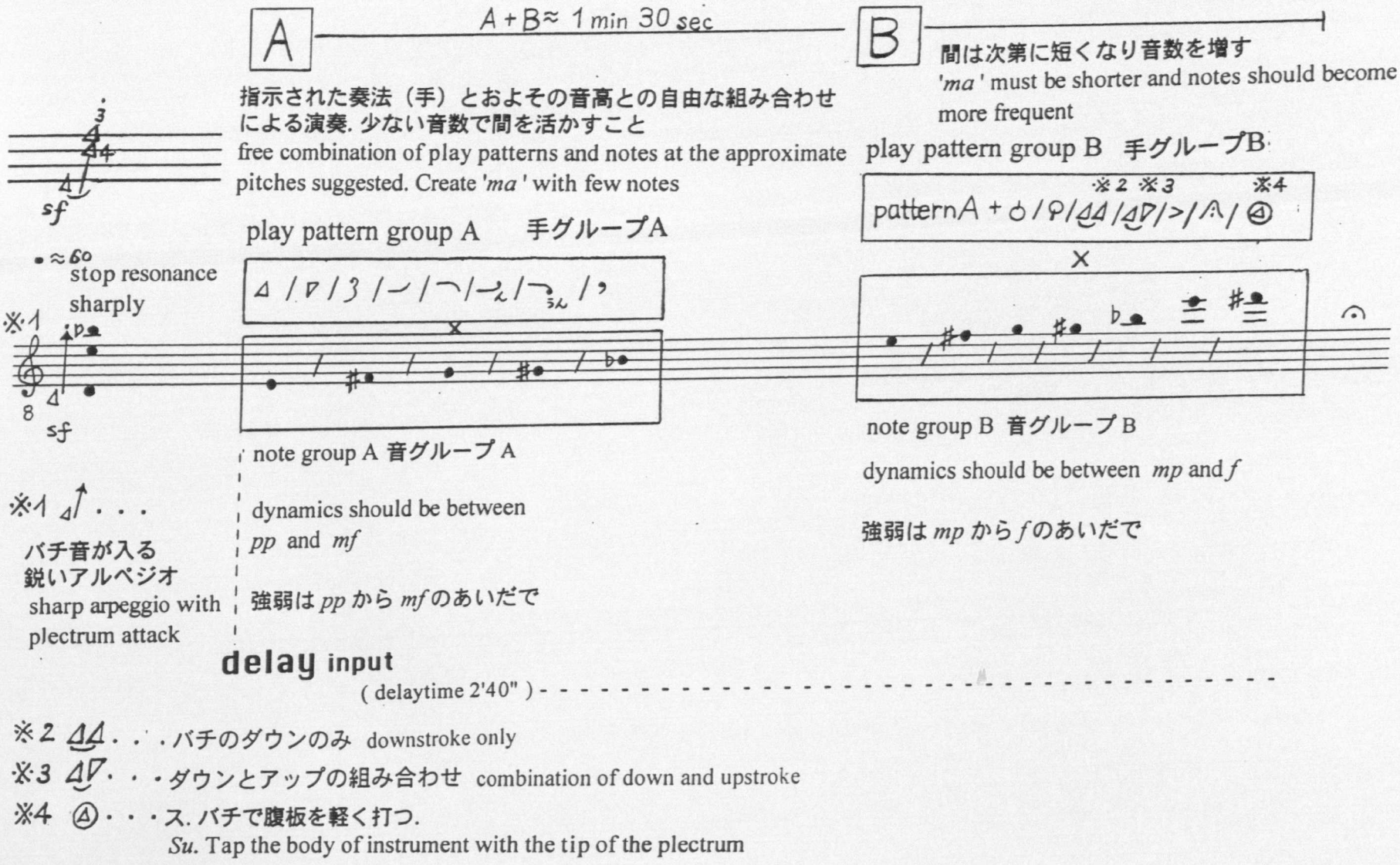
※1 ㄩ ・・・左指でタッピング
tapping with the left fingers

※2 ユ ・・・指でミュートする
damp with a finger

※3 >>>> / ||||| ・・・捨て拍子
Sutebyoshi . Repeat slowly at first, then accelerate to a rapid speed. Then, slow down quickly. (Usually ending the pattern with a single strong note)

※4 ・・・gradual stretch of the string. This stretch should reach the stretch-position 2.

※5 A ・・・strong and quick pulling of the string quickly after plucking



※2 . . . バチのダウンのみ downstroke only

※3 . . . ダウンとアップの組み合わせ combination of down and upstroke

※4 Ⓐ . . . ス. バチで腹板を軽く打つ.
Su. Tap the body of instrument with the tip of the plectrum

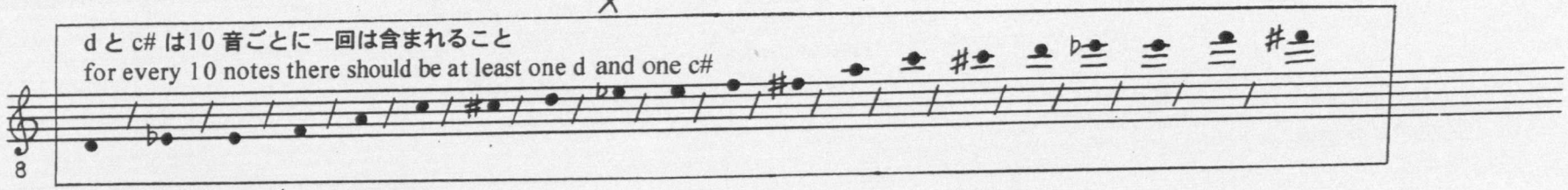
C1 ca. 1 min 15 sec

到達した音の密度またはそれ以上で
with notes occuring as frequently or even more frequently

手グループ B
play pattern group B

X

d と c# は10 音ごとに一回は含まれること
for every 10 notes there should be at least one d and one c#



note group C 音グループC
dynamics should be mainly *f*
強弱は 主として *f*

delay 1 from 1 & 3 sp.

A → B

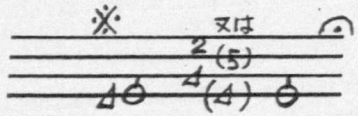
delay 2 from 2 & 4 sp.

ca 9"

A → B

C2 ca. 1min 15sec. - 30sec.

到達した音の密度で with notes occuring as frequenntly
play pattern group C (and any variations)
手グループC (及びこれらのヴァリエーション)



※1 ※2

8の字. くり返しは2回まで
Hachinoji. Repetition must be max. twice

くり返しは8回まで.
repetition must be max. 8 times

※
一弦または二弦の開放の
D音を強調して終わる限り
この部分も変奏可

※
this pattern can be varied as far as it is finished with open D emphasising its decay

8

dynamics should be mainly *ff*
強弱は主として*ff*

note group C
音グループC

※Dを開始するためのきっかけとなるパターンを選び、C2全体の中ほどに置く
choose one of the patterns and set it around the middle of C2 in order to use it as a sign for starting D

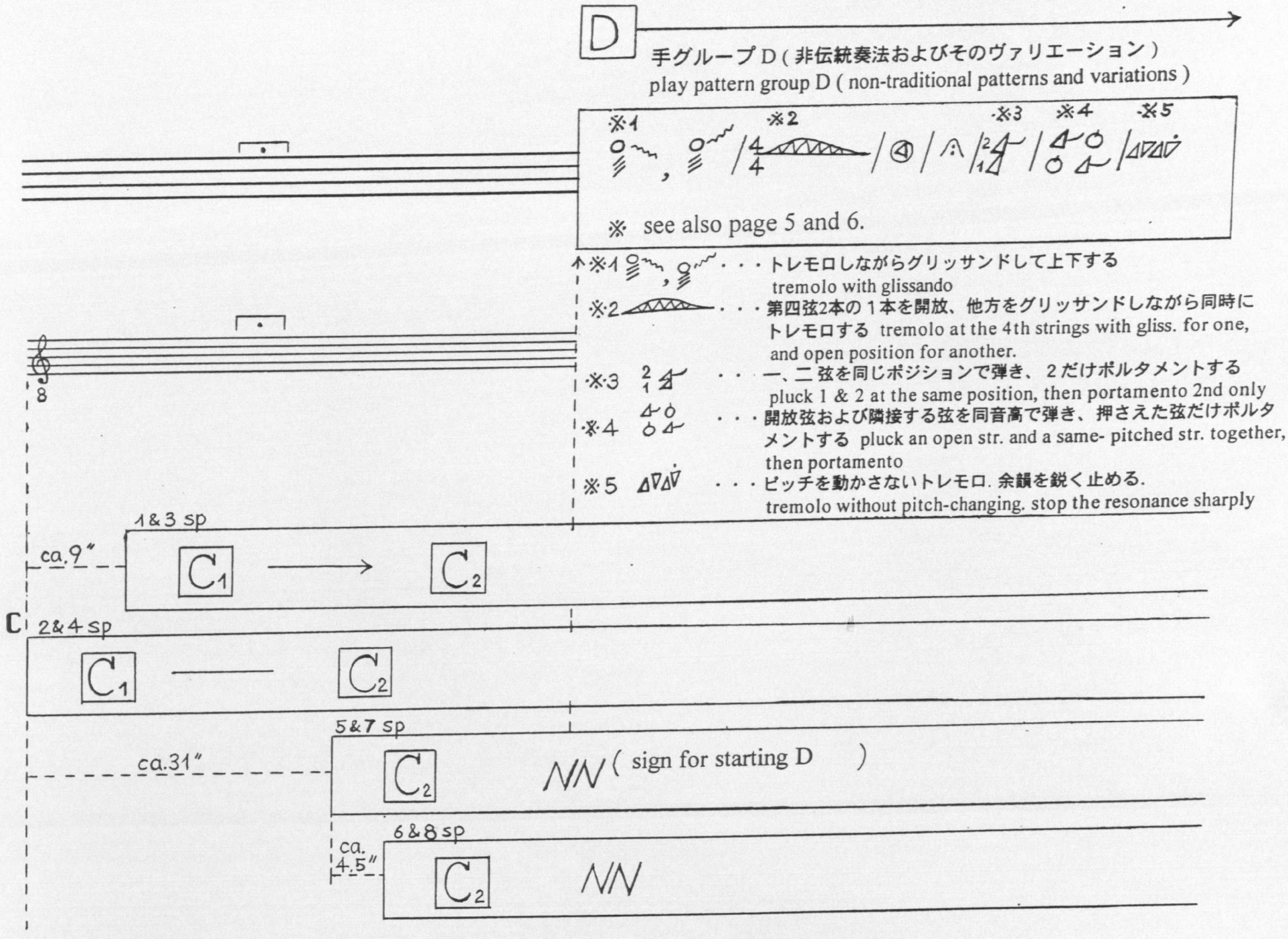
1&3 sp.

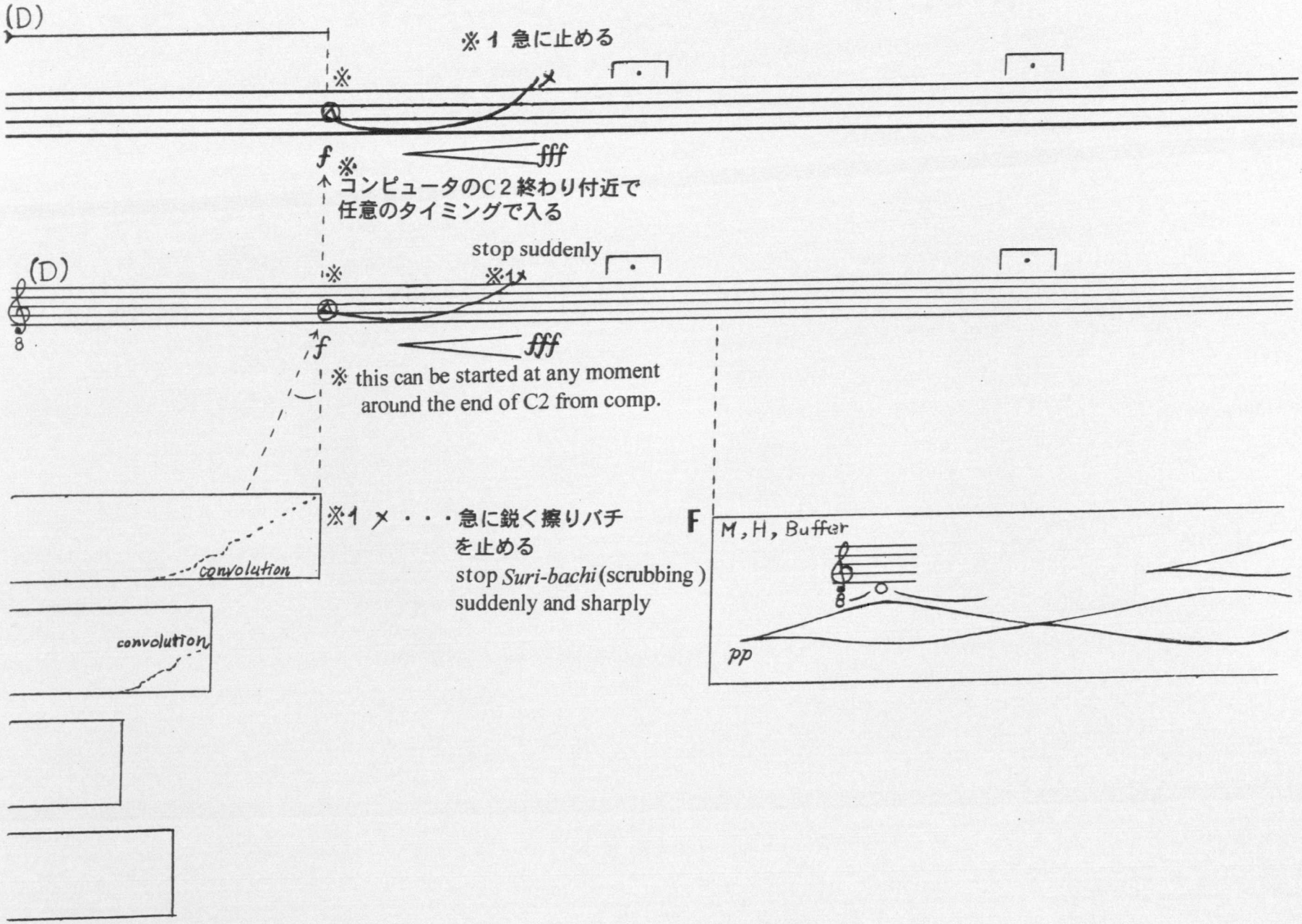
2&4 sp.

※1 ・・・1、2弦と3、4弦を交互に. play 1or 2 (or 1 &2) str. , then 3 or 4 (or 3 &4) str. in turn

※2 ・・・同様に交互に、アップ、ダウンで. play as above with Up and Down in turn.

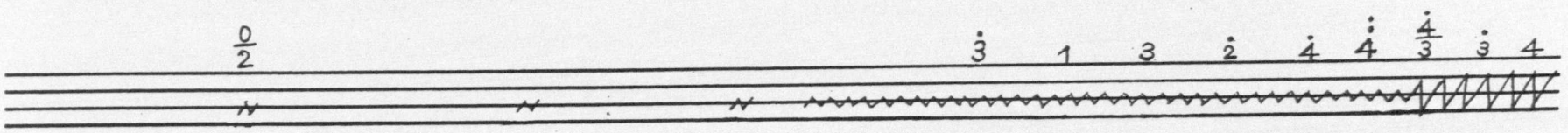
※3 ・・・*laissez vibrer* till the absolute end of the decay


D
手グループD (非伝統奏法およびそのヴァリエーション)
play pattern group D (non-traditional patterns and variations)
※1
※2
※3
※4
※5
※ see also page 5 and 6.
※1 ・・・トレモロしながらグリッサンドして上下する
tremolo with glissando
※2 ・・・第四弦2本の1本を開放、他方をグリッサンドしながら同時にトレモロする tremolo at the 4th strings with gliss. for one, and open position for another.
※3 ・・一、二弦を同じポジションで弾き、2だけポルタメントする
pluck 1 & 2 at the same position, then portamento 2nd only
※4 ・・・開放弦および隣接する弦を同音高で弾き、押さえた弦だけポルタメントする pluck an open str. and a same- pitched str. together, then portamento
※5 ・・・ピッチを動かさないトレモロ. 余韻を鋭く止める.
tremolo without pitch-changing. stop the resonance sharply
8
1&3 sp
ca.9"
C1
C2
C
2&4 sp
C1
C2
5&7 sp
ca.31"
C2
NN (sign for starting D)
6&8 sp
ca. 4.5"
C2
NN

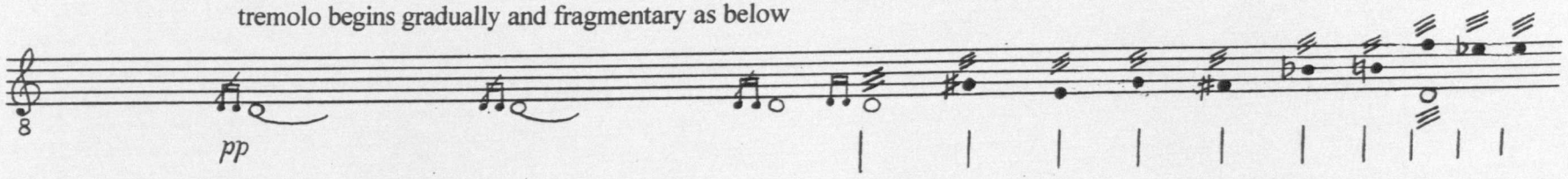

(D)
※1 急に止める
※
f
fff
※
コンピュータのC２終わり付近で
任意のタイミングで入る
stop suddenly
※1メ
(D)
f
fff
※ this can be started at any moment
around the end of C2 from comp.
※1 メ ・・・急に鋭く擦りバチ
を止める
stop Suri-bachi (scrubbing)
suddenly and sharply
convolution
convolution
F
M, H, Buffer
pp

音を変えるタイミングは全体として捨て拍子となること

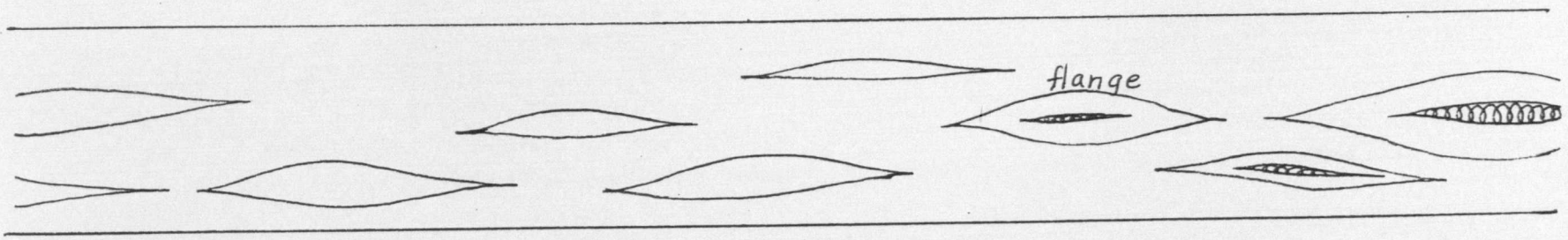
トレモロは断片的に始め、やがて本格的に

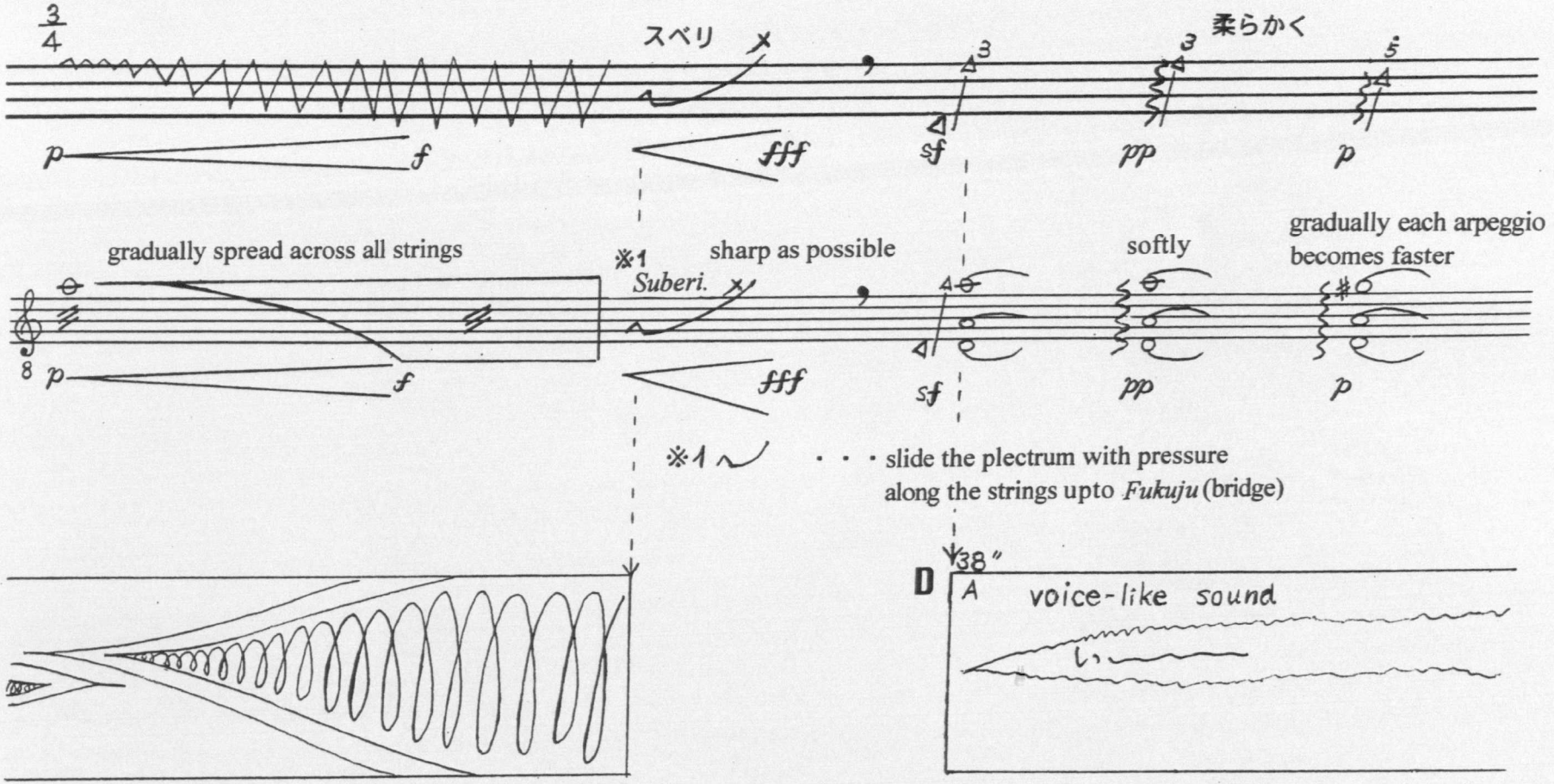


tremolo begins gradually and fragmentary as below

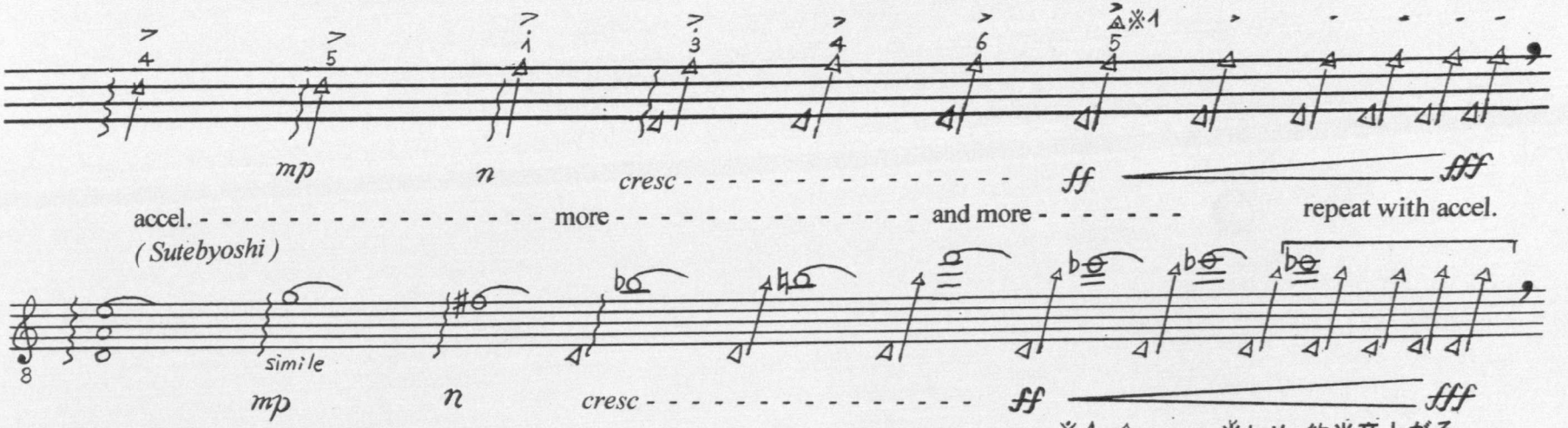


the timing of pitch-change should create *Sutebyoshi* as a whole

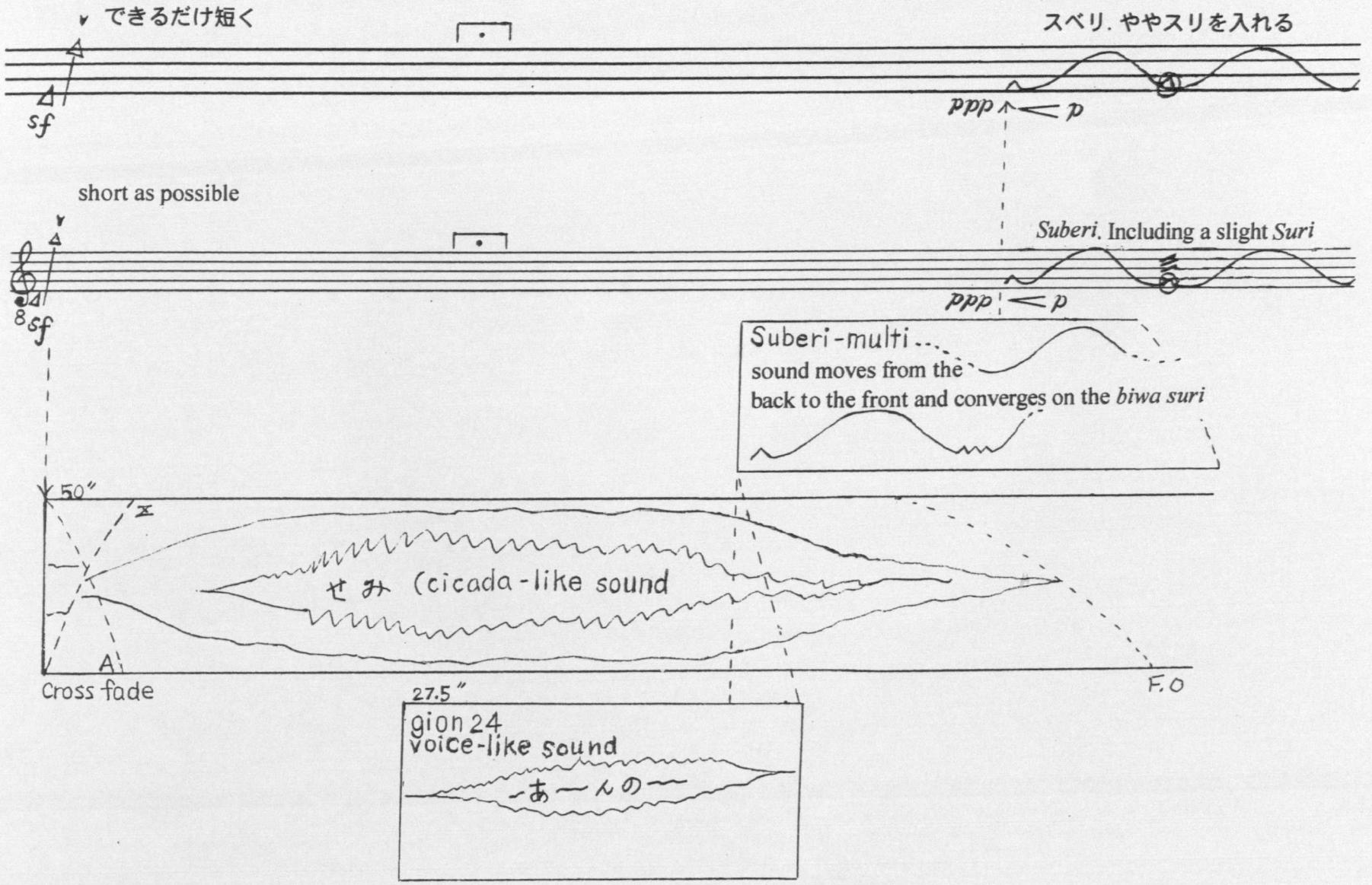


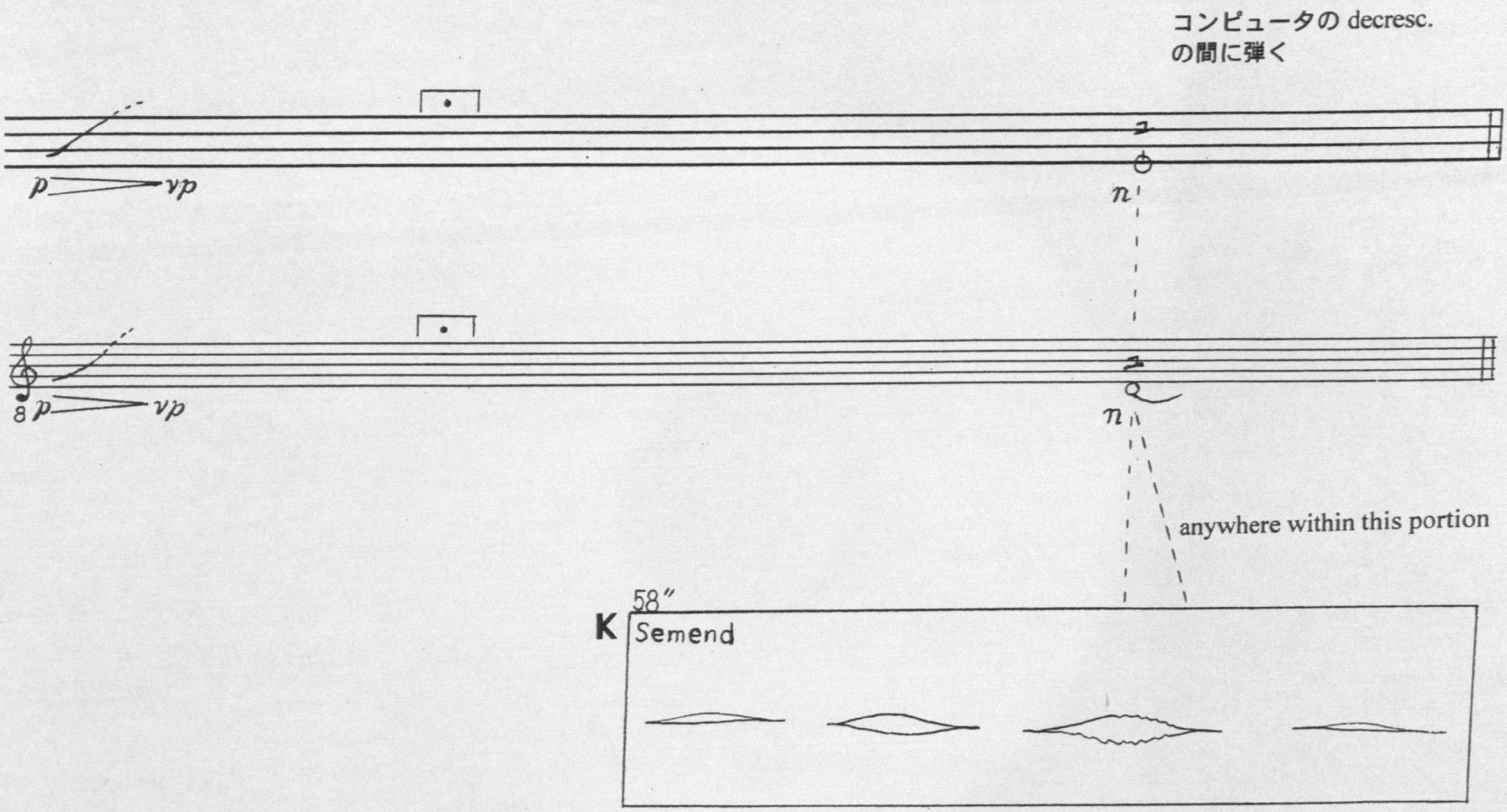

3/4
スベリ
柔らかく
p
f
fff
sf
pp
p
gradually spread across all strings
※1
Suberi.
sharp as possible
softly
gradually each arpeggio becomes faster
8
※1 ～ ・・・ slide the plectrum with pressure along the strings upto Fukuju (bridge)
38"
D
A
voice-like sound
い

捨て拍子. 間を次第につめて切迫していく



※1 ⧋ ・・・半しめ. 約半音上がる
half-*Shime* (stretching). The pitch becomes about a semi-tone higher


できるだけ短く
スベリ. ややスリを入れる
sf
ppp
p
short as possible
Suberi. Including a slight Suri
8
sf
ppp
p
Suberi-multi...
sound moves from the
back to the front and converges on the biwa suri
50"
せみ (cicada-like sound
A
Cross fade
F.O
27.5"
gion 24
voice-like sound
-あーんの-


コンピュータの decresc.
の間に弾く
p
vp
n
8
p
vp
n
anywhere within this portion
58″
K
Semend

Hiromi Ishii

風の道

KAZE NO MICHI (Wind Way)

for

shakuhachi and live electronics

2005

Programme note

The concourse of Shinjuku train station is one of the noisiest and most crowded places in Tokyo. For many years a mendicant priest has been appearing there every day. He stands absolutely still at the same place in the middle of all the noise and bustle and performs his religious mendicancy. As he wears the costume of the wandering Buddhist priest with a wide and deep conical straw hat, passers-by can never see his face. People cannot even be sure whether he is always the same person.

What does he hear there? What does he feel? What is he thinking about?

It must certainly be difficult to concentrate in such a place to attain enlightenment; but the area where he is standing has acquired a totally different atmosphere as if it were in another dimension...

Instruction for performance

This piece was composed for shakuhachi and live electronics. It is considered that the shakuhachi developed its timbral expressivity during the period when it was used as a religious tool. Reducing the resonance gave it this enormously wide timbral range. In this piece, several different qualities of shakuhachi timbral change, dark-light, airy-focused (indirect-direct) and quality of *shibui,* are applied to the structure for both the shakuhachi and computer parts compositionally. The environmental sound of Shinjuku station from the computer, which corresponds to the timbral expression of shakuhachi part, is processed in real time on Max/MSP.

The score consists of three parts.

- a schematic score which describes the whole structure of the music.
- a skeleton melody which consists of basic tones (full resonance).
- sheets of mode tables.

Schematic score

This describes whole musical events and timing both in the shakuhachi and computer parts. The performer refers to this score for 'what happens and when?'. The performer can make a plan and prepare improvisational play according to the written durations for each part.

Skeleton melody

This melody consists of basic tones of the shakuhachi. It was developed from the electric chime heard in the recorded environmental sound. As basic tones of the shakuhachi consist of a pentatonic scale the skeleton melody is also pentatonic. Play several phrases applying this, giving ornaments at the beginning. The phrases can be like shakuhachi folk music *Oiwake*. This part should sound full-resonant. The melody is notated in Japanese *katakana* characters which are used as symbols in traditional shakuhachi notation, as well as alphabetic characters. Later the performer can interpret them developing freely both in pitch and timbre.

Timbre mode tables

The tones of the shakuhachi are classified according to the timbre scale, *light-dark*, mainly related to pitch. Other timbre scales, *airy-focused*, direct-indirect, and *shibui* quality are also mapped corresponding with the main scale. The performer can choose any tones within the given range of timbre at each part of the piece, and is expected to create phrases by original combinations. The performer may interpret the skeleton melody as well as playing freely. For example, the beginning character *tsu* ツ can be interpreted as *tsu- no- meri*[1] ツメ, in the part in which *meri* mode is included, whereas it can also be interpreted simply as F.

[1] *Meri*...Lower the pitch with small angle of chin to the shakuhachi. Timbre becomes dark. The symbol for *meri* is メ.

使われる尺八の奏法用語(The terms for the shakuhachi used in this piece)

meri.....Lower the pitch with small angle of chin to the shakuhachi. Timbre becomes dark. The symbol for *meri* is メ.

kari.....Slightly overblown to produce a higher pitch with the great angle of the chin to the shakuhachi. The symbol for kari is カル or カ.

meri-kari....The technique of lightening and darkening the timbre as well as making the pitch higher and lower by altering the head angle.

no-..... *'No'* means 'of'. *Tsu-no-meri* means *meri* of *tsu*.

chumeri.....Half-*meri*.

omeri.....Full-*meri*. The symbol for *omeri* is 大メ. Lower *ro* has not *chumeri*, but *meri* and *omeri*.

muraiki.....Blow a very explosive charge of air into the instrument to create a sound which is part wind and part musical tone.

tamane.....Flutter tonguing.

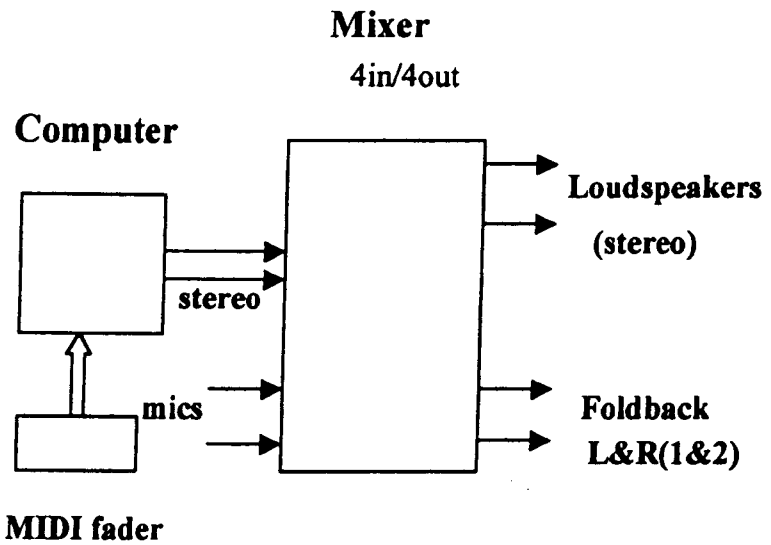
korokoro...Trill with the special fingering.

sorane.....A light, airy tone. Contains more breath than a normal tone.

Reference

Blasdel, C.Yomei, *The Shakuhachi*, Tokyo: Ongaku no tomosha, 1998.

Linder, E. G., *Research on the Gaikyoku of Kinko-style shakuhachi* (MA dessertation at the Tokyo University of Art and Music), 1996.



System diagram for *Kaze no Michi*

Equipment and software required for performance

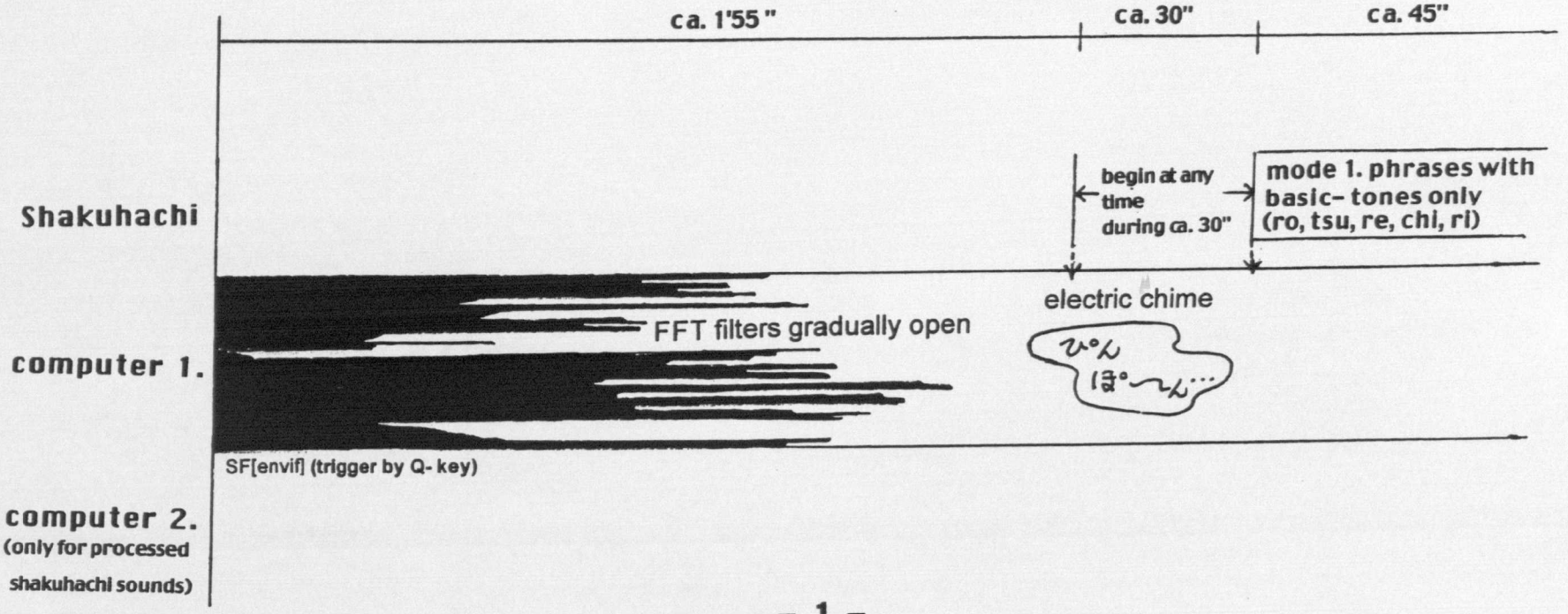
Computer 1: Mac OSX.3.3 or later. Max/MSP 4.5 or later

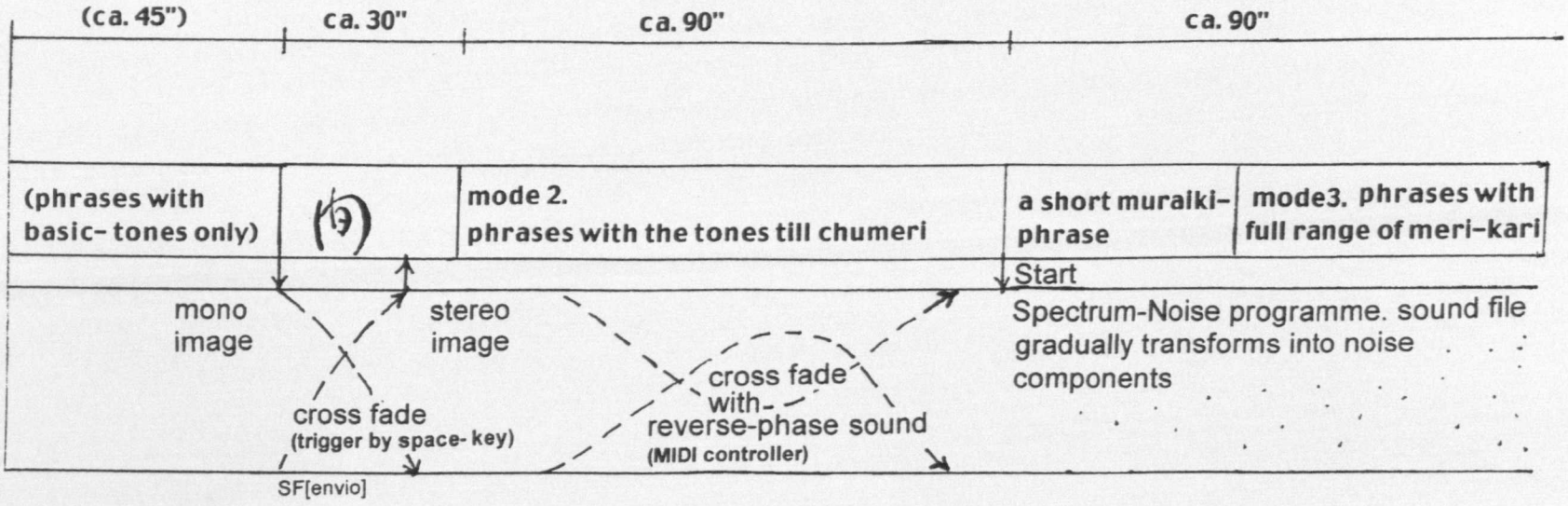
Computer 2: Max/MSP with IRCAM SPAT 2.2 or later

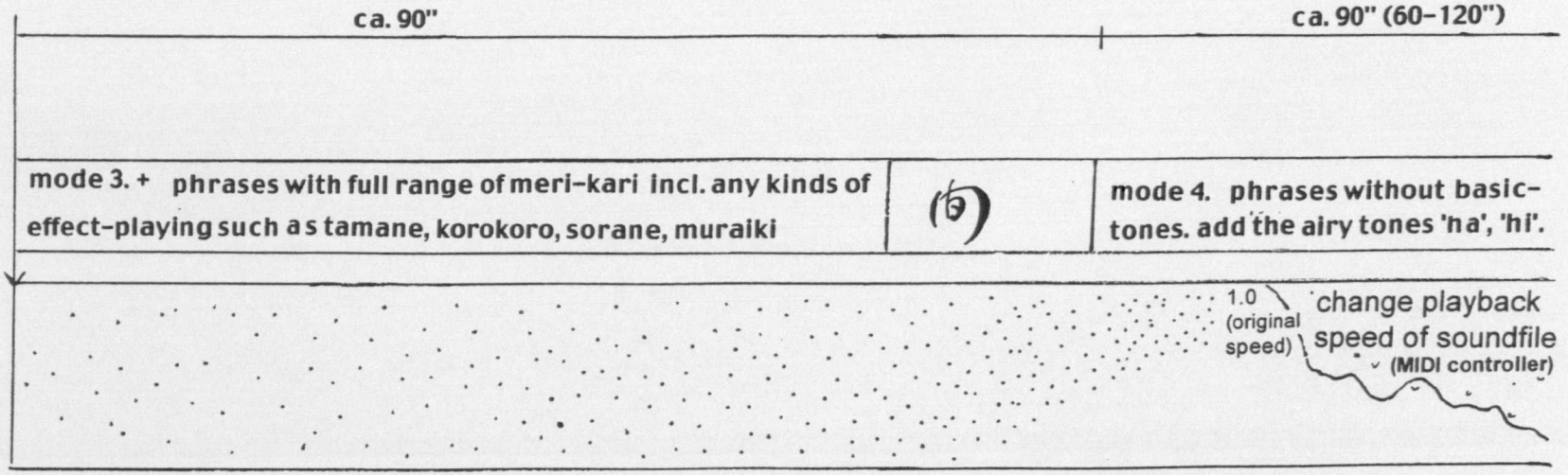
MIDI controller with 16 channels or more fader

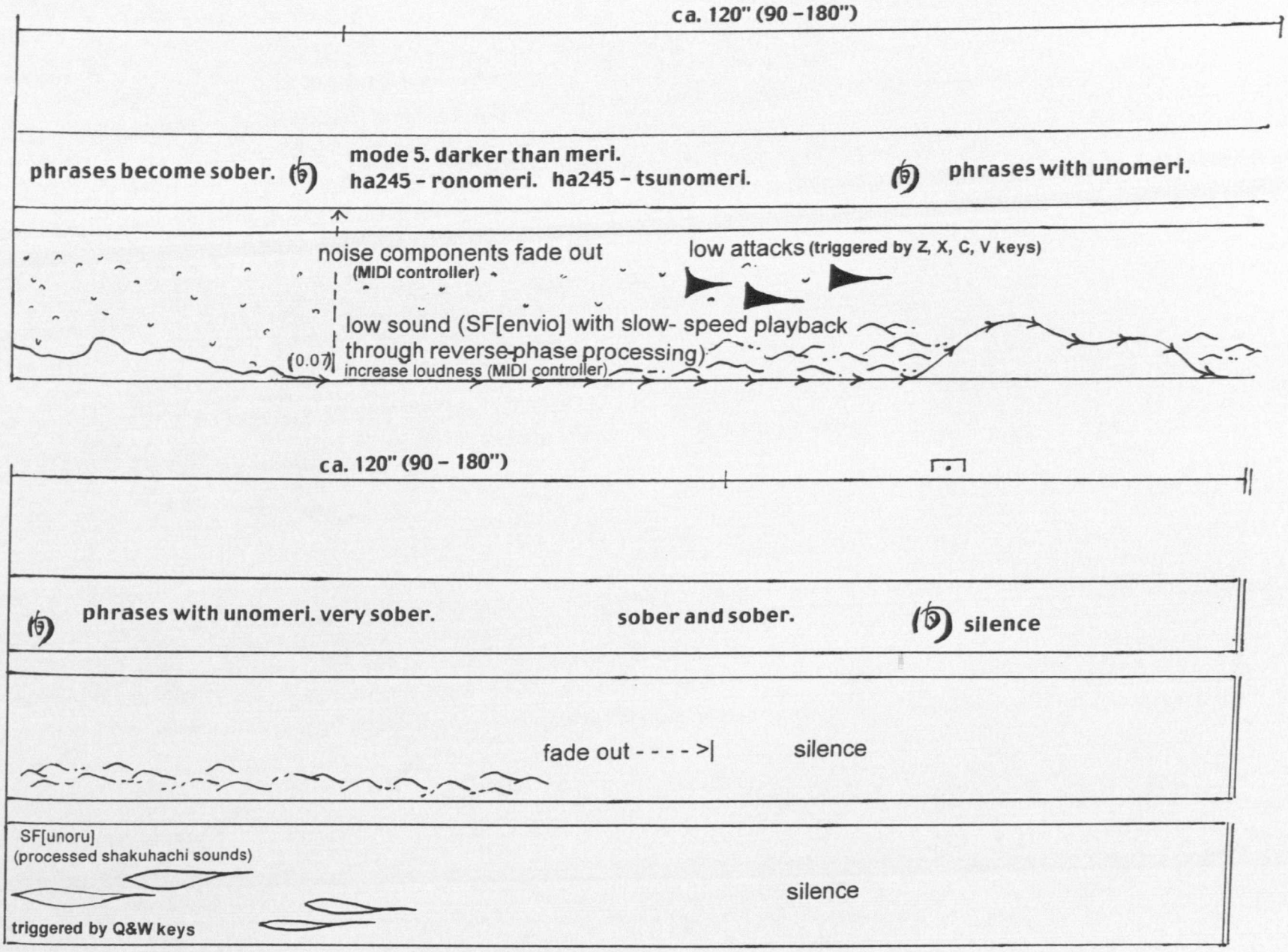
Hiromi Ishii

KAZE NO MICHI (Wind Way)
for
Shakuhachi and Live electronics



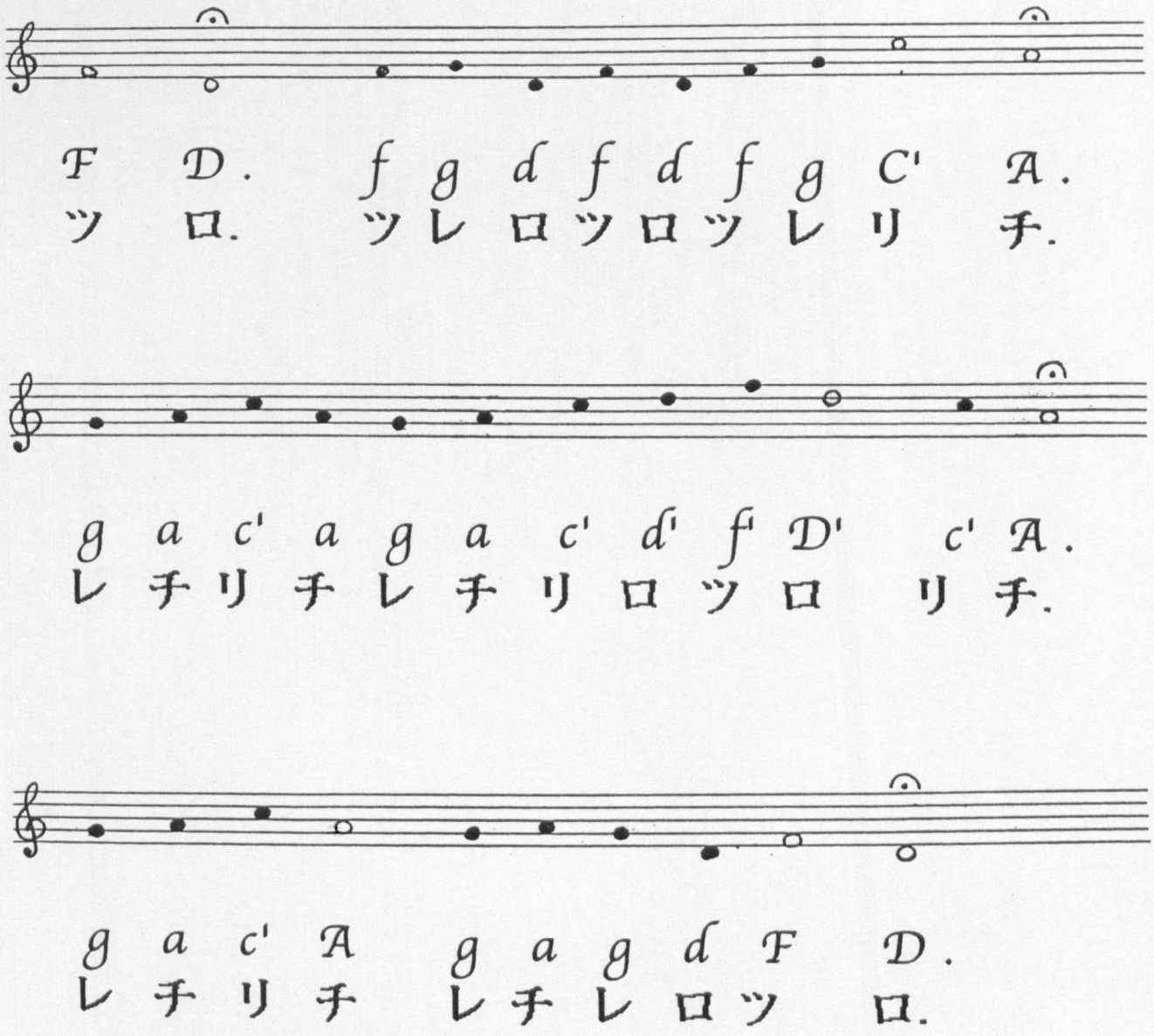

(ca. 45")
ca. 30"
ca. 90"
ca. 90"
(phrases with basic- tones only)
(b)
mode 2.
phrases with the tones till chumeri
a short muraiki- phrase
mode3. phrases with full range of meri-kari
Start
mono image
stereo image
cross fade
(trigger by space- key)
SF[envio]
cross fade with- reverse-phase sound
(MIDI controller)
Spectrum-Noise programme. sound file gradually transforms into noise components


ca. 90"
ca. 90" (60-120")
mode 3. + phrases with full range of meri-kari incl. any kinds of effect-playing such as tamane, korokoro, sorane, muraiki
(b)
mode 4. phrases without basic- tones. add the airy tones 'ha', 'hi'.
1.0 (original speed)
change playback speed of soundfile
(MIDI controller)


ca. 120" (90 –180")
phrases become sober.
mode 5. darker than meri.
ha245 – ronomeri. ha245 – tsunomeri.
phrases with unomeri.
noise components fade out
(MIDI controller)
low attacks (triggered by Z, X, C, V keys)
low sound (SF[envio] with slow- speed playback
through reverse-phase processing)
(0.07)
increase loudness (MIDI controller)
ca. 120" (90 – 180")
phrases with unomeri. very sober.
sober and sober.
silence
C1.
fade out - - - - >|
silence
SF[unoru]
(processed shakuhachi sounds)
C2.
silence
triggered by Q&W keys

Kaze no Michi (Wind Way)

Skeleton Melody

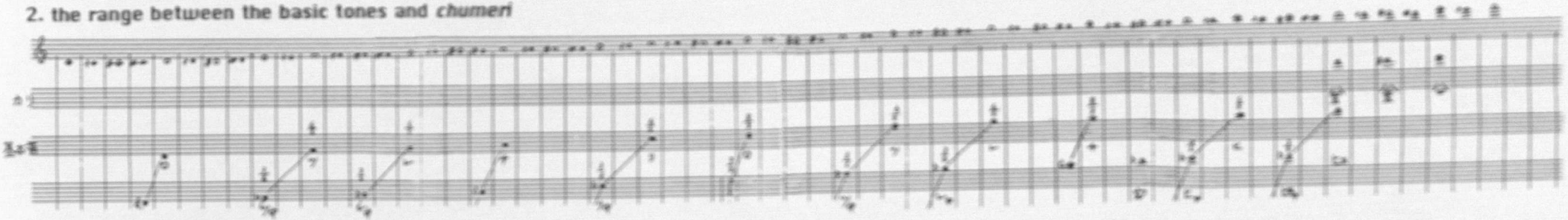


Kaze no Michi (Wind Way)

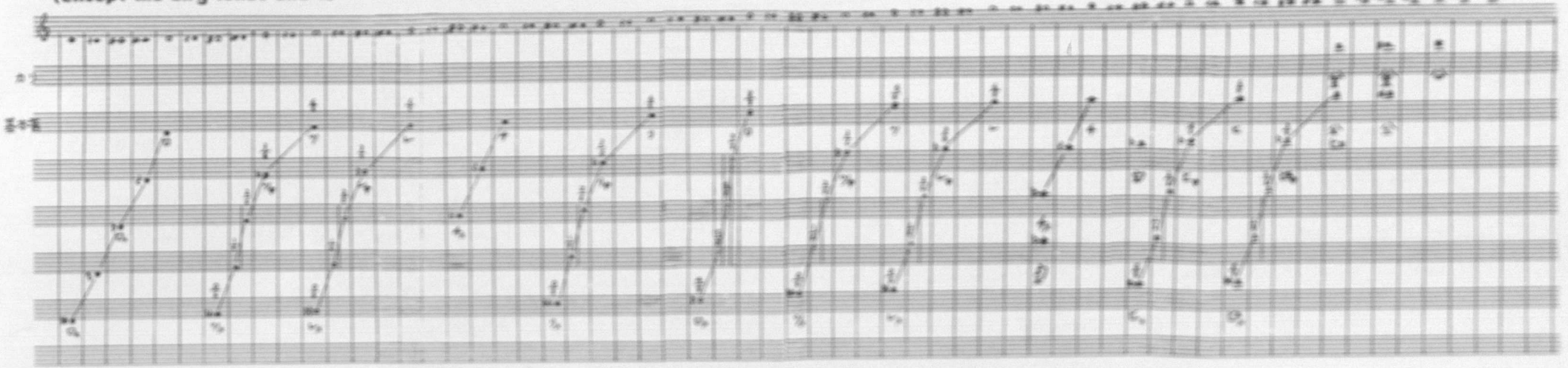
timbre mode tables

1. the basic tones

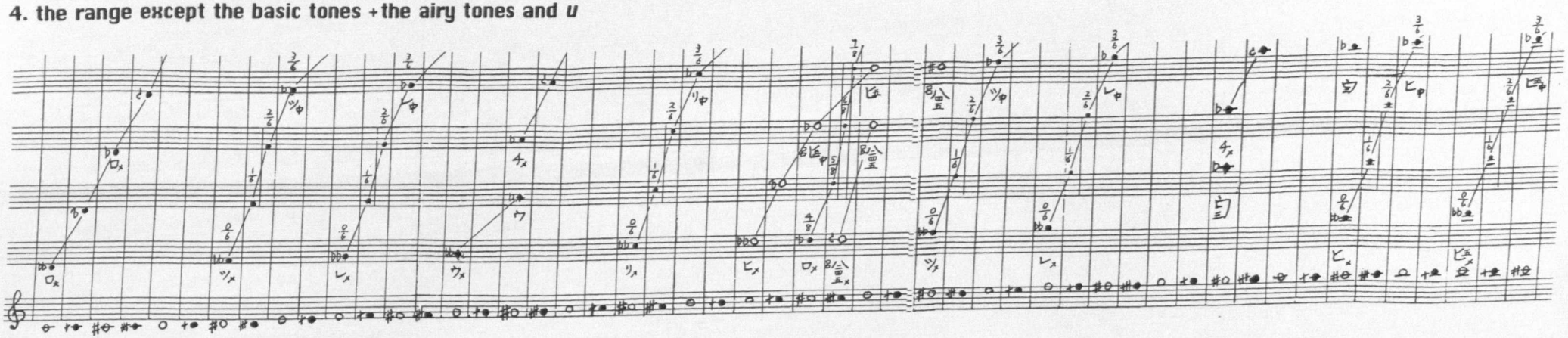
2. the range between the basic tones and *chumeri*



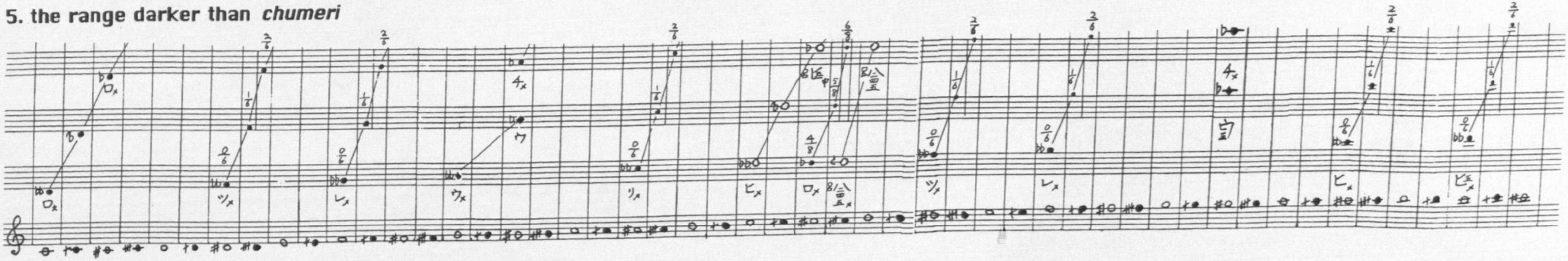
3. the whole range of light-dark scale
(except the airy tones and *u*)



4. the range except the basic tones +the airy tones and *u*



5. the range darker than *chumeri*



microtones

- 𝄲 - - - 1/4 higher
- ♯ - - - 1/2 higher
- 𝄪 - - - 3/4 higher
- 𝄳 - - - 1/4 lower
- ♭ - - - 1/2 lower
- 𝄬 - - - 3/4 lower

0/6 ~ 6/6 - - - 6th tones

0/8 ~ 8/8 - - - 8th tones

*The Timbre Mode Table was created by the author with the cooperation by Ernst Gunnar Linder.

Hiromi Ishii

東方へ！

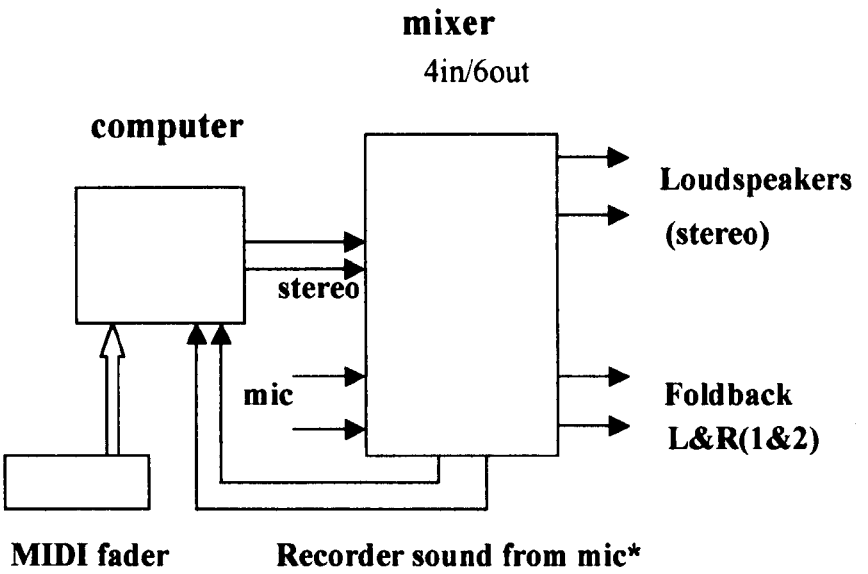
Higashi-e! (Nach Osten!)

for

renaissance tenor recorder

and live electronics

2005



* Clip microphone is recommended.

System diagram for *Higashi-e!*

Equipment and software required for performance

Computer 1: Mac OSX.3.3 or later. Max/MSP 4.5 or later with "Fiddle object"
MIDI controller with 16 channels or more fader
1 clip microphone for real-time sound processing

Higashi-e! (Nach Osten!)

for renaissance tenor recorder
and live electronics (2005)
commissioned by
Prof. Ulrike Volkhardt (Folkwang Hochschule Essen)

Notes for performance

There is no formal score to Part I&II. Verbal guidelines are given below to allow the performer to construct the work.

Part I.

This part consists of the performer's live sound and two different processings of this sound by the computer in real time.
The idea for the sound processing is based on the musical elements of *gagaku*. Computer programme 1 creates delayed formant sounds which are gradually to be separated from the original sound and reveal their character. Computer programme 2 creates a random 'harmony' derived from the original sound. From time to time portamenti are made by the operator.
Refer to *gagaku* music. The performer and what he/she extracts from it becomes the basis of the interpretation. The performer plays phrases with the following characteristics :

Play only using the 'good notes' : **C D E G A**

The phrases should include portamento expression.
In slow tempo, quietly, without any dramatical phrases, do not include much silence. Stay mainly in the lower register.

Do not try to adjust the pitch to that produced by the computer.
Accept and enjoy the detuning produced by the interaction of performer and computer.

Duration : ca 5 min.

Part II.

This part consists of the original sound of the performer and real time processing. The computer programme creates a noise component by applying the spectrum of the original sound to white noise.
The performer refers to *gidayu* music and create phrases with the following characteristics :
Observe the relationship between the storyteller and the plucked string instrument *futozao*. 'Not to stick too close, but not to go far away' is the motto of the *gidayu* ensemble.
The notes are classified into three groups as follows.

good notes :	**C**	**D**	**E**	**G**	**A**			
bad notes :	*c#*	*d#*	*f*	*f#*	*g#*	*a#*	*b*	
multiphonics :	**f***	**f#***	**g#***	**a#***				

To make phrases, choose one note from the 'good notes' and play it, then choose one from 'bad notes' and play it. For example,

C. c#.

(' . ' means the end of a phrase.) Then go back to the first note, in this case C, and continue the phrase using another good note, for example D. Then, go back to the bad note played, in this case c#, and continue the 'bad notes phrase' choosing another bad note, e.g. d#. These phrases become as follows.

C D. *c# d#.*

Repeat this process and develop each phrase. When the phrases are developed, they can include multiphonic notes in either 'good' or 'bad' phrases.

C D. *c# d# f.* C D G g#*. *f# c#* f*

Noise expressions, 'dirty' sounds are very much expected.
Various lengths of notes, various expressions and a quick change in dynamics make this music intresting. Finish this part with a tone produced with any pitched vocal sound in forte.

Duration : max. 3min.

Part III.

The 'good' and 'bad' notes and multiphonics are as in part II. This part is also interactive, but the performer's sound is not processed.
This part concerns shakuhachi and *noh* sound aesthetics. Concentrating on the production of a single tone is all that is required. This part includes much silence. Listen to the silent moment (and let the audience listen to it). Basically, one breath for each note. The shapes of individual notes and phrases are indicated in the score.
At the opening play 'notes' which move steadily from noise to pitch (as

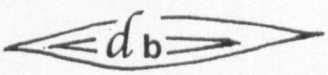
indicated). Quiet, slow, meditative.
The expression of the first half until the phrase enlargement derived from solo shakuhachi music, and the second half from *noh*-like ornamental improvisation.
To play this part, refer to the shakuhachi *honkyoku* (solo repertoire) and to *noh* music.
The following is a score for the performance of this part. The graphic phrases are guide examples and need not be strictly interpreted.

Duration : ca 4min.

III.

time (elastic) [ca.4min.]

Breath noise without tone noise → tone → noise

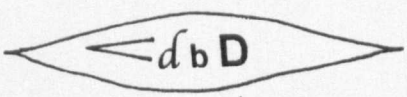
Recorder  ,  ,

Begin with breath noise. when a tone appears, gradually go back to breath noise.

time

The tone changes in pitch

ma

R. 

Computer sound

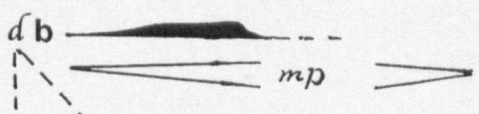
(processed Recorder)

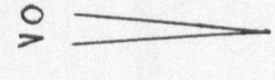
time

When the computer plays the second sound, play Db with cresc. When the pitch over-blows, continue it. Then,

a 'good note' with tonguing.

over-blown pitch

R. 



(any time during .)

Comp. the second sound

time

(pitch)

R.

Play a slow 'legato' phrase by beginning with the same 'good note'.

Repeat it making it faster and shorter, omitting some notes finally to arrive at a two-note tremolo or trill.

time

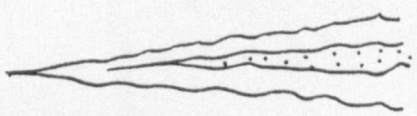
ma ex.

R.

Enlargement of the original phrase.

Create ornaments towards the same 'good note' (or octave higher) and play this 'ornament improvisation' variation. Refer above.

Comp.



Mid-low – low sound sneaks in.

time

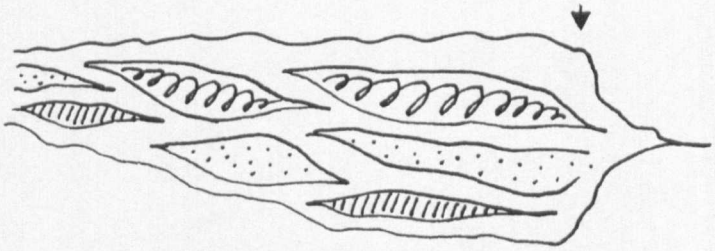
make the tension higher and higher

R.

Do not adhere to the 'good note' as 'core'. Exchange it with other notes, but keep the 'ornament improvisation'. Transfer the register gradually higher. During the whole 'ornament improvisation', the dynamics increase and the tempo becomes faster.

Choose one 'good note' and play *Sutebyoushi* rhythm. Begin with a long tone slowly, and gradually repeat it shorter and shorter then gradually (slightly) slower.

Comp.



time

over-blown tone

ma

R.

(attack without tonguing is preferable)

Play only once to conclude. Vibrato of this pattern can be added.

D

or

etc.

low long-tone. clear, strong tone. good note. A stable pitch is not required.

HIROMI ISHII

Steine, Stimme und Sterne

Für

Vokalensemble
und
Elektronische Klänge

(2002)

For performance

The piece consists of two different kinds of sound materials. Voices and the sound of volcanic rocks clashing together. The text of the voice part consists of two different sections. The first is made up of several pieces of astronomical data derived from astronomy encyclopaedias. These data refer to two stars, Altair and Vega who, according to an old Japanese folktale, are lovers separated by the river of heaven. This narration, heard through loudspeakers, is also processed by computer to make them 'nearer to the stone-sound', and also chopped into syllables and spoken by the choir as if by a random function of the computer. The second section is derived from an old Japanese poem which is sung by a tragic emperor. The two series of vowels, "u, e, i," and "a, o," are sung by the choir, at first individually then combined with the consonants of the original words finally to make the whole sentence.

Scale tones for the vocal part coincide with the pitches of the partial tones in the stone sound. These pitches appear at first as fragments, then as a chord, and eventually as a long heterophonic melody sung with the expression of Japanese *noh* singing.

Another factor, the stone sound, is played firstly as original sound, then is gradually transformed 'nearer to voice'. For this process, the vowels mentioned are also used as data for formant filters. The transformation almost reaches a crossover with the sound processed from the voices, and finally the two elements combine to create a complex morphing sound, 'stone-voice'. The processed sounds are programmed to initiate by the operator using the computer keyboard, or the conductor using MIDI devices such as a MIDI pedal.

Text :

Altair...flying eagle. Aquila's brightest star

Magnitude 0.8 (nought point eight)

At the distance of thirteen light years

Vega...alpha-Lyre

Standard star from magnitude scale 0 (nought) point

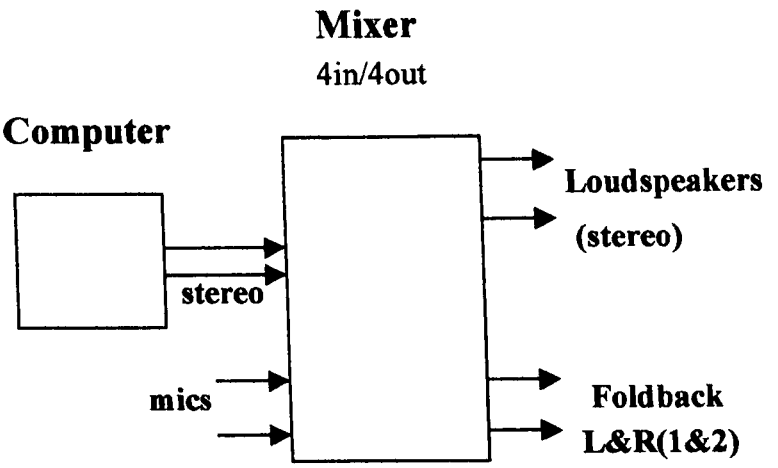
Two meteor showers emanate from Lyre

In twelve thousand years Vega will become the Pole Star

Waretemo sueni awan tozo

(although we are separated now, surely we can meet again in the future!)

Steine, Stimme und Sterne was commissioned by the State of Saxony, 2001.



System diagram for *Steine, Stimme und Sterne*

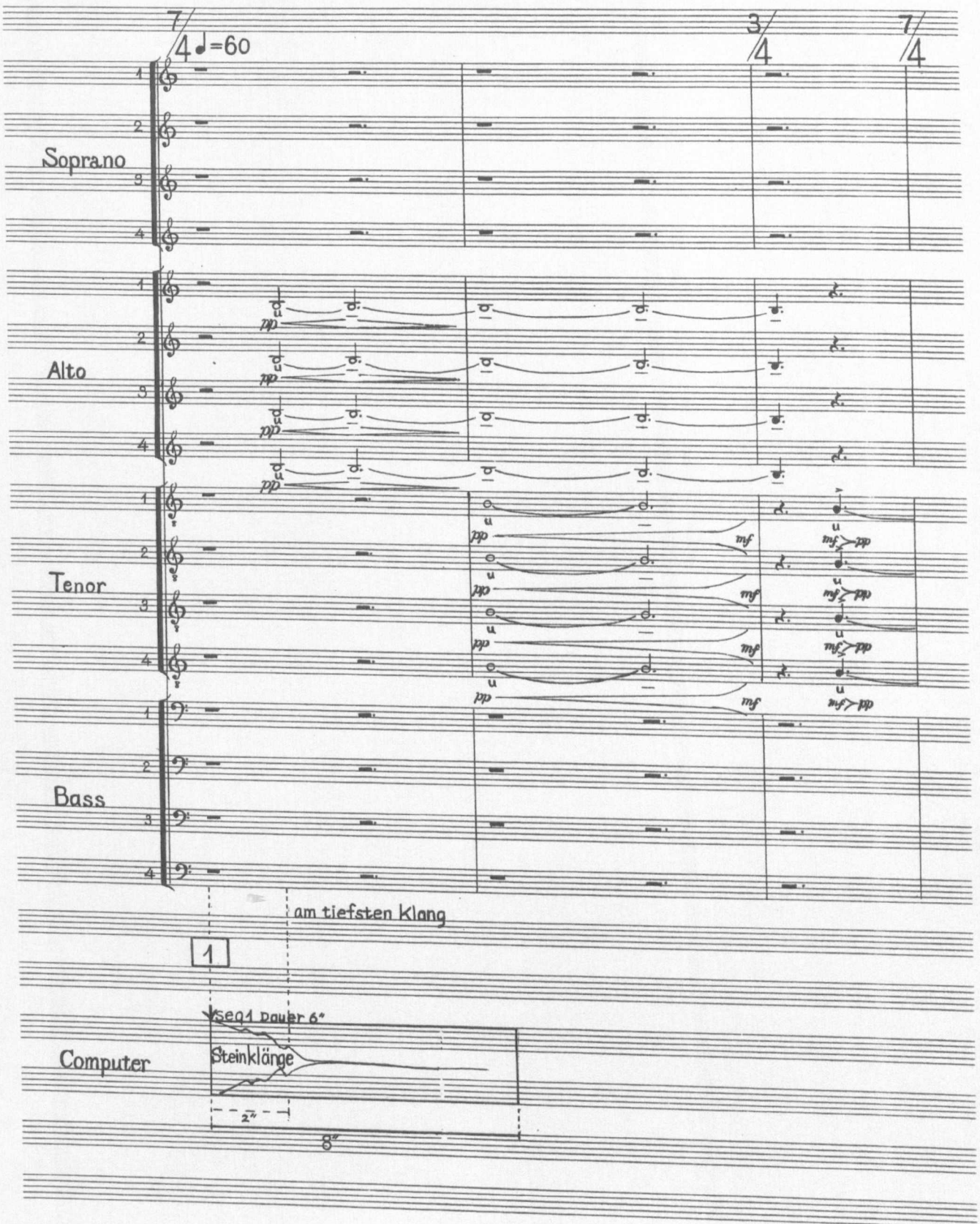
Software required for performance

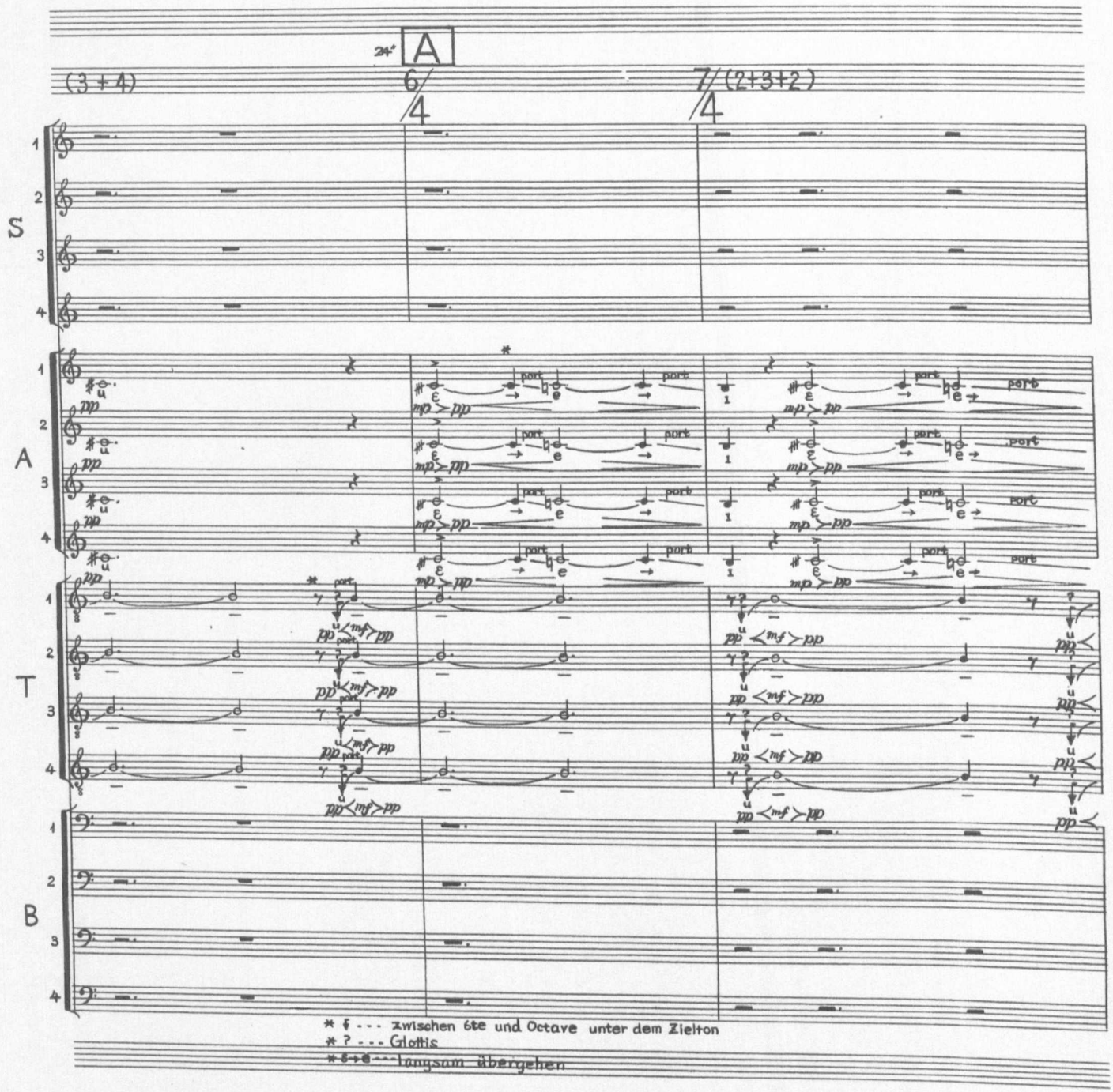
Computer : Mac OSX.3.3 or later. Max/MSP 4.5 or later

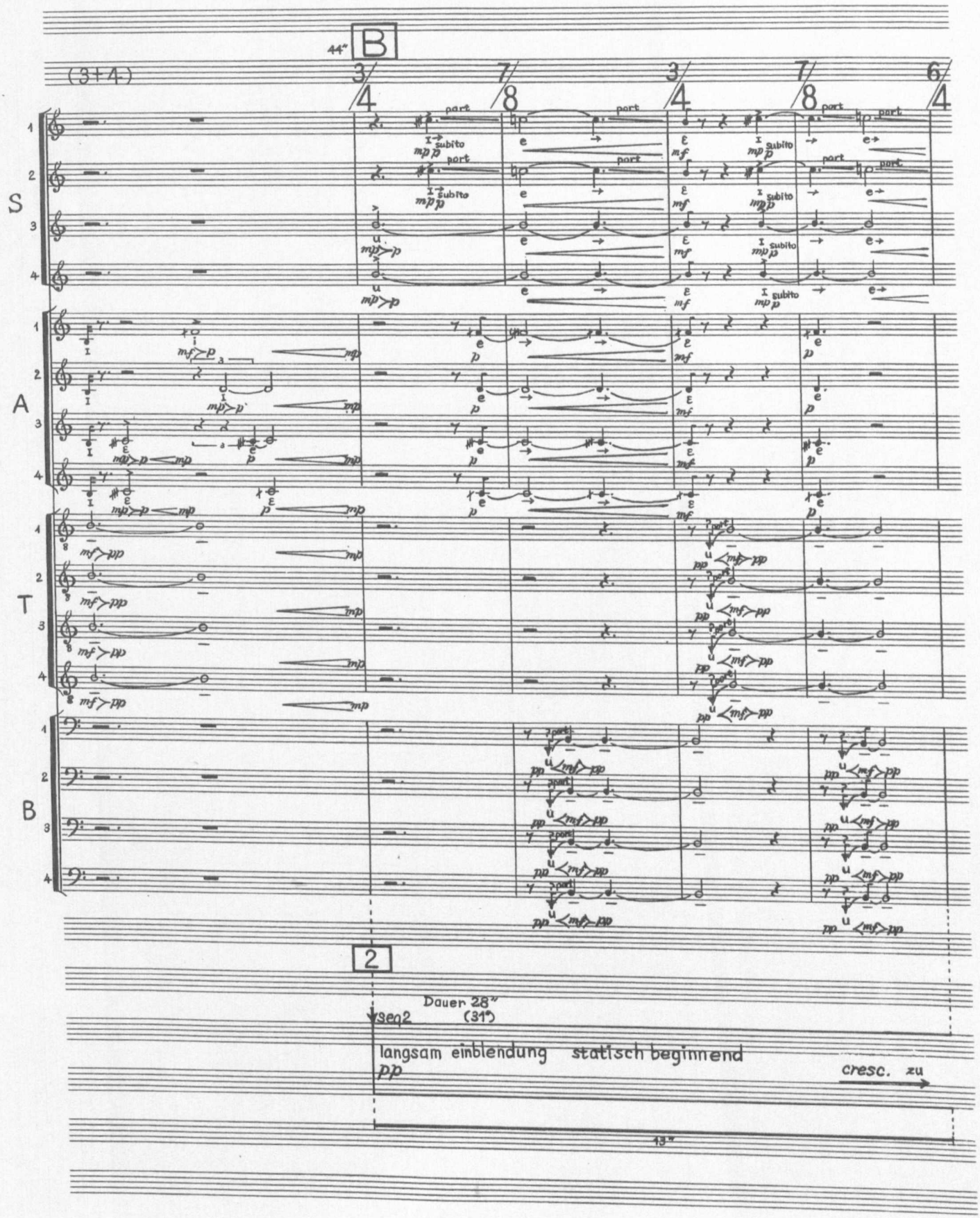
Steine, Stimme und Sterne

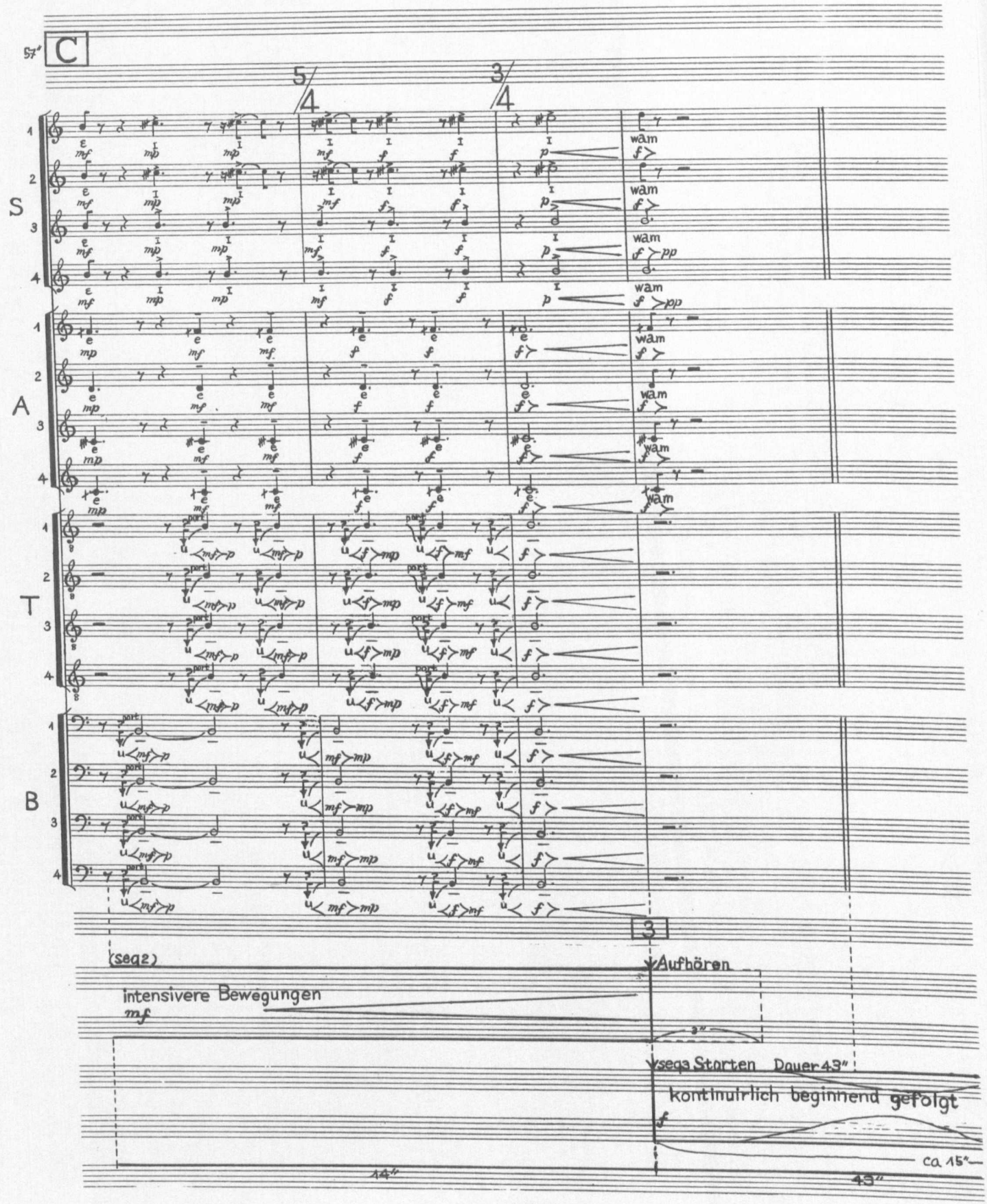
für

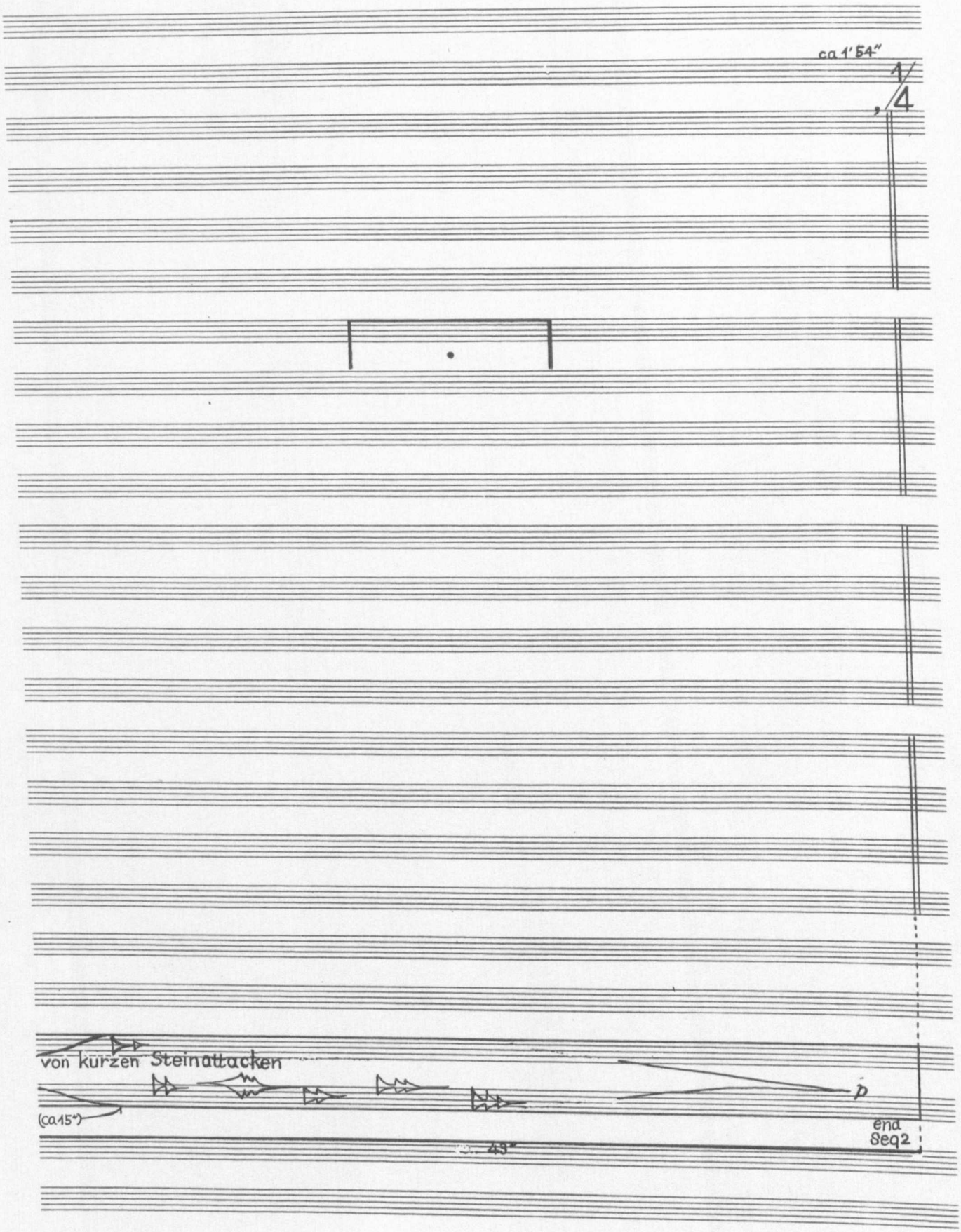
Vokalensemble und elektronische Klänge

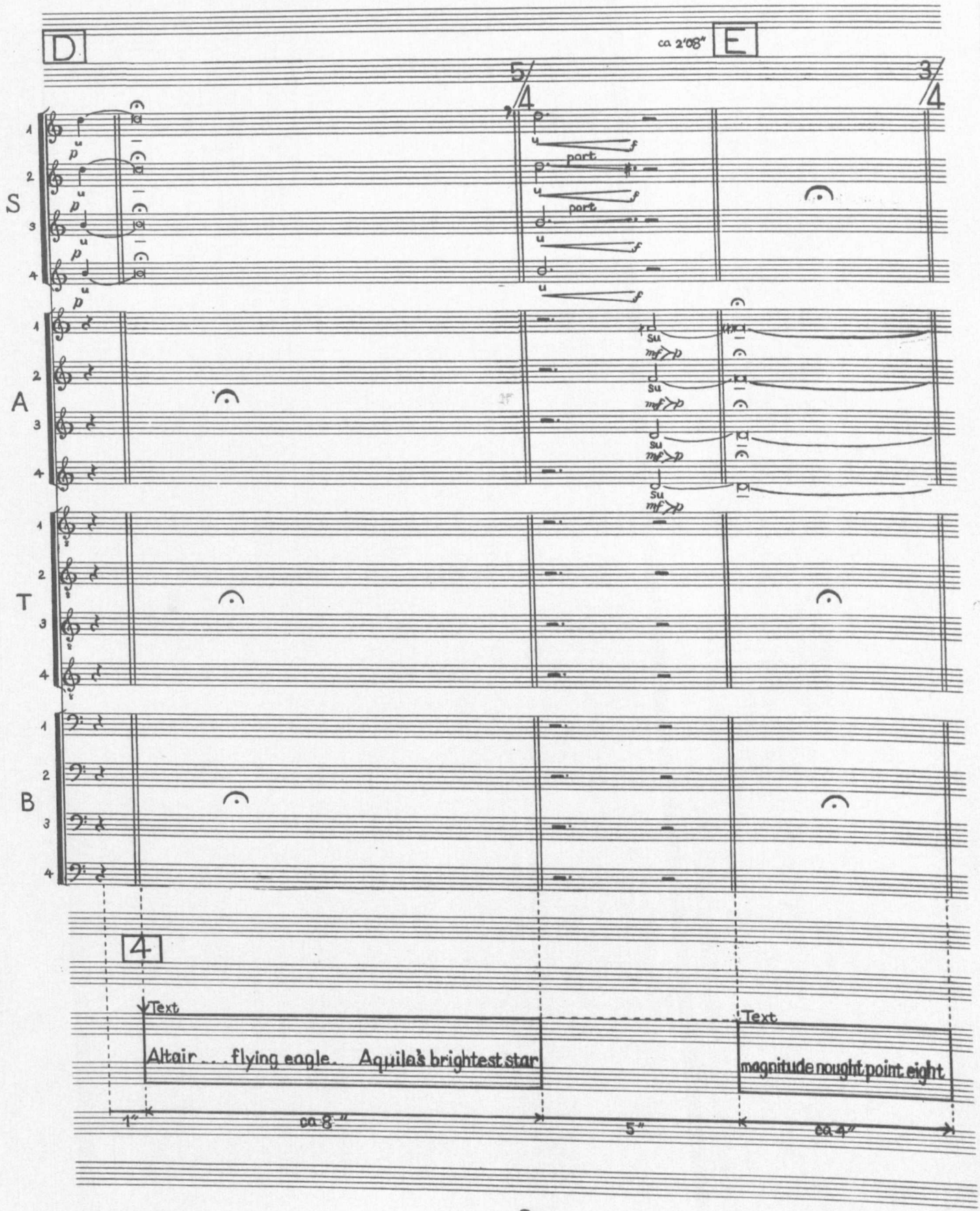


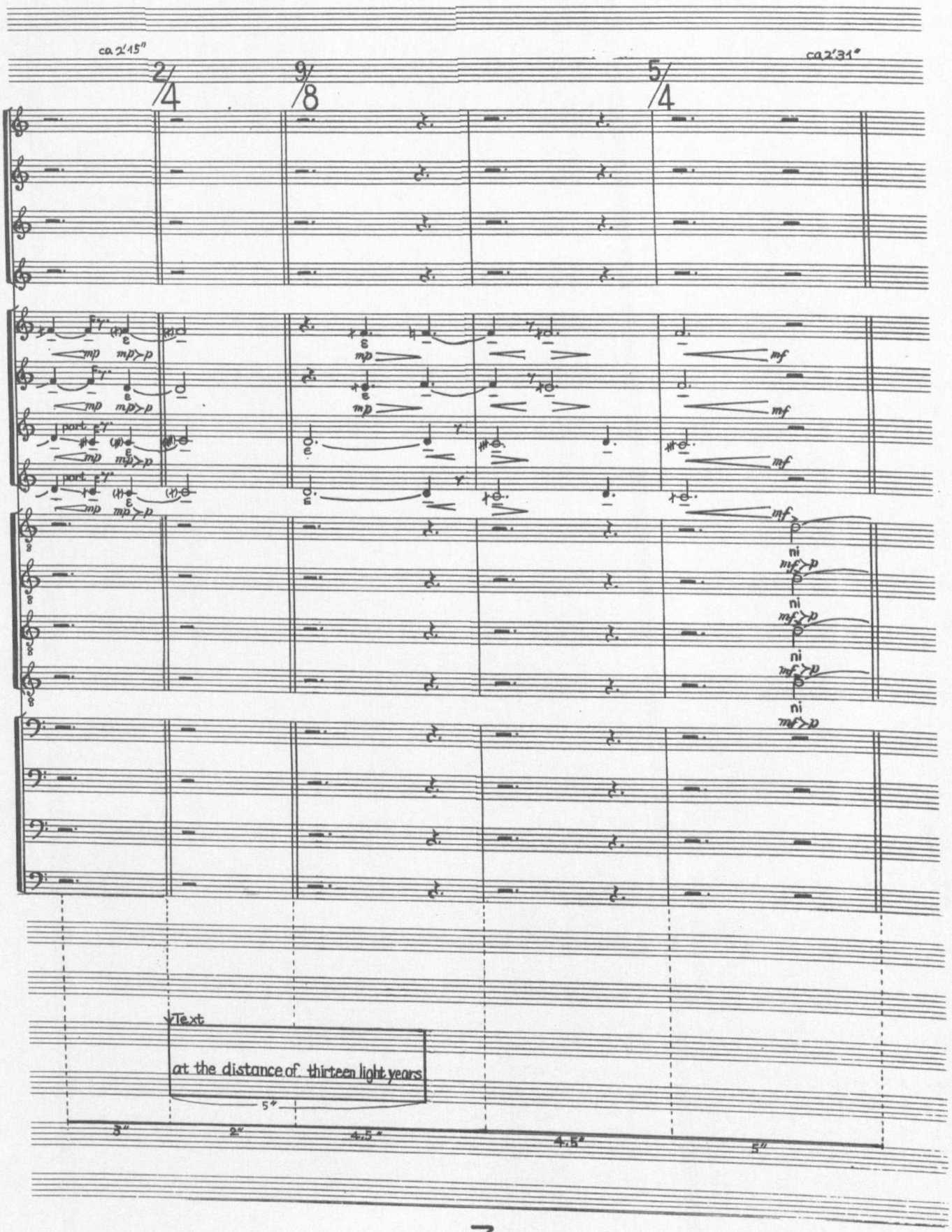

24'
A
(3+4)
6/4
7/(2+3+2)/4
S
A
T
B
port
pp
mp
mf
* ♮ --- zwischen 6te und Octave unter dem Zielton
* ? --- Glottis
* ♮→? --- langsam übergehen

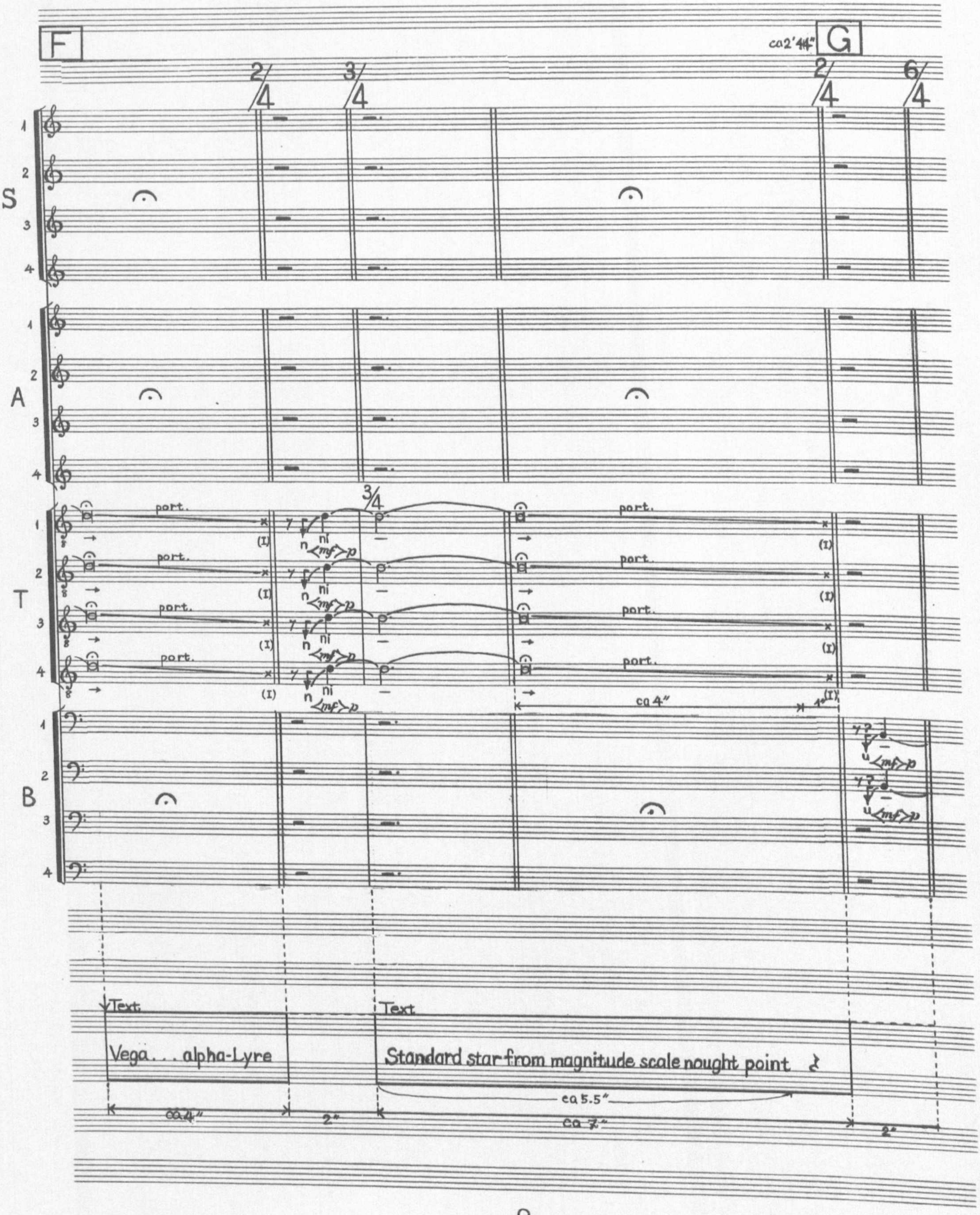

44"
B
(3+4)
3/4
7/8
3/4
7/8
6/4
S
A
T
B
part
subito
2
Dauer 28"
(31")
seq2
langsam einblendung statisch beginnend
pp
cresc. zu
13"

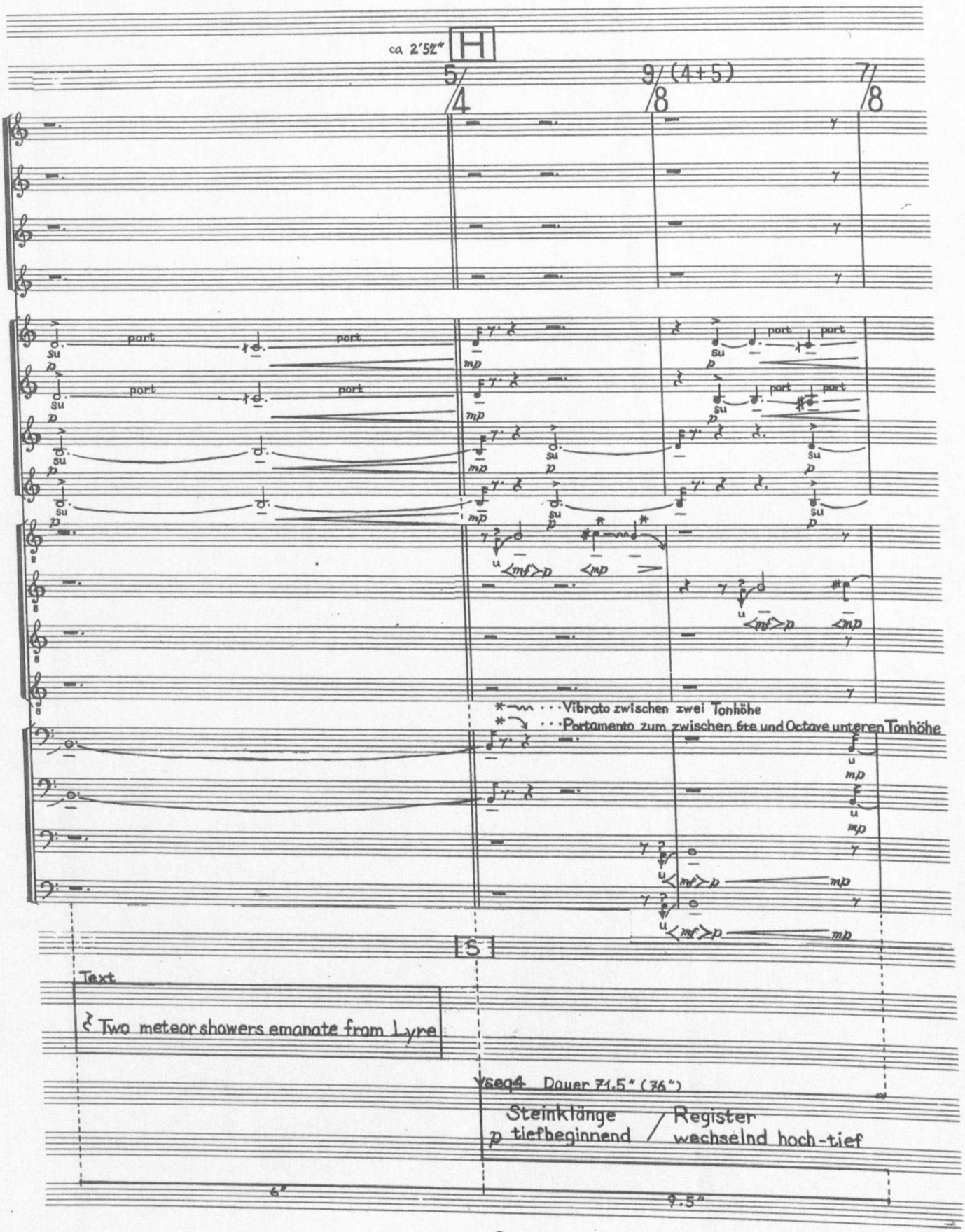

57'
C
5/4
3/4
S
A
T
B
wam
3
(seqz)
Aufhören
intensivere Bewegungen
mf
3"
seqa Starten Dauer 43"
kontinuirlich beginnend gefolgt
ca 15"
43"

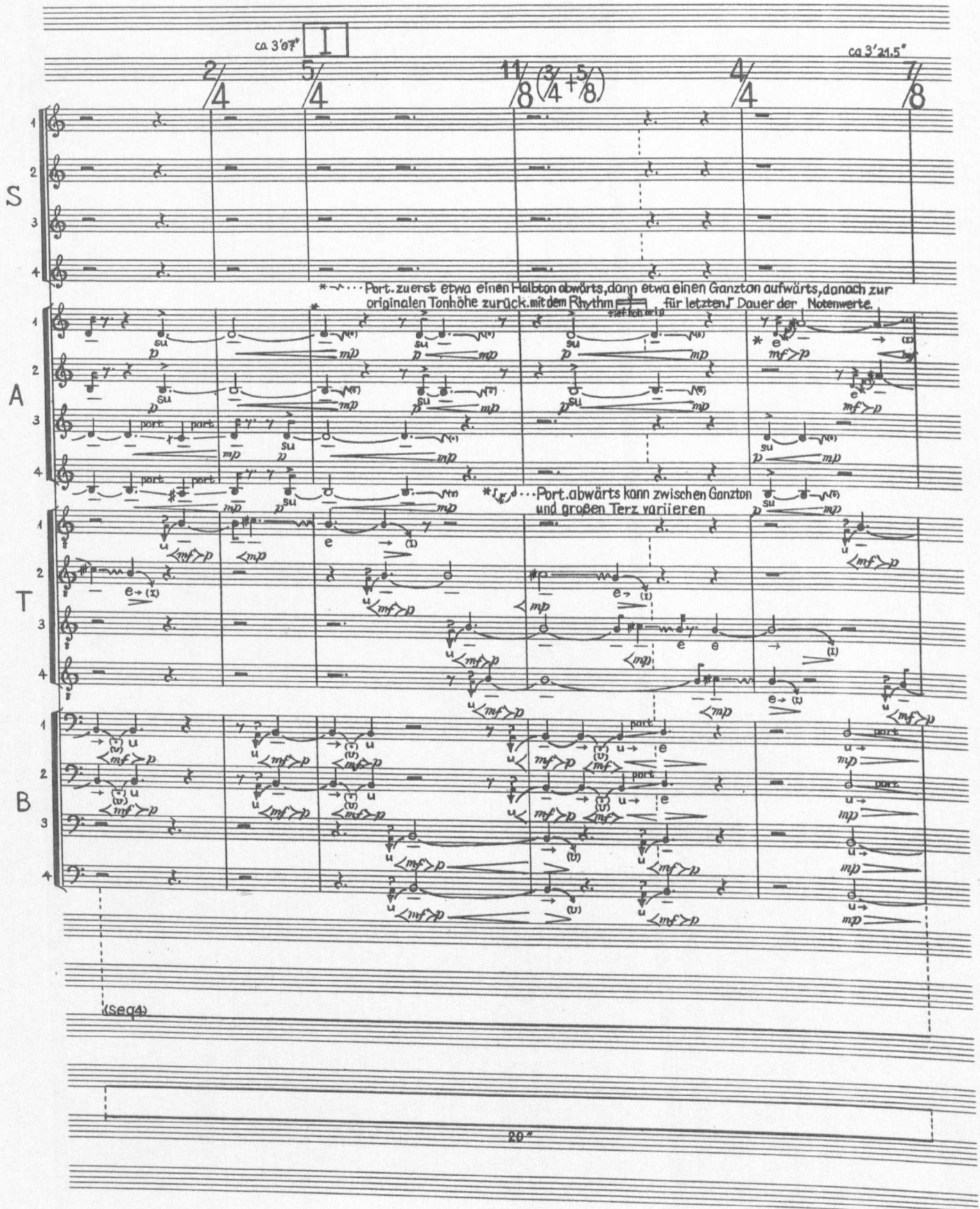

ca 1'54"
1/4
von kurzen Steinattacken
(ca 15")
p
ena
Seq2

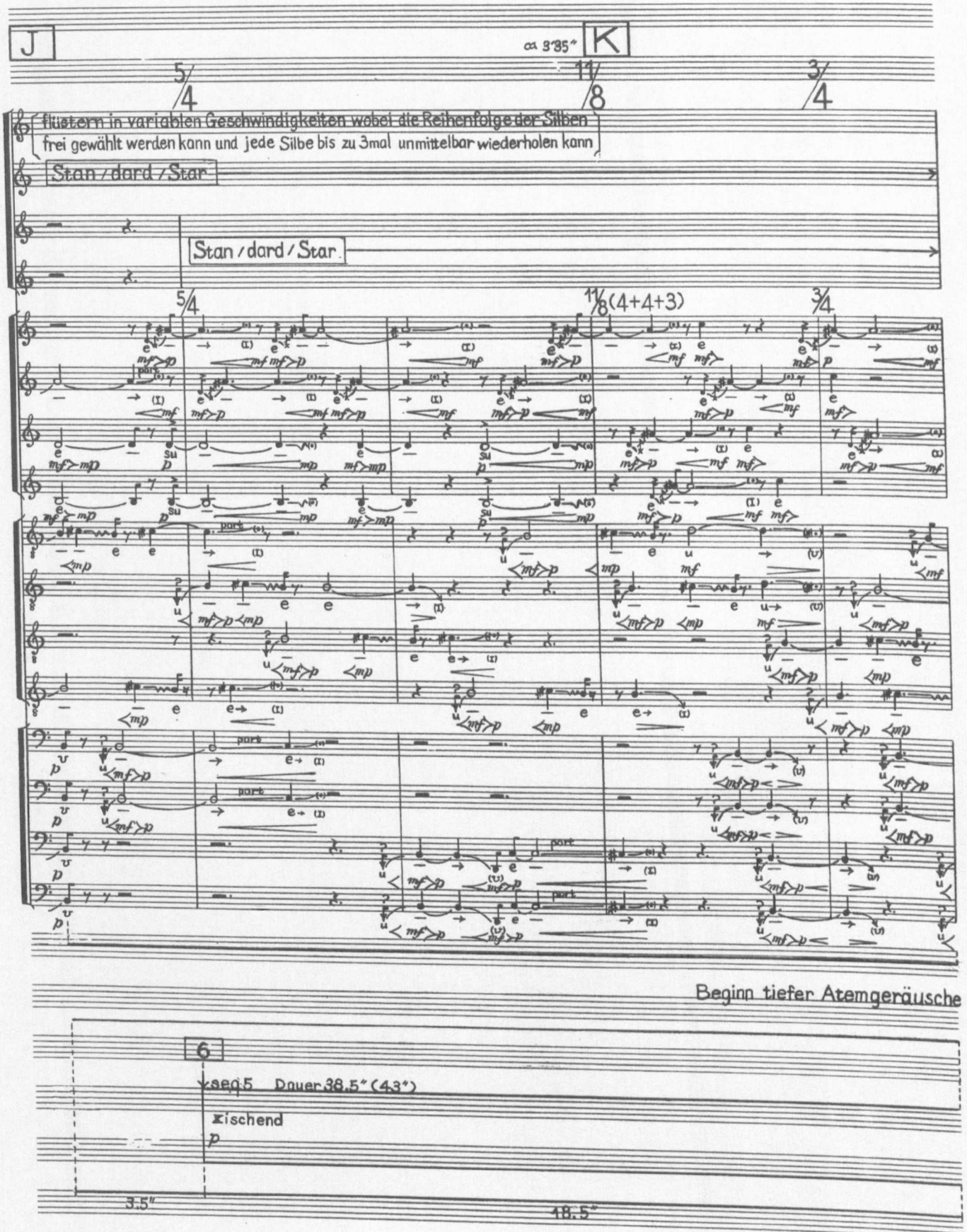

D
ca 2'08"
E
5/4
3/4
S
A
T
B
part.
Su
mf
p
4
Text
Altair . . . flying eagle. Aquila's brightest star
Text
magnitude nought point eight
1"
ca 8"
5"
ca 4"

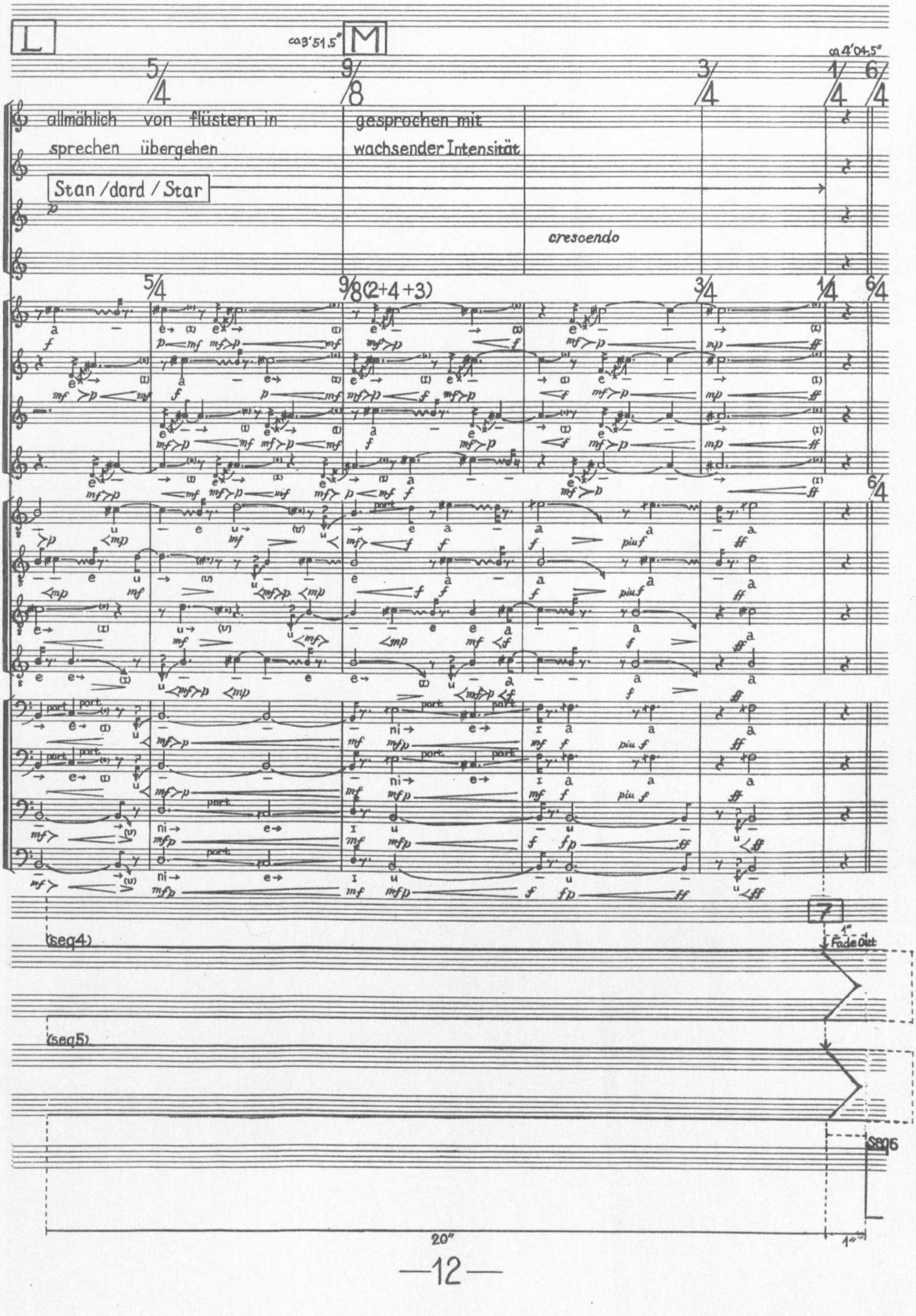

ca 2'15"
2/4
9/8
5/4
ca 2'31"
mp
mp>p
mf
ni
mf>p
part.
Text
at the distance of thirteen light years
5"
3"
2"
4.5"
4.5"
5"

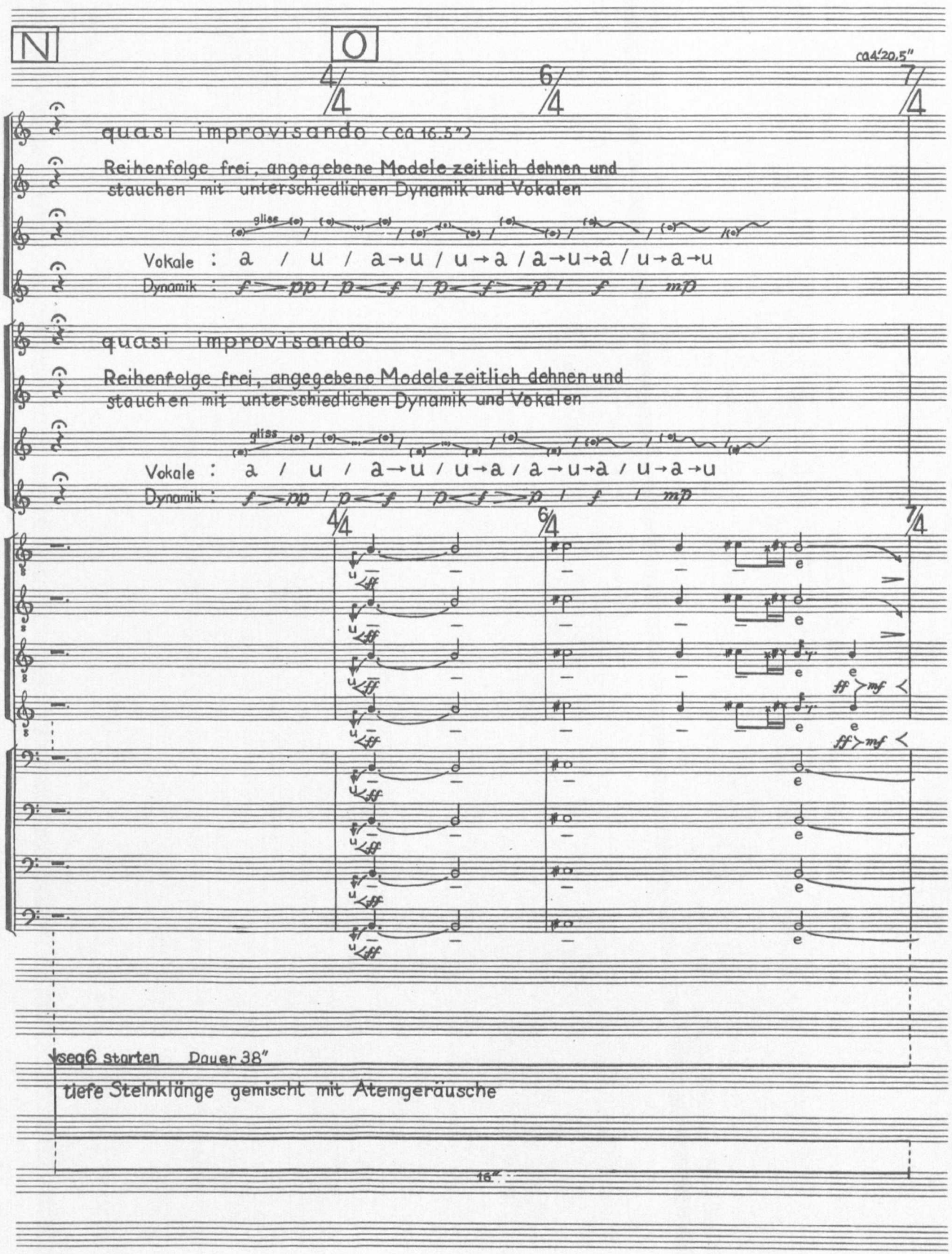

F
ca 2'44"
G
S
A
T
B
port.
(I)
n
ni
<mf>p
ca 4"
1"
u
Text
Vega . . . alpha-Lyre
Standard star from magnitude scale nought point
ca 5.5"
ca 4"
2"
ca 7"
2"

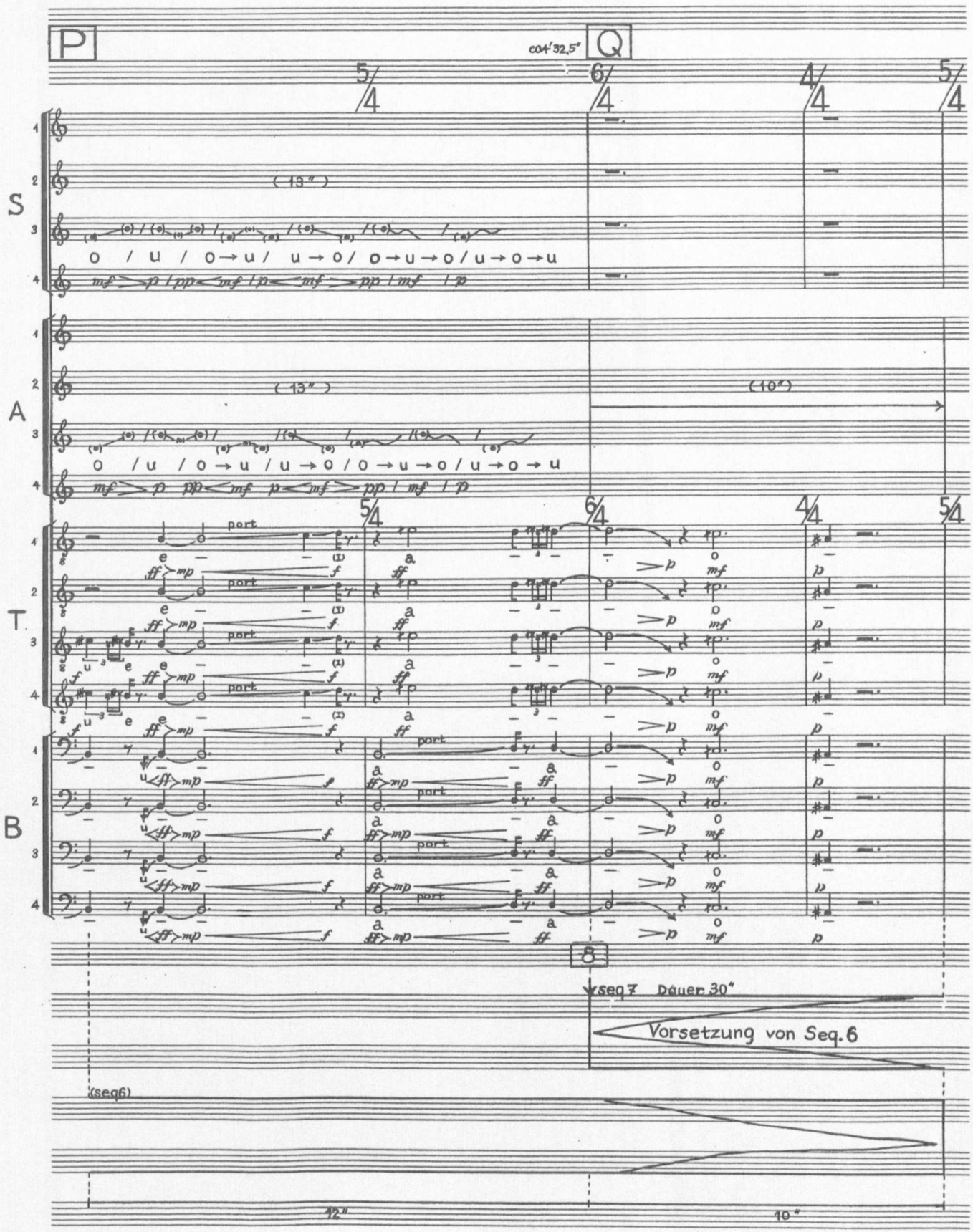

ca 2'52"
H
5/4
9/8 (4+5)
7/8
port
su
p
mp
u
<mf>p
<mp
*~~ ... Vibrato zwischen zwei Tonhöhe
* ... Portamento zum zwischen 6te und Octave unteren Tonhöhe
S
Text
Two meteor showers emanate from Lyre
Vseq4 Dauer 71.5" (76")
Steinklänge
p tiefbeginnend / Register
wechselnd hoch-tief
6"
9.5"

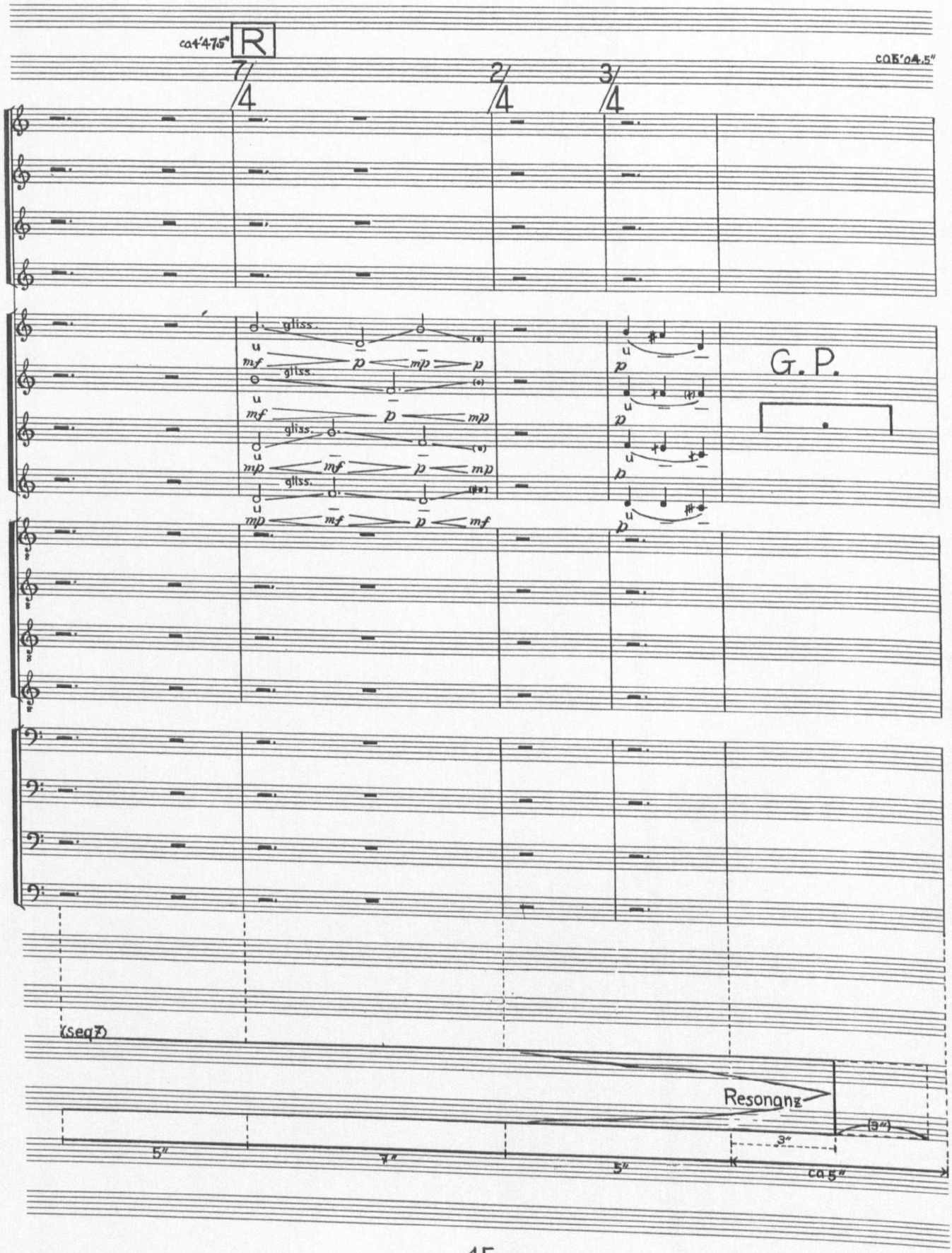

I
ca 3'07"
ca 3'21.5"
2/4
5/4
11/8 (3/4+5/8)
4/4
7/8
S
A
T
B
* ··· Port. zuerst etwa einen Halbton abwärts, dann etwa einen Ganzton aufwärts, danach zur originalen Tonhöhe zurück. mit dem Rhythm für letzten ♩ Dauer der Notenwerte.
* ··· Port. abwärts kann zwischen Ganzton und großen Terz variieren
(Seq4)
20"

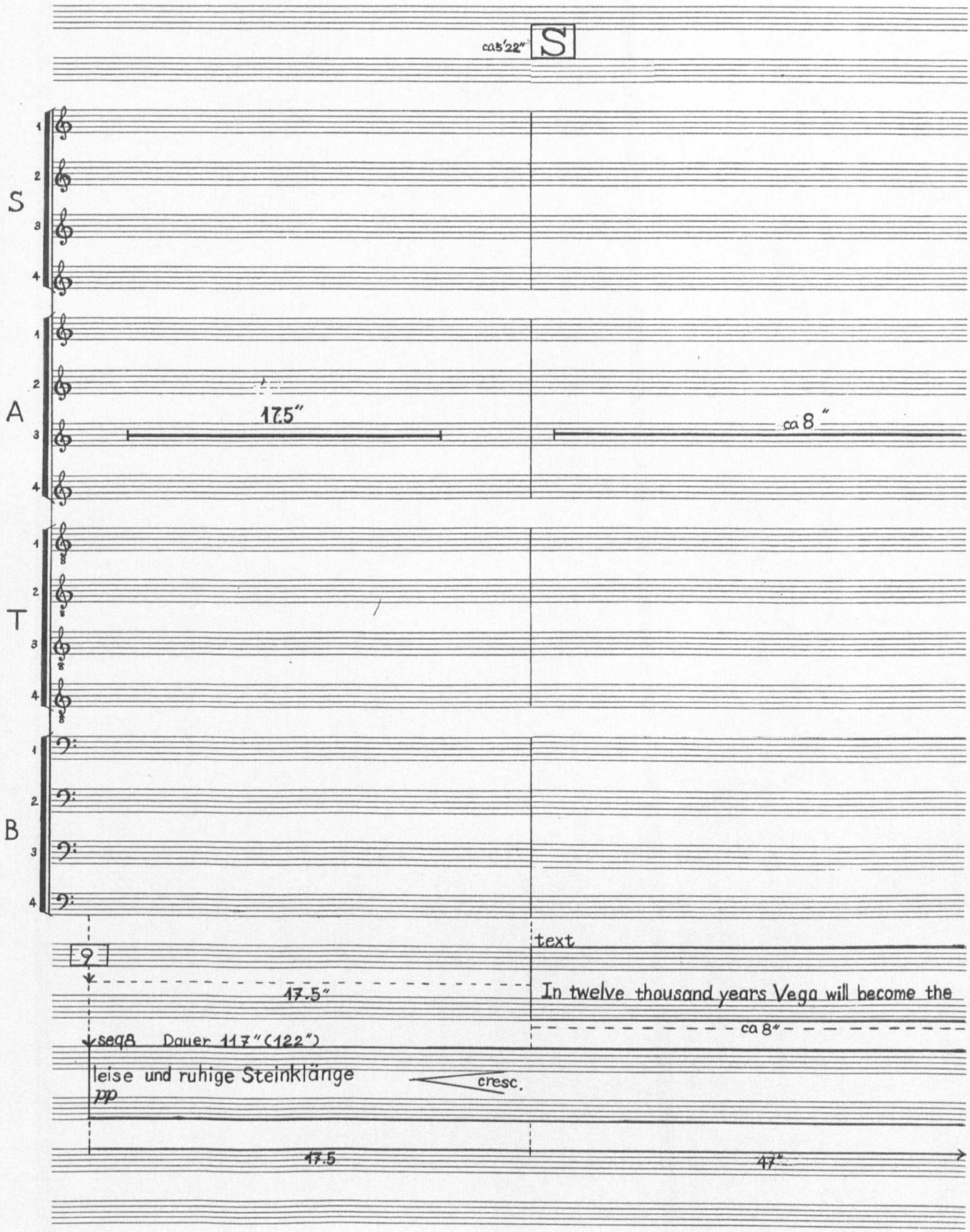

J
ca 3'35"
K
5/4
11/8
3/4
flüstern in variablen Geschwindigkeiten wobei die Reihenfolge der Silben frei gewählt werden kann und jede Silbe bis zu 3mal unmittelbar wiederholen kann
Stan / dard / Star
Stan / dard / Star
5/4
11/8 (4+4+3)
3/4
Beginn tiefer Atemgeräusche
6
seq 5 Dauer 38,5" (43")
zischend
p
3,5"
18,5"

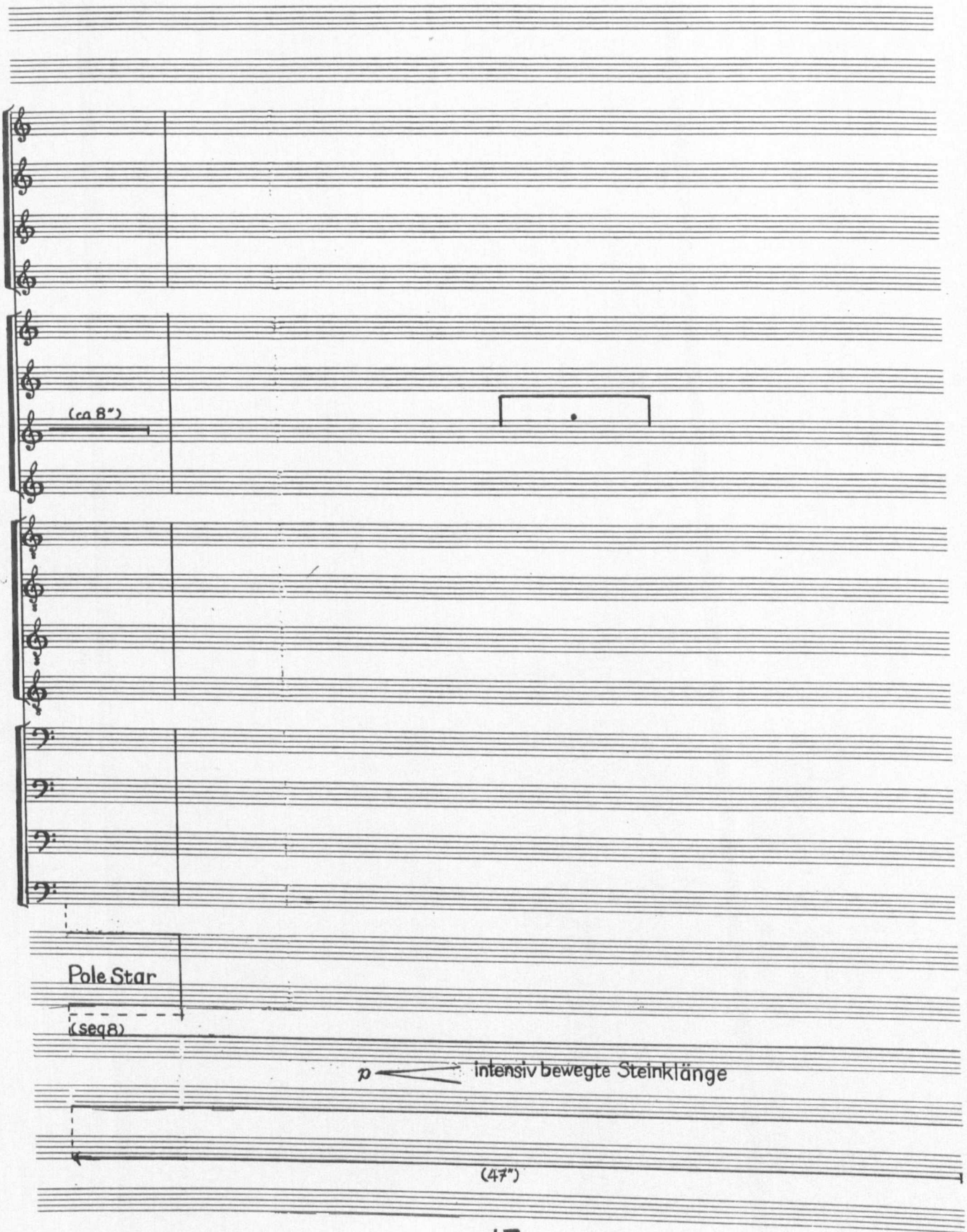

L
ca 3'51.5"
M
ca 4'04.5"
allmählich von flüstern in sprechen übergehen
gesprochen mit wachsender Intensität
Stan / dard / Star
crescendo
9/8 (2+4+3)
S
A
T
B
port
(seq4)
(seq5)
7
Fade Out
Seq6
20"
1"

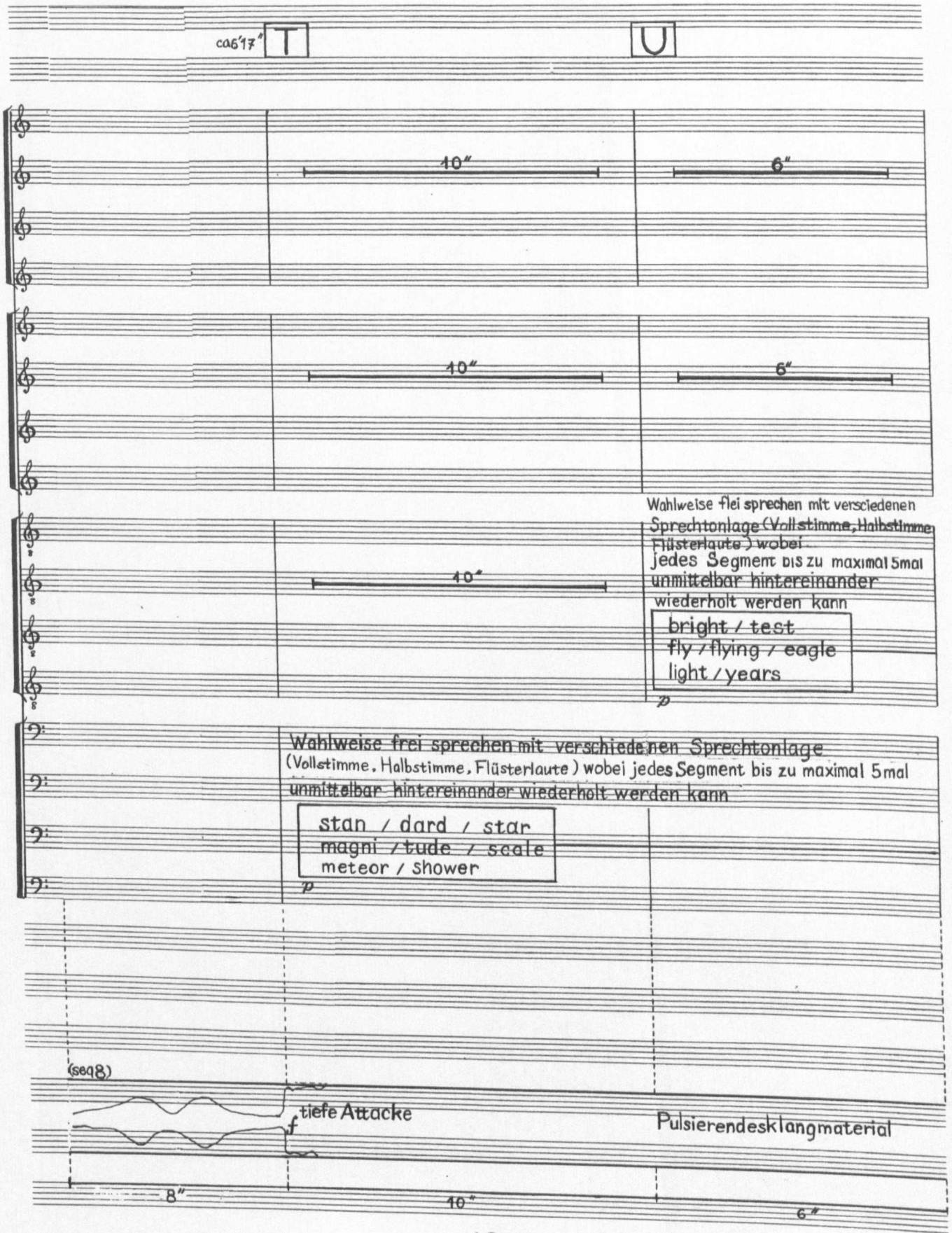

N
O
ca 4'20,5"
4/4
6/4
7/4
quasi improvisando (ca 16.5")
Reihenfolge frei, angegebene Modele zeitlich dehnen und stauchen mit unterschiedlichen Dynamik und Vokalen
gliss
Vokale : a / u / a→u / u→a / a→u→a / u→a→u
Dynamik : f>pp / p<f / p<f>p / f / mp
quasi improvisando
Reihenfolge frei, angegebene Modele zeitlich dehnen und stauchen mit unterschiedlichen Dynamik und Vokalen
gliss
Vokale : a / u / a→u / u→a / a→u→a / u→a→u
Dynamik : f>pp / p<f / p<f>p / f / mp
4/4
6/4
7/4
ff>mf
ff>mf
seq6 starten Dauer 38"
tiefe Steinklänge gemischt mit Atemgeräusche

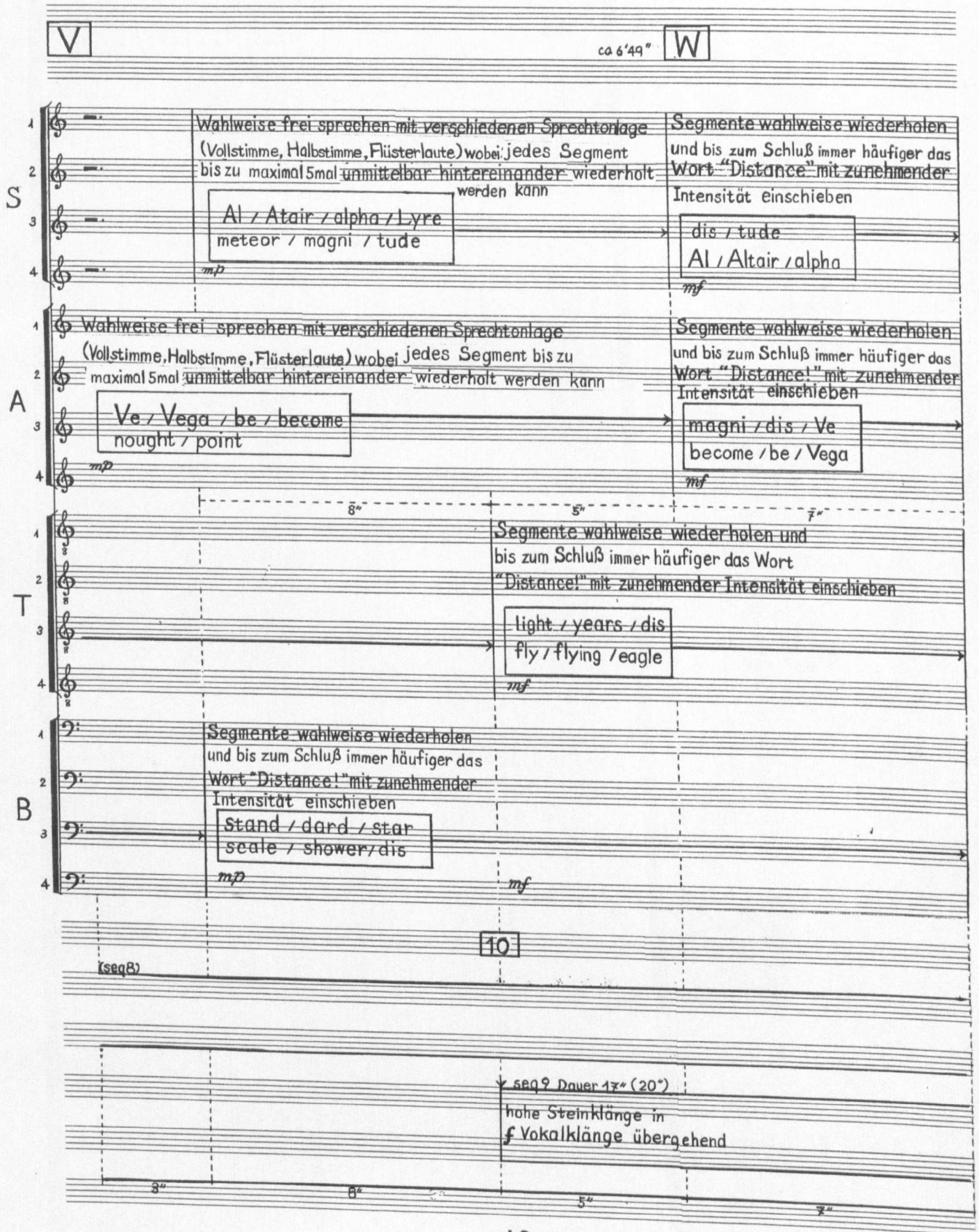

P
cat' 32,5"
Q
5/4
6/4
4/4
5/4
S
A
T
B
(13")
(10")
o / u / o → u / u → o / o → u → o / u → o → u
mf > p / pp < mf / p < mf > pp / mf / p
port
8
seq 7 Dauer 30"
Vorsetzung von Seq. 6
(seq6)
12"
10"

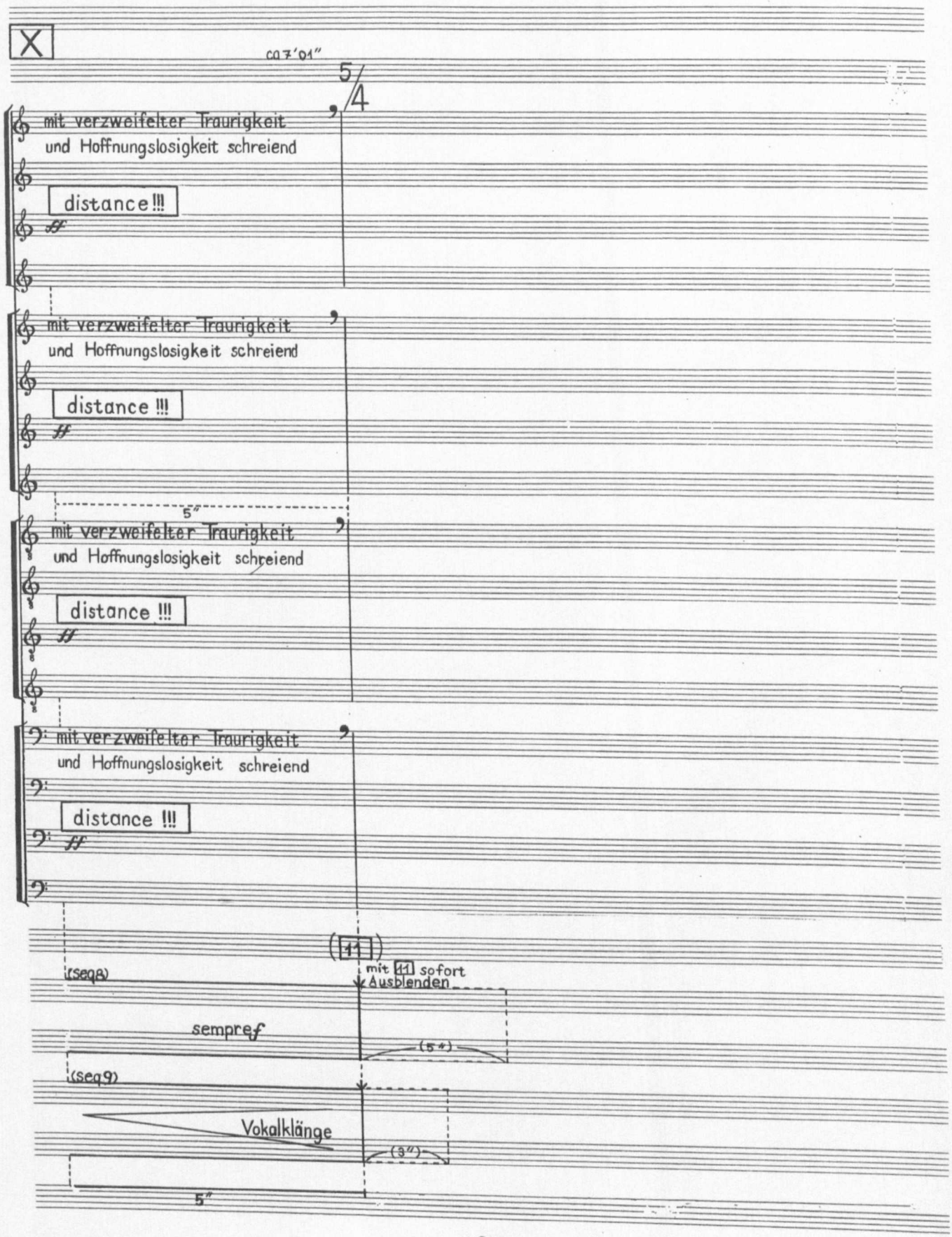

ca4'47.5"
R
ca5'04.5"
7/4
2/4
3/4
gliss.
G.P.
(seq7)
Resonance
(3")
3"
5"
7"
5"
ca5"

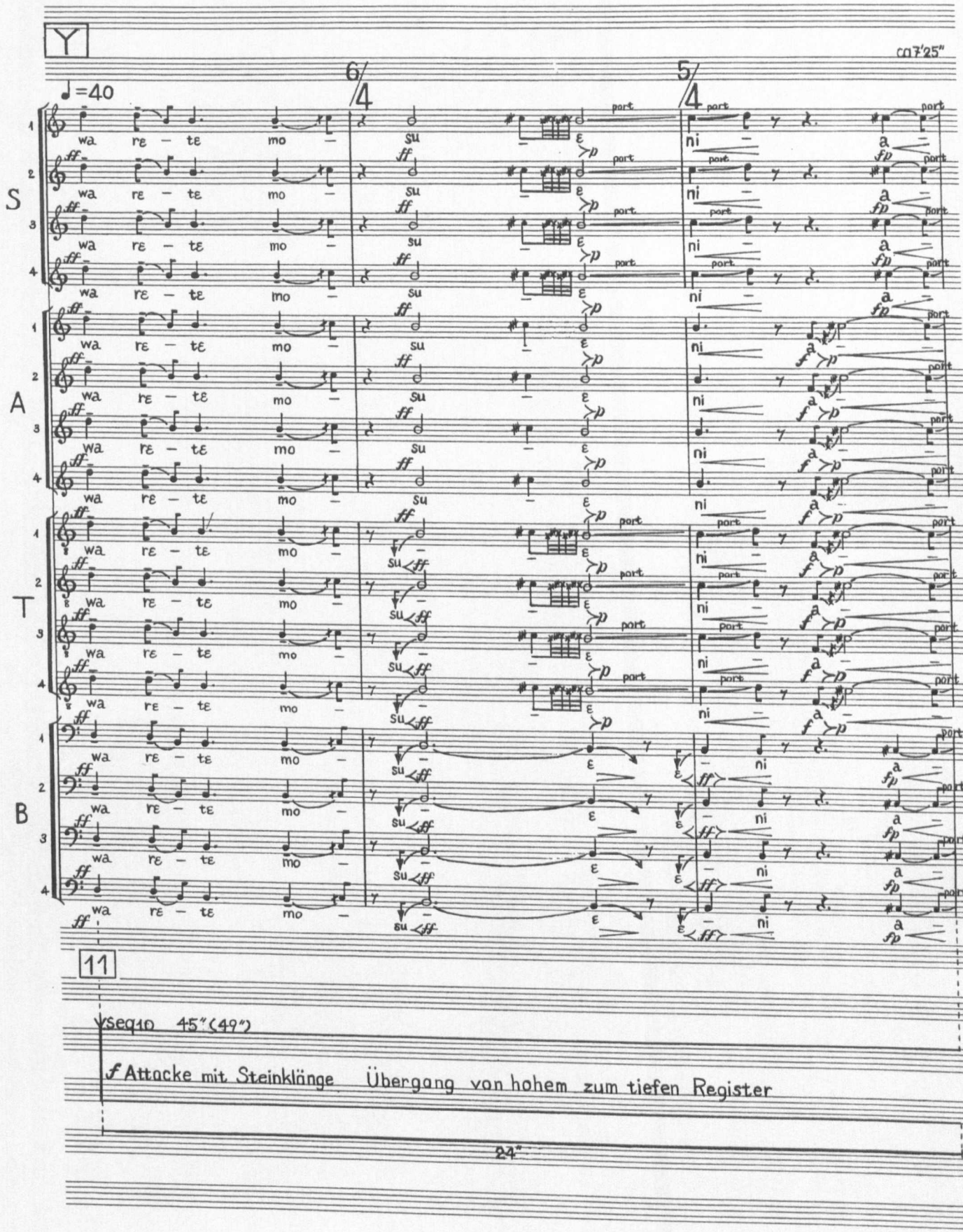

ca 5'22"
S
S
A
17.5"
ca 8"
T
B
9
17.5"
text
In twelve thousand years Vega will become the
ca 8"
seq8 Dauer 117" (122")
leise und ruhige Steinklänge
pp
cresc.
17.5
47"

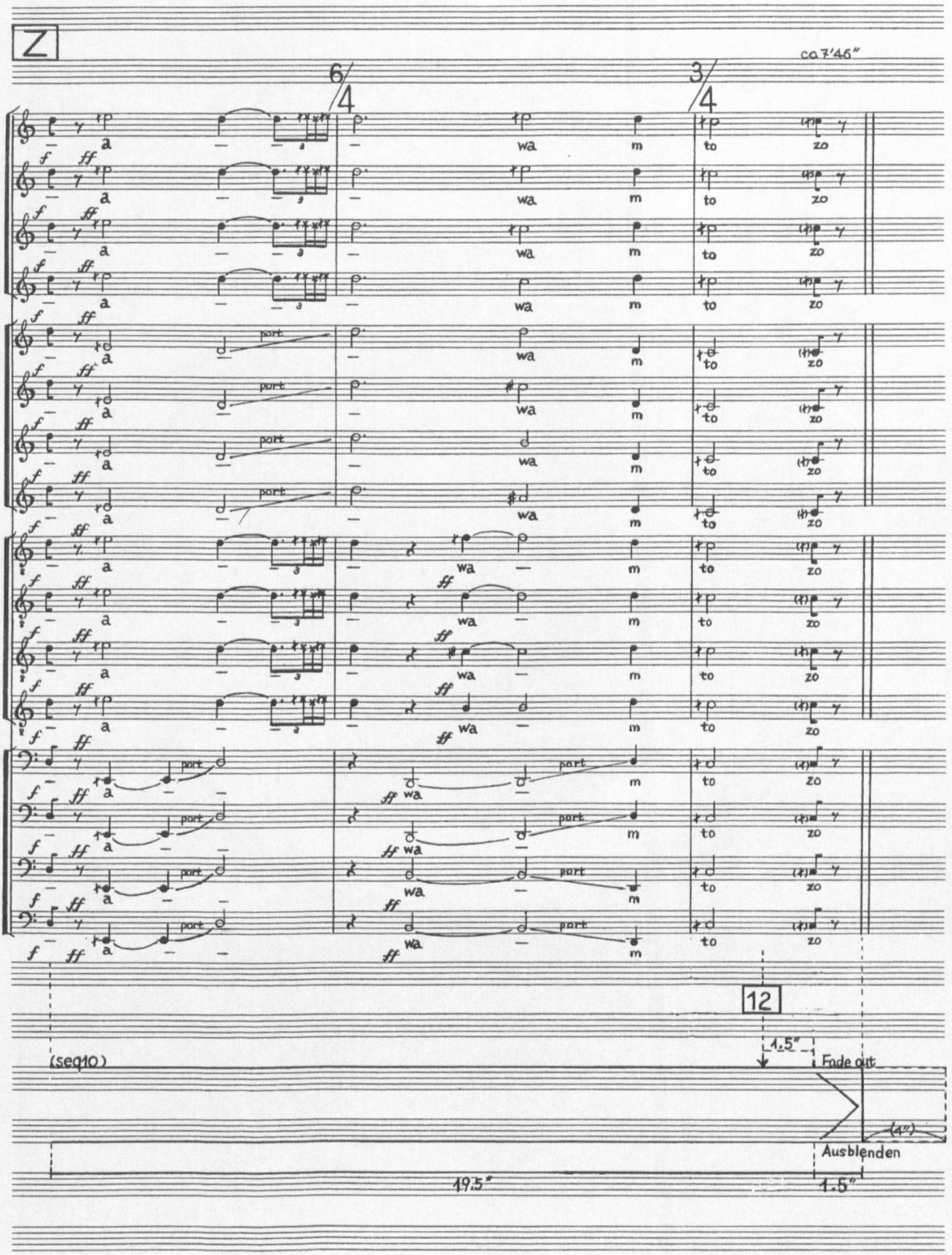

(ca 8")
Pole Star
(seq 8)
p
intensiv bewegte Steinklänge
(47")


ca 17"
T
U
10"
6"
10"
6"
10"
Wahlweise frei sprechen mit verschiedenen Sprechtonlage (Vollstimme, Halbstimme, Flüsterlaute) wobei jedes Segment bis zu maximal 5mal unmittelbar hintereinander wiederholt werden kann
bright / test
fly / flying / eagle
light / years
p
Wahlweise frei sprechen mit verschiedenen Sprechtonlage
(Vollstimme, Halbstimme, Flüsterlaute) wobei jedes Segment bis zu maximal 5 mal unmittelbar hintereinander wiederholt werden kann
stan / dard / star
magni / tude / scale
meteor / shower
p
(seq 8)
f
tiefe Attacke
Pulsierendesklangmaterial
8"
10"
6"


V
ca 6'49"
W
S
Wahlweise frei sprechen mit verschiedenen Sprechtonlage (Vollstimme, Halbstimme, Flüsterlaute) wobei jedes Segment bis zu maximal 5mal unmittelbar hintereinander wiederholt werden kann
Al / Atair / alpha / Lyre
meteor / magni / tude
mp
Segmente wahlweise wiederholen und bis zum Schluß immer häufiger das Wort "Distance" mit zunehmender Intensität einschieben
dis / tude
Al / Altair / alpha
mf
A
Wahlweise frei sprechen mit verschiedenen Sprechtonlage (Vollstimme, Halbstimme, Flüsterlaute) wobei jedes Segment bis zu maximal 5mal unmittelbar hintereinander wiederholt werden kann
Ve / Vega / be / become
nought / point
mp
Segmente wahlweise wiederholen und bis zum Schluß immer häufiger das Wort "Distance!" mit zunehmender Intensität einschieben
magni / dis / Ve
become / be / Vega
mf
8"
5"
7"
T
Segmente wahlweise wiederholen und bis zum Schluß immer häufiger das Wort "Distance!" mit zunehmender Intensität einschieben
light / years / dis
fly / flying / eagle
mf
B
Segmente wahlweise wiederholen und bis zum Schluß immer häufiger das Wort "Distance!" mit zunehmender Intensität einschieben
Stand / dard / star
scale / shower / dis
mp
mf
10
(seq8)
seq9 Dauer 17" (20")
hohe Steinklänge in
f Vokalklänge übergehend
3"
8"
5"
7"


X
ca 7'01"
5/4
mit verzweifelter Traurigkeit
und Hoffnungslosigkeit schreiend
distance !!!
ff
mit verzweifelter Traurigkeit
und Hoffnungslosigkeit schreiend
distance !!!
ff
5"
mit verzweifelter Traurigkeit
und Hoffnungslosigkeit schreiend
distance !!!
ff
mit verzweifelter Traurigkeit
und Hoffnungslosigkeit schreiend
distance !!!
ff
(11)
(seq8)
mit 11 sofort
Ausblenden
sempre f
(5")
(seq9)
Vokalklänge
(3")
5"


Y
ca7'25"
♩=40
6/4
5/4
S
A
T
B
wa rɛ – tɛ mo –
su
ni a
port
11
seq10 45"(49")
f Attacke mit Steinklänge Übergang von hohem zum tiefen Register
24"



20th March 2002, London