<u>Dirty Light:</u>
the application of musical principles to the organisation of light as an extension of musical expression into the non-figurative visual realm.

A thesis submitted for the degree of Doctor of Philosophy

by

Marko Ciciliani

School of Arts, Brunel University London
July 2010

Abstract
This thesis describes a number of compositions in which the objective was to investigate whether, and how far, the organisation of light can function as an extension of musical expression in the non-figurative visual realm. I explore the extent to which sound and light are compatible as media, in the sense of both being able to communicate a common set of ideas.

The thesis begins by placing the discussion in a historical context, with an overview of the history of analogies between sound and light from Antiquity to the 19th century, as well as the history of Light Art. The second part of the thesis describes synaesthesia as a historically developed aesthetic concept and as a field of research that reveals interesting facts about the neuronal processing of stimulations from the senses. The third part forms the core of the research. It leads from a general historic discussion to more specific problems that emerged in my own work with sound and light. Light is a medium strongly characterised by purity; at first, light therefore seemed an inappropriate medium in which to offer plausible translations of different degrees of sonic noise. However, because of the importance that the inclusion of noise has taken in music since the 20th century, this would have meant a severe handicap in looking for a homological relationship between sound and light in artistic contexts. From a discussion of the broad implications the idea of dirt has in social and cultural contexts, the focus is eventually reduced to the aesthetic problem at hand. By means of a classification of three different sorts of noise, a more differentiated understanding becomes possible of the various functions that noise can have. Corresponding forms of ‘dirty light’ eventually become conceivable and artistically applicable. In the fourth part, six compositions and one audiovisual installation are discussed. Each of these works explores different relationships between the visual and sonic component. When appropriate, the various concepts of ‘dirty light’ that have been derived in the third part are reflected in the form of concrete examples. After discussing each work individually, certain practical problems are addressed that surfaced repeatedly under different performance circumstances. In the fifth part I pose the question of how far events that are conceived to be musical have to be based on sonic events. Common definitions of music that describe sonic events as its exclusive concern are questioned and a number of examples of music are discussed where the sonic outcome is hardly audible or even completely silent. I propose a notion that conceives music as a larger field of activity in which visual manifestations form an integral part.

The seven audiovisual works form the practical component of this dissertation. As a result of this research a more differentiated understanding of the nature of the coupling of sound and light has emerged, alongside a comprehension of the at times strongly differing views on the general nature of cross-disciplinary works.

Dirty Light:
the application of musical principles to the organisation of light as an extension of musical expression into the non-figurative visual realm.

1. Historical overview

1.1 History of analogies between light and sound until the 19th century[1]

It seems to be a natural psychological step that a person first compares unfamiliar phenomena with existing personal experiences and thereby tries to recognise familiar patterns. Similarly, the forming of analogies has always been a common method in the sciences. Although analogies sometimes yield compelling explanations, they are of questionable scientific value, as long as no underlying laws of nature have been discovered. As soon as the underlying laws have been formulated, the analogy however has become superfluous as an explanation.[2] Comparisons between colours and pitches are as old as mankind. In early texts there is however no concept of singular relationships between the two. They were rather part of an all-embracing worldview, in which many different elements, like colours, pitches, seasons, elements, weekdays etc. were put into correlation. Hence they belong to the idea that mankind and cosmos form a singular entity.

Creation myths of some cultures report combinations of sound and light. An ancient Egyptian myth tells about a "scream of light" which created the world and which was emitted by a singing sun. A Brahmin myth describes the very first men as illuminated and resonating beings.[3] Similar motives that unite sound and light can also be found in Chinese, Japanese, Aztec and aboriginal creation myths.[4]

1.1.1 The Harmonic Pythagoreanism

The Harmonic Pythagoreanism is a body of knowledge that is in equal measure based on visual as on sonic observations. As the name suggests, the Harmonic Pythagoreanism goes back to the teachings of Pythagoras (± 570-495 BC). Since Pythagoras himself did not leave behind any writings, everything that is known about him is from secondary literature. In his philosophy Pythagoras assumed that the same laws of nature governing the human soul and music. These laws are based on specific harmonic relationships,[5] which also describe the proportions between planets, based on their distances and speeds of rotation. Many of these laws can therefore be expressed mathematically. Terms like 'harmonia mundana' and 'music of the spheres' describe this accordance of musical and planetary relationships. In Antiquity,

---

[1] A large part of the overview presented here of the history of analogies between light and sound is based on the book: Jewanski, Jörg: Ist C = Rot?, Berlin: Berliner Musik Studien Band 17 (1996).
[2] Stegmüller, Wolfgang: Probleme und Resultate der Wissenschaftstheorie und Analytischen Philosophie, Vol. 1, Berlin: Springer (1969/74), 35.
[3] Schneider, Marius: Singende Steine. Rhythmus Studien an drei katalanischen Kreuzgängen romanischen Stils, Kassel: Bärenreiter Verlag (1955), 14.
[4] Jewanski, Jörg: Ist C = Rot?, Berlin: Berliner Musik Studien Band 17 (1996), 68.
[5] Haase, Rudolf: "Harmonikale Grundlagenforschung", in: Acta Musicologica, Vol. 58, Fasc. 2, International Musicological Society (1986), 282.

these ideas can be found in the writings of Plato (427-347 BC)[6], Aristotle (384-322 BC)[7] and Ptolemy (90-168).[8] They also gained much attention in the Middle Ages – most notably by St. Augustine (354-430)[9] and Anicius Manlius Severinus Boethius (ca. 480-524)[10] and eventually underwent a thorough revision through Johannes Kepler's (1571-1630) Harmonices mundi libri V from 1596.[11]

The influence of Harmonic Pythagoreanism on Western music can hardly be overestimated. The Pythagorean laws of harmonic relationships also served as the basis to include music as *Ars musica* into the *Septem artes liberales* that consisted of the mathematically oriented *Quadrivium* and the linguistically oriented *Trivium*. Alongside arithmetics, geometry and astronomy music formed the *Quadrivium.*[12] The *Artes liberales* were the main curriculum of the universities since the Middle Ages. The integration of music into academic studies formed the basis for the development of music theory and for the formation of a discourse on the treatment of consonances and dissonances in church music. The correlation of a visual (the observation of the rotation of the planets), aural, spiritual and mathematical phenomenon is therefore deeply embedded in the understanding of Western music.

Since the Renaissance the idea of Harmonia Mundi has lost its momentum due to the growth of rationalism and the development of systematic sciences.[13] Since it is not possible to prove that the rotation of the planets actually produces an audible result,[14] during the Enlightment period the concept was regarded with increasing skepticism. In the 20th century, however, it came up again as part of numerous new-age movements. Interestingly, the idea of a "gigantic symphony" underlying all matter in the universe is also a common metaphor used in String Theory,[15] a branch of Quantum Mechanics and Relativity Theory that developed from the late sixties of the 20th century with the aim of merging and reconciling the two areas of physics that have hitherto contradicted each other. Part of the String Theory is a so-called dual-resonance model, which is assumed to underlie all matter. Presuming that vibration is at the core of everything and that the universe forms a giant symphony conjures up the concept of *harmonia mundi*.

---

6 Godwin, Joscelyn: The Harmony of the Spheres, Rochester, Vermont: Inner Traditions International (1993), 4ff.
7 Haase, Rudolf: Geschichte des Harmonikalen Pythagoreismus, Vienna: Verlag Elisabethe Lafite (1969), 11.
8 Godwin, Joscelyn: The Harmony of the Spheres, Rochester, Vermont: Inner Traditions International (1993), 22ff.
9 Haase, Rudolf: Geschichte des Harmonikalen Pythagoreismus, Vienna: Verlag Elisabethe Lafite (1969), 24-28.
10 Godwin, Joscelyn: The Harmony of the Spheres, Rochester, Vermont: Inner Traditions International (1993), 87f.
11 Haase, Rudolf: Geschichte des Harmonikalen Pythagoreismus, Vienna: Verlag Elisabethe Lafite (1969), 84.
12 "Ars musica" in Meyers Taschenlexikon Musik, Vol.1, Mannheim: Meyers Verlag (1984), 61.
13 Haase, Rudolf: Geschichte des Harmonikalen Pythagoreismus, Vienna: Verlag Elisabethe Lafite (1969), 81.
14 This criticism was raised for the first time already in the early 14th century by Walter Odington. See Haase, Rudolf: Geschichte des Harmonikalen Pythagoreismus, Vienna: Verlag Elisabethe Lafite (1969), 36.
15 http://www.scienceagogo.com/news/string_theory.shtml, [accessed on January 10, 2010].

1.1.2 Antiquity

The Greek Antiquity is considered to be the root of modern natural sciences for which Pythagoras's philosophy provided many basics. Due to its privileged position in Pythagoras's thinking music was considered a science. Optics, however, were not.

The first rudimentary theory of colour is attributed to Alkmaeon of Croton (mid 5th century BC) a student of Pythagoras. He assigned four colours to the four basic elements fire, air, earth and water. Also Heraclitus (±550-480 BC), Empedocles (±500-±430 BC), Democrates (±460-±370 BC) and Plato differentiated between four main colours. It is characteristic of the natural sciences of the Antiquity that numerical concepts of certain orders of things were considered more important than their empirical accuracy.

Aristotle went deeper into analogies between sound and colours as part of his thorough researches on the human senses. In his book De anima he describes sight and hearing as superior senses. There he also describes several aspects that sound and light have in common, like the excitement of the air that is a prerequisite for both so that they can be perceived. He also compares pale colours with faint sounds and points out that other materials reflect both sound and light. In his book De Sensu he gives a detailed comparison between tastes and colours. Based on the musical scale he assigns 7 different tastes to 7 different colours. He also speaks of consonances and dissonances between colours. Placing black and white on the edges of the colour scale, he states that these colours are less pleasant for the eye to look at. Green he places in the middle of the scale, since he perceived it as the most balanced and agreeable colour.[16] According to the same criteria he formed the scale for tastes. Thinking in such analogies, Aristotle put himself in an old tradition.[17] The idea of gaining knowledge about natural processes by drawing analogies between different phenomena can be traced back to the oldest writings of Greek Antiquity, including Pythagoras.

1.1.3 Middle Ages

In the early Middle Ages the occidental Christianity was more interested in preserving the knowledge collected in the classical era, rather than in developing new interpretations.[18] The major body of scientific knowledge was based on Aristotle. Since he was considered as being too rational, his ideas were often extended by occult sciences.

[16] In reference to Aristotle, in the 16th and 17th century green was therefore often equated with the octave interval.
[17] Jewanski, Jörg : Ist C = Rot?, Berlin: Berliner Musik Studien Band 17 (1996), 87f.
[18] Crombie, Alistair Cameron: Augustine to Galileo, München: DTV (1959/77), 5.

> In the long run, the logical and hierarchical worldview of Aristotle was not able to satisfy the religious sense [of the Middle Ages]. It appeared to be too abstract for the natural sensation. In the occult sciences sensuality was able to assert itself.[19]

The forming of analogies based on numerical symbolisms, and the idea of a cosmologic all-encompassing order were in high gear. St. Augustine said that he "perceived numbers via an inner sense organ".[20] The numbers 7, 4 and 3 were of special importance. The seven *artes liberales* were the common canon of knowledge and wisdom and music – which was considered a science rather than an art form – was part of it. As in Antiquity, the study of music was regarded as a way to examine the basic laws of harmony that underlie the universe.

As part of analogous systems colours and pitches or modes were included. There was however no established theory of a fixed correlation between the two. It is noteworthy, though, that the beginnings of modern music notation took place in the Middle Ages and that the use of coloured lines was common practice. In the 10th century only one line was used. It designated the note f and was drawn in red. Since the 12th century a second line in yellow was added designating the note c. Around 1085 the tractatus Questiones in musica described a notation system which used only one line in different colours, according to the mode that was used: dorian was red, phrygian green, lydian yellow and mixolydian purple. Similar uses of colour can often be found in the Middle Ages. However, it does not seem as if synaesthetic experiences or concepts played any role in these developments. Vinzenz von Beauvais (±1190-1264) wrote a tractatus about music around 1260, which was largely based on Boethius . He, for the first time, compared musical intervals to combinations of colours.

1.1.4 Alchemy in the Middle Ages and the Renaissance

Alchemy had its origin in the late Hellenistic culture and was pervaded by a pantheistic and holistic understanding of the universe. In the alchemists' view the world was God's emanation. Matter was therefore imbued with God's spirit and matter and spirit were considered as one entity. It was believed that God enacted his will on the earth through light, more specifically through the stellar spheres and planets. Especially since the 16th century astrology was therefore an essential part of alchemist practice.[21] As Alchemy strongly drew from the Greek philosophers, the Pythagorean idea of a universal harmony of the spheres also found its way into alchemist astrology. Light was considered divine and some alchemists

[19] Fierz, Markus: Girolamo Cardano (1501-1576), Basel: Schriftenreihe der Eidgenössischen Technischen Hochschule Zürich, Vol.4 (1977), 12f, my translation.
[20] quoted after Crombie, Alistair Cameron: Augustine to Galileo, München: DTV (1959/77), 15.
[21] Szulakowska, Ursula: The Alchemy of Light, Leiden: Brill (2000), 13ff.

(Robert Fludd, for example) believed that matter was condensed light – an idea that was already expressed by Plato.[22]

The major mission of alchemists was the purification of matter through chemical processes in order to gain a higher form of substance. The development of optics in the Renaissance became relevant also for these practices. Mirrors and lenses could imitate planetary influences, increasing and decreasing the intensity of their radiations and imprinting their divine powers on matter.[23]

1.1.5 15th to the 17th century

The era between the 15th and the 17th century forms the transition to Rationalism. Symbolic colour systems that include mystical analogies coexist with new theories that are based on the study of paintings or physics. This abundance of different approaches is eventually abrogated by Isaac Newton's (1643-1727) publication of Optics in 1704. Around 1450 Johannes Gutenberg (±1400-1468) invented the printing press through which the works and thoughts of Aristotle and Plato underwent larger distribution. New chemical experiments by alchemists still supported colour theories that were based on the four basic elements. Paracelsus (1493-1541) believed that sulphur formed the basis of all colours. He came to the following equation: brown – earth, white – water, black – air and red – fire.[24] Leonardo da Vinci (1452-1519) elevated painting to a science, arguing that it was based on "rational principles".[25]

Until the 16th century, the three basic colours of painting red, yellow and blue were not justified in theoretical terms. However, it is evident that already since the 14th century they have been used as the dominating colours with illustrations of religious motives.[26] From the 15th century onwards in Italian painting this colour-triad is replaced by the contrasting colour pairs yellow-blue and red-green.

In the 17th century the phenomenon of refractions of light in prisms was commonly known and laid the ground for a scientific investigation of colours. The number of different colours that were distinguished in the spectrum resulting from prisms differed strongly from researcher to researcher. Francesco Maria Grimaldi (1618-1663) was the first one to come to the conclusion that sunlight consists of spectral colours and that the human eye perceives the

---

[22] Szulakowska, Ursula (2000): The Alchemy of Light, Leiden: Brill (2000), 34.
[23] Szulakowska, Ursula (2000): The Alchemy of Light, Leiden: Brill (2000), 38.
[24] Jewanski, Jörg: Ist C = Rot?, Berlin: Berliner Musik Studien Band 17 (1996), 130f.
[25] quoted after Gericke, Lothar and Schöne, Klaus: Das Phänomen der Farbe. Zur Geschichte und Theorie ihrere Anwendung, Berlin: Henschel Verlag (1970/73), 18.
[26] Thürlemann, Felix: "Grün – Die verstossene Vierte. Zur Genealogie des modernen Farbpurismus", in: Rot Gelb Blau: Die Primärfarben in der Kunst des 20. Jahrhunderts, Stuttgart: Teufen (1988), 15-18.

sum of all spectral colours as white light.[27] At the same time as prism experiments were conducted new researches were done in the field of acoustics. Comparisons between light and sound can be found more often in this period. In the 16th and 17th century the *Camera Obscura* and the *Laterna Magica* were (re-)invented and became very popular. Through them the play of colours and visual effects came into fashion.

> If rays of light fall through a small hole into a dark space, on the opposite wall an upside-down projection of the object is formed, from which that light is reflected.[28]

A *Laterna Magica* is similar to today's slide projectors. Small images painted on glass were projected by lamps with a bundeled ray of light. The *Laterna Magica* was an attraction at amusement parks.

There are no analytical researches in the field of pitch-colour correlations, although theories that make analogies between colours and intervals (Gioseffo Zarlino (1517-1590)[29]) or modes (Franchinus Gaffurius (1451-1522)[30]) as opposed to single pitches, become more and more frequent. These analogies often included other aspects, like planetary movements or other human senses. These ideas still reach back to Greek Antiquity, mostly to Aristotle, and are often based on the symbolic number seven. From the middle of the 17th century on, French theorists started to draw analogies between musical intervals and colours according to aesthetic judgements. Painting was supposed to give the same sense of harmony to the eye as music to the ear. Previous analogies at best resorted to aesthetic considerations as a secondary measure.[31] From the 17th century on it became increasingly common to regard music as an art rather than a science. This put its ranking in the discourse of the sciences and universities into question. In order to re-establish its position as part of the *artes liberales* it was necessary to provide evidence of the antique idea that the human spirit adheres to the same numeric ratios as music.

1.1.6 Isaac Newton's Optics

> Stated in its broadest terms, the theory of colour in the Western tradition, from Antiquity to the present, can be divided into two phases. Until the 17th century the main emphasis was on the objective status of colour in the world, what its nature was,

---

[27] Goethe, Johann Wolfgang: Farbenlehre (1810), Weimar: Deutsche Akademie der Naturforscher Leopoldia, Schriften zur Naturwissenschaft Vol.4 (1988), 240.
[28] Hilmar Hoffmann & Walter Schobert (ed.): Perspektiven. Zur Geschichte der filmischen Wahrnehmung. Dauerausstellung 1: Vom Guckkasten zur Cinematographe Lumière, Frankfurt: Deutsches Fimmuseum (1986), 10, my translation.
[29] Zarlino, Gioseffe: Le institutioni harmoniche, parte III, cap.8, Venice (1558), 155.
[30] Gaffurius, Franchinus: De harmonia musicorum instrumentorum opus, Book 4, Chapter 5 (1500) 183f.
[31] Jewanski, Jörg: Ist C = Rot?, Berlin: Berliner Musik Studien Band 17 (1996), 219.

and how it could be organized into a coherent system of relationships. From the time of Newton, on the other hand, the emphasis has been increasingly subjective, concerned more with the understanding of colour as generated and articulated by the mechanisms of visions and perception.[32]

In 1704 Isaac Newton published the book Optics in which he asserted that the different spectral colours obeyed the same numeric principles as the pitches of the octave. He used the (at the time already obsolete) dorian mode as a basis and assigned 7 colours to the seven intervals: red, orange, yellow, green, blue, indigo and violet. He found the same proportions between those colour intervals as between the pitches of the dorian mode, which he listed as: 1/1 : 8/9 : 5/6 : 2/3 : 3/5 : 9/16 : 1/2.[33]

It has to be pointed out that Newton did not compare the actual colours with the intervals but colour areas within the otherwise continuous spectrum. These colour areas were demarcated with division lines. This choice of these division lines has later been much criticised since their positions seemed rather arbitrary. Although Newton represents the transition from alchemist sciences to natural sciences in the sense of Rationalism, he still carried over some ideas from symbolism and Greek antiquity. Why else would he have chosen to divide the spectrum in seven instead of in any other number of colours? Apparently he thought that it was necessary to find a correspondence between the visual and acoustic domain. He was still searching for universal harmonies that underlie all natural phenomena, including the rotations of the planets. However, since Newton was a huge authority whom for a long time hardly anyone dared to criticise, his colour/interval scale formed the basis for many new colour-pitch theories that were yet to come.

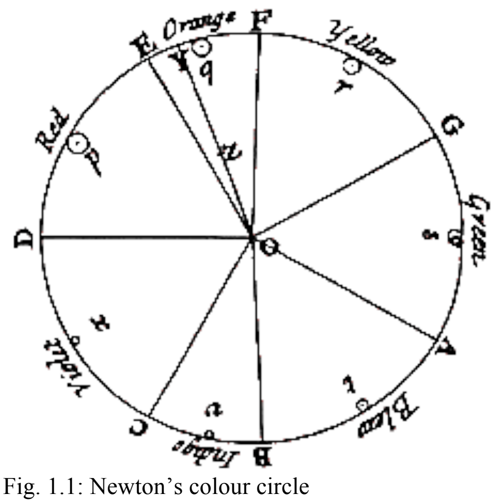


Fig. 1.1: Newton’s colour circle

[32] Gage, John: Colour and Meaning, London: Thames and Hudson (1999), 43.
[33] Newton, Isaac: Optics, Book 1, Part 2, Prop.3, Prob. 1, Exper. 7 (1704), 126.

In another essential part of his Optics, Newton proved according to experiments that white light consisted of different spectral colours that themselves can not be divided anymore. This formed a clear break with Aristotle's theory, which said that all colours were situated between the extreme points that were formed by black and white. Although Grimaldi already made this discovery earlier, it was through Newton that this new theory was commonly acknowledged. Newton was also one of the first ones to arrange the colour spectrum in a circle, probably in order to provide a logical explanation of the octave repetition in the interval/colour analogy. This arrangement became the basis for later colour theories, which were then extended to the ball-shaped arrangement.

1.1.7 Louis Bertrand Castel

Louis Bertrand Castel (1688-1757) spent more than 30 years working on the conception and construction of a light organ. His idea was to find an analogous translation from the aural into the visual domain. In 1740 he released Optique des couleurs, a book in which he laid out in detail the results of his research. The similarity of the title to Newton's Optics is hardly a coincidence. Until that point Castel's research in the field of sound-colour correlations was by far the most thorough of its kind. He was also the first to give sound and colour full attention without seeing it as only one aspect of a larger cosmologic complex of analogies.

All colour-pitch theories in the 16th and 17th century were based on modal scales. In his search for analogies, Castel however referred to Jean-Philippe Rameau's (1683-1764) Traité de l'harmonie (1722). Rameau derived his theory from the overtone-scale and therefore only considered the fifth, the major third and the minor third as perfect harmonies. He developed functional harmony, which uses the tonic, dominant and subdominant as structurally governing pillars. Underlying the idea of justifying the consonances according to the overtones is the belief that "the essence of sounding material can be found in nature".[34] Castel's research started out with a comparison of the overtone scale with the light spectrum, which results from filtering white light with a prism. He saw the common principle of sound and light in the fact that both were based on vibration. He believed that the human senses were structured in similar ways. Synaesthetic analogies as a spontaneous reaction are however not of any relevance in his research.

The benefits that he pursued with his colour-pitch analogies were that:

- deaf people would be able to enjoy music and blind people paintings;

---

[34] quoted after Sirker, Udo: "Joseph Saveurs musikakustische Untersuchungen. Ein Beitrag zur experimentellen Forschung um 1700", Cologne: Ars musica, musica scientia, (1980), 415.

- painters would be able to study the harmonies of colours based on the harmony of music;
- colours would be freed from their static appearance typical of paintings;
- colour-scores presented as a sort of wallpaper would make a new experience possible;
- musicians otherwise not trained in visual arts would be able to create images.[35]

In 1726 Castel released in "Lettre du P.Castel, Jesuite, à M.de la Roque" the first colour-pitch analogy that was based on scientific research. In 1735 in "Nouvelles experiences d'optique et d'acoustic" he released a revised version of the analogy but only to replace it with yet another new theory in the same year, based on the three principal colours red, blue and yellow, in analogy to the perfect major chord. In 1740 in Optique des couleurs he again released another colour analogy with almost the identical colour-scale as in 1735, only replacing gray with *violant*-blue.

pitches	**Colour analogy 1726**	**Colour analogy 1735 first comparison**	**New colour analogy 1735**	**New colour analogy 1740**
C	Purple	Purple	Blue	Blue
C#			*Celadon*	*Celadon*
D	Indigo	Indigo	Green	Green
D#			*Olive*	*Olive*
E	Blue	Blue	Yellow	Yellow
F	Green	Green	*Fauve*	*Fauve*
F#			*Nacarat*	*Nacarat*
G	Yellow	Yellow	Red	Red
G#			*Cramoisi*	*Cramoisi*
A	Red	Orange	Purple	Purple
A#			*Agathe*	*Agathe*
B	Purpur[36]	Red[37]	Gray[38]	*Violant*-Blue[39]

Castel's analogies assign a colour to every pitch, not to an interval as in Newton's system. There are however similarities in the order of the colours that Castel chose.

In the first colour analogy from 1735, Castel used Newton's order of colours, but in an inverted succession. He pointed out that the octave repetition was also valid for colours.

---

35 Jewanski, Jörg: Ist C = Rot?, Berlin: Berliner Musik Studien Band 17 (1996), 282.
36 after Castel, Louis-Bertrand: "Lettre du P.Castel, Jesuite, à M. de la Roque, écrité à P. le 9. Juin 1725", in: Mercure de France (probably 1726), 1542f.
37 after Castel, Louis-Bertrand: "Nouvelles expériences d'optique et d'acoustic", in: Mémoires (de Trévoux) pour l'histoire des sciences et des beaux arts 35 (1735), 1435.
38 after Castel, Louis-Bertrand: "Nouvelles expériences d'optique et d'acoustic", in: Mémoires (de Trévoux) pour l'histoire des sciences et des beaux arts 35 (1735), 1466.
39 after Castel, Louis-Bertrand: Optique des couleurs, Fondée sur les simples observations, & tournée sur-tout à la pratique de la peinture, de la teinture & des autresbarts coloristes, Paris (1740), 139.

However, the octave repetitions were supposed to appear in different colour shades – an idea that he would work out in more detail in Optique des couleurs from 1740. Eventually Castel rejected the colour system from 1735 because he believed that the order of colours had to be based on the three fundamental colours blue, yellow and red. Departing from these three colours he derived a system for all 12 pitches, although C was still considered to be the fundamental. In this system he obtained the other colours by mixing the fundamental ones. He chose blue to be the first one and assigned it to C. In Optique des couleurs he explains that blue was the closest colour to black and that the scale therefore had to start with blue. Here can be found a reference to Aristotle who considered black and white to be the extreme points of a continuous colour scale. By deriving the colour scale on the basis of the three fundamental colours, Castel rejected Newton's system.

Castel expressed differences between the various octaves by giving the colours different brightnesses. Here Castel asked for a differentiation between 12 octaves,[40] which is much more than was common in the musical practice of his days. Apparently in this point he succumbed to the charm of numeric analogies since there is no convincing reason to ask for 12 octaves other than to create an analogy to the 12 pitches of the octave.

Castel and his idea of a colour organ were popular in his time. The more he elaborated his theories, the more he was asked to provide evidence for them by building a colour organ. Especially after the publication of his "Nouvelles expériences d'optique et d'acoustic" in 1735, which caused public interest, the pressure increased. He was very reluctant to build a colour-organ, arguing that it was not an architect's job to build a house, only to plan it. However, there are testimonies – mainly by Castel himself – saying that two public performances of a *Clavecin Oculaire* took place on December 21, 1754 and on January 1, 1755. The fact that there is practically no other mention of those performances indicates that they were either witnessed by a very small public or that they did not actually take place. Undoubtedly Castel made a long lasting effort to build his envisioned *Clavecin Oculaire*.

Up to his time and for a long time after, Castel's research in colour-pitch analogies was by far the most thorough of its kind. His vision of organising colours was not confined to the colour organ. He also mentioned fireworks and the *laterna magica* as wonderful media to display colours.[41] He anticipated ideas that were only realised and then further developed in 1890 by Alexander Wallace Rimington (1884-1918) in England and from the 1920s on with the

---

[40] after Castel, Louis-Bertrand: Optique des couleurs, Fondée sur les simples observations, & tournée sur-tout à la pratique de la peinture, de la teinture & des autresbarts coloristes, Paris (1740), 301.

[41] Castel, Louis-Bertrand: "Lettre d. P.C.I.A.M.L.P.D.M. (sur un feu d'artifice où les couleurs bien diversifiées feraient un clavecin oculaire", in: Mémoires (de Trévoux) pour l'histoire des sciences et des beaux arts 35 (1739), 1676-1678.

abstract experimental film. However, Castel's research did not receive the credit that it deserved and was rather strongly criticised by many of his contemporaries. The lack of a functioning colour organ, which would successfully demonstrate his theory to a larger audience was probably one of the reasons for the scepticism. Another critical point was Castel's rejection of the theories of Newton who by most scientists and scholars was considered the highest authority in science. Voltaire, Dennis Diderot and Jean-Jacques Rousseau – the most significant contemporary philosophers in France at that time – all dismissed Castel's efforts.

1.1.8 Pitch-Colour concepts outside of France until the release of Goethe's "Farbenlehre"

The centre of colour-pitch theories in the 18th century was France. From there the tradition was carried on to Germany (from 1739 on) and from there to Russia (1742). From France the tradition also moved to England (1757).[42]

1.1.8.1 England

Documents on colour organs or colour-pitch analogies are scarce in England. An anonymous tractatus dating from 1757 gives a rather detailed description of a colour organ – probably the same that was designed by Castel.

> The fore-board, that fronts the spectators, carries sixty coloured glasses, every one analogous or answering to the sound that is to be heard by the ear, at the same time that the coloured lightening will act upon the eye. For the same touch that produces the sound will, at the same time, start the luminous colour.[43]

But neither in England are there any indications that the *ocular harpsichord* was ever built.

1.1.8.2 Germany

The first detailed report on the colour-pitch theory was Georg Philipp Telemann's (1681-1767) "Beschreibung der Augenorgel, oder des Augenclavecimbels, so der berühmte Mathematicus und Jesuit zu Paris, Herr Pater Castel, erfunden und ins Werck eingerichtet hat" (1739). Possibly under the influence of this report, Johann Gottlob Krüger (1715-1759) – a natural scientist and mathematician – wrote about pitch-colour analogies and a colour organ in 1740.[44] He based his analogy on Newton's colour theory and apparently did not know

---

42 Jewanski, Jörg (1996): *Ist C = Rot?,* Berlin: Berliner Musik Studien Band 17 (1996), 453.
43 [Anonymus]: An explanation of the Ocular Harpsichord, upon shew to the Public, London, Printed for S.Hooper and A.Morley, London, British Library (1757), 17f.
44 Krüger, Johann Gottlob: Naturlehre, volume 1, Halle (1740), 586.

about Castel's Optique des couleurs. Krüger made detailed construction plans for a colour organ. In difference to Castel, Krüger's instrument would have produced colour-plays without music. However, like Castel, he never managed to realise it.

Moses Mendelssohn (1729-1786) included psychological and physiological aspects in the research of pitch-colour analogies that he described in his book Über die Empfindungen (1755). He emphasized the emotional judgement – as opposed to mainly mathematical criteria – when deciding about the assignment of colours to pitches.

> Hence, the problem situates itself into the realm which can only be detected emotionally.[45]

In Germany the era between 1750-1780 is a period of *"*aesthetic realisation*"*.[46] In the Romantic period the idea of synaesthesia as a spontaneous emotional reaction comes up for the first time.

> Historically, the typical mental structure of the Romantic […] has to be understood as a contrast to the rationalism of the Enlightment and a reapproachment to neo-platonism, mysticism and gothic.[47]

In the late 18th century Karl von Eckartshausen (1752-1803) developed visions for a colour organ. In 1784 he wrote a book titled Augenmusik oder Harmonie der Farben. Unfortunately it is lost, but it might very well have been the first German book that was entirely dedicated to colour-pitch analogies. Also his colour organ was apparently never built. At the turn of the century Johann August Apel (1771-1816) wrote a thorough investigation of colour-pitch analogies. He eventually came to a negative conclusion, arguing that the nature of light and sound were too different and that therefore they were not compatible with each other.[48]

In the course of the 19th century the natural sciences were split up into different disciplines like physics, astronomy, mathematics, psychology, physiology, anthropology and biology. The investigation of the human senses and their perceptual capabilities became of special interest in some disciplines.[49] Painting was less and less understood as being related to direct

---

[45] quoted after Auhagen, Wolfgang: Studien zur Tonartencharakteristik in theoretischen Schriften und Kompositionen vom späten 17. Bis zum Beginnn des 20. Jahrhunderts, Frankfurt a.M.: P.Lang (1983), 79.
[46] Nivelle, Armand (1971): Les théories estétiques en Allemagne de Baumgarten à Kant, Paris (1971), 3.
[47] Schäfke, Rudolf: Geschichte der Musikästhetik in Umrissen, Berlin (1934), 329.
[48] Apel, August: "Ton und Farbe", in Allg. musikalische Zeitung (Leipzig) 2 (44), 30.7. (1800), 753-762.
[49] Jewanski, Jörg: *Ist C = Rot?,* Berlin: Berliner Musik Studien Band 17 (1996), 465.

representation. As a consequence of this, colour was detached from direct association and the immediate physical, mental and psychological responses to it received increased attention.[50]

1.1.9 Measuring the spectrum

At the beginning of the 19th century the scientist Thomas Young (1773-1829) discovered various aspects of the nature of light that would also stimulate new impulses in the colour-pitch discussion. As a result of double-slit experiments that showed interferences of light, around 1800 Young proved the theory that light did not consist of particles, as Newton said, but that it was a wave – a theory that was first developed by Christiaan Huygens (1629-1695). Based on these experiments he calculated the wave lengths of the different colours. This placed colour-pitch theories on a new ground. Since it was not yet known that sound consisted of mechanical waves in the air and light of electro-magnetic waves, it was assumed that sound would turn into light if it was transposed frequently enough. Young calculated that C was equal to yellow-green.[51] Nowadays the visible spectrum is indicated as being much larger than Young found out, which is primarily because of the higher precision of modern measurement equipment.

In 1864 James Clerk Maxwell (1831-1879) developed the theory that light obeyed to the laws of electro-magnetism. In 1887 Heinrich Hertz (1857-1894) prove that visible light was a certain extract in the range of electro-magnetic waves. This showed that light and sound were not of the same nature as was first assumed.

1.1.10 Goethe's 'Farbenlehre'

Johann Wolfgang von Goethe (1749-1832) published his Farbenlehre in 1810. He parted radically with Newton's theories and developed a colour system with two principal colours: yellow and blue. All other colours were considered to be degrees of those two. He also investigated the psychological effect of colours. Although Goethe's Farbenlehre is in many respects obsolete, still today it is remarkable for its phenomenological examinations. As a catalogue of observations, Goethe's experiments are useful data for understanding the complexities of human colour perception. Goethe also commented on Castel's and other colour organ experiments. He came to reject colour-pitch analogies altogether, arguing that the nature of the two was too different. He did admit, though, that there might be a "higher formula" – a common origin of the two which might explain some basic similarities in some responses of the senses. This would nevertheless not provide the basis for any scientifically valid comparison of the two.

---

[50] Gage, John: Colour and Meaning, London: Thames and Hudson (1999), 262.
[51] Young, Thomas: "On the Theory of Light and Colours", in: Philosophical Transactions, of the Royal Society of London (1802), 38.

Fig. 1.2: Goethe’s colour wheel

> Colour and sound do not admit to being compared together in any way, but both can be referred to a higher formula. However, they can both be derived, each for itself, from this higher law. They are like two rivers which have their source in one and the same mountain, but consequently pursue their way under totally different conditions in two totally different regions, so that throughout the whole course of both no two points can be compared. Both are general elementary effects acting according to the general law of separation and tendency to union, of undulation and oscillation, yet acting in wholly different provinces, in different modes, on different elementary mediums, for different senses.[52]

1.1.11 Summary

Since Antiquity there has been an unbroken stream of colour-pitch discussion. At no point, however, has there been any consensus on a particular analogy, although Aristotele’s and Newton’s colour-pitch theories had a long-lasting influence. Until Goethe’s Farbenlehre all theories resulted from observations in optics, music-theory, acoustics, but also astronomy or even alchemy. Up to that point colour-pitch analogies based on synaesthesia as spontaneous emotional reactions never played a role. Until the first half of the 18th century the general idea of colour-pitch analogies was commonly accepted. Only after 1725 critical comments can be found that questioned the very basic compatibility of the two. The most intense discussion took place in the 18th century in France and culminated in Castel’s research. After Castel’s death in 1757 the discussion in France rapidly faded away and moved to Germany and to a lesser extent to England.

[52] Goethe, Johann Wolfgang von (1810/1951): Farbenlehre, Weimar: Deutsche Akademie der Naturforscher Leopoldia, Schriften zur Naturwissenschaft, Vol.4, 271.

1.2 The History of Light Art

The development of Light Art took place at the turn of the 20th century and was inseparable from the technological advent of electric light. It can be described as a shift from the representations of light, as it was central to realistic painting, to a display of light as a reality. It was also tightly connected to the emancipation of colour that started to take place in painting already 150 years earlier. This development implied that colour was increasingly valued according to its perceptual and psychological aspects, rather than only as a means to imitate nature.

1.2.1 Colour Theories

As mentioned above, Newton's Optics (1704) laid the ground for a scientific investigation of the phenomenon of colour, which led in the following 200 years to a growing number of colour theories. Goethe's Farbenlehre (1810) was another landmark in this development. The discovery of the colour spectrum and new insights in the physiognomy of sight in the 19th century gave another boost to new publications on colour theories. Most notable are Hermann Graßmann's (1809-1877) Zur Theorie der Farbenmischung (1853) where he laid out the laws of mixing colours additively. Here the primary colours red, green and blue define a sort of vector space of colours. Hermann von Helmholtz (1821-1894) published the Handbuch der physiologischen Optik in 1878. He followed and extended various theories that were already in 1802 formulated by Thomas Young. Young proved that light did not consist of particles as Newton had said, but of waves and that different colours consisted of different wavelengths. Heinrich Hertz proved experimentally in 1888 that light is electromagnetic radiation.

1.2.2 Influence on artists, shifts in paradigm

Colour theories have always had an influence on painting. Wilhelm Ostwald (1853-1932) presented in 1905 a theory, which became especially popular in the Constructivist, Bauhaus and De Stijl camps.

> What we see is nothing but radiant energy that triggers chemical changes on the cornea of the eye that we sense as light. For painting, colour was the central medium that could be used to portray light… . Seeing that colour as a form of energy, … made it easier for artists to substitute light for paint/colour, as light is nothing other than energy and electromagnetic waves. This way, colour became a phenomenon of light, light the overarching concept, and thus the way was clear for an art of light.[53]

[53] Weibel, Peter: "The Development of Light Art", in: Light Art from artificial Light, ZKM/Hatje Cantz (2005), 91.

Traditionally, the primary function of painting was based on illustration and representation. In the 1820s photography was invented. The mechanical process of reproduction questioned the very fundamentals of painting and thereby encouraged the emancipation of the single elements that are at play at the latter, most notably shape and colour. Gradually painting moved away from the realistic representation of its motive. This development was also supported by the advent of psychology in the 19th century which encouraged painters to express subjective emotional aspects through the use of colour. Hence, colour became an independent element and freed itself from the function of merely representing light.[54]

This development is especially evident in Impressionism, where texture and colour formed the main objectives. The interest in moving away from a representation of light to real light can also be seen in George-Pierre Seurat's (1859-1891) development of *Pointillism,* which he himself called *Chromo-Luminarism*.

> The crucial justification of the Neo-Impressionist dot was the phenomenon of optical mixture: the light reflected from contiguous patches of two or more colours will mix in the retina to form a third colour, more luminous, it was claimed, than if it had been mixed beforehand on the palette.[55]

Seurat achieved colours by paining dense areas of dots of complementary or basic colours – a technique reminiscent of mosaics, also anticipating the working method of television screens that are likewise based on juxtapositions of tiny dots of red, green and blue. In the early 20th century the shift from Figuration to Abstraction was taken further by a change from Representation to Reality. The representation of movement in painting for example led to the reality of movement in Kinetic Art. Another culminating point of this development is Marcel Duchamp's (1887-1968) readymade, but also the inclusion of found materials like glass, wood, newspapers and bus tickets in many collage artworks of Dada. The "real" original object was thus incorporated in the work of art – as in the case of Dada – or became the object itself – as in the case of the readymade. The primacy of colour and form was therefore replaced by a primacy of material. Similarly, the representation of light led to the reality of light and eventually to its emancipation as Light Art.

> The concept of material was used to expand the concept of art, from product to process, from object to performance. The expanded concept of material thus spawned

[54] It should be mentioned, that the use of colour in the Middle-Ages was not strictly bound to representation as it used to be since the Renaissance. See for more details see Gage, John: "Colour in History – Relative and Absolute", in: Colour and Meaning, London: Thames and Hudson (1999), 67-89.
[55] Gage, John: Colour and Meaning, London: Thames and Hudson (1999), 78.

> was to lead to technical media, from neon light to TV sets, and the human body all being included as material.[56]

But just as colour and light cannot be separated, material and immaterial cannot be kept apart. The primacy of material led to the birth of immateriality as an aspect of artworks, which can be found in kinetic sculptures, in the use of transparent and reflective materials like metal, glass and light. Later on, this tendency was continued in Installation Art, where the space between the elements of the composition form a crucial part of the work, and in Conceptual Art, where the idea had primacy before the material.

In the early forms of Light Art, light bulbs were usually incorporated in sculptures in order to emphasize contours. Gradually light became used more independently.

> Slowly light emerged with an absolute status instead of being a side effect of the material, becoming an independent image in which the material parts were merely auxilaries for the generation of light spectacles, and finally light became the sole material for creative art.[57]

Amongst the first artists who placed an emphasis on light as a primary artistic medium were Zdenek Pesanek (1896-1965), César Domela (1900-1992), Nikolaus Braun (1900-1950) and Laszlo Moholy-Nagy (1895-1946).

1.2.3 Coupling of Art forms

As it was stated in Chapter 1.1 ("History of analogies between light and sound until the 19th century"), the search for analogies between the senses and different art forms is as old as mankind. During the Romantic period the idea of a total artistic experience however became idealised. This is especially well documented in the writings of Richard Wagner (1813-1883) and his concept of the *Gesamtkunstwerk*.

Coupled with advanced technical possibilities, in the 19th and the beginning of the 20th century, the ideal of combining different fields of art led to numerous attempts to create Colour-Organs. While Louis-Bertrand Castel already systematically developed concepts for colour-organs in the 18th century, it was only at the turn of the 20th century that such instruments were presented to larger audiences. In 1898 Alexander Wallace Rimington

---

[56] Weibel, Peter: "The Development of Light Art", in: Light Art from artificial Light, ZKM/Hatje Cantz (2005), 101.
[57] Weibel, Peter: "The Development of Light Art", in: Light Art from artificial Light, ZKM/Hatje Cantz (2005), 112.

presented a colour organ in public. Alexander Burnett Hector (1866-1956) patented another colour organ in 1908, and shortly thereafter the pianist Mary Hallock-Greenewalt (1870-1951) patented her version of this instrument.

In 1912 Rimington published the book A New Art - Colour Music. He also developed a colour organ with which he accompanied Alexander Scriabin's (1872-1915) composition Prométhée. Around the 1930s the group *Les Musicalistes* emerged in Paris. They created paintings in analogies to specific musical compositions and propagated a fusion and musicalisation of all arts. One of their members, the Swiss artist Charles Blanc-Gatti (1890-1966) published a book titled Sons et Couleurs in 1932. There he wrote:

> Today there are no longer any borders, and instead one great interconnected whole, meaning that energy and material are one and the same thing. Only yesterday we cried: Sound is energy; pigment colour is matter. But now, if we ignore the chemical composition (in which the molecules are systems or small worlds) of the colour masses used in painting, they are the equivalents of energy in the form of light. They shatter our visual senses just as sound shatters our sense of hearing. As regards coloured light, as projected light it is no longer matter but energy.

The idea of amalgamating art forms was also pursued in the Bauhaus and Dada movements, most notably by the Austrian Dadaist Raoul Hausmann (1886-1971), who patented a colour projector, the *Optophon* in 1926. In his Manifesto "Die überzüchteten Künste", Hausmann wrote in 1933:

> Gentlemen Musicians and Painters, you will see through your ears and hear through your eyes!

At the Bauhaus Ludwig Hirschfeld-Mack (1893-1965), Josef Hartwig (1880-1956) and Kurt Schwerdtfeger (1897-1966) worked with elements of movement, rhythm and relationships between musical and coloured forms. They used them in an effort to create real movement in space and time. They expanded the concept of the light organ to large-scale images and stage-sets.[58] Ludwig Hirschfeld-Mack produced Farbsonatine in 1925, where variations of intensities of light-sources in different colours and with varying stencils were arranged.

[58] Weibel, Peter: "The Development of Light Art", in: Light Art from artificial Light, ZKM/Hatje Cantz (2005), 161.

> The Bauhaus artists staged colour music to energise it, shifting “moving light, structured in orderly rhythm” back and forth on stage by means of stencils and different colours in front of the spots. They also projected colours onto the reverse side of a transparent screen. The result was colours that moved in space and time.[59]

Also Laszlo Moholy-Nagy played a key role in the development of intermedia artworks on the basis of light. He spoke of “painting with light” and experimented with light projections, photography, film and kinetic sculptures. He played an important role in making synaesthesia[60] popular as an artistic idea.

1.2.4 The time-aspect: Visual/Colour Music and Abstract Film

Light Art was the first visual form of art, which was based on changes over time – an aspect that was new to visual artist. Since Light Art is an abstract form of art, innovations in the field of theatre at first did not offer suitable examples for dealing with visual aspects over time. Although Adolphe Appia (1862-1928) revolutionised theatre directing, stage design and especially lighting at about the same time when various colour-organs were built, there is little indication that this had an influence on the development of Light Art as a time-based art form. The closest parallel was found in music, which served as a model for the creation of Light Art and early abstract films. Many of the latter were titled according to musical forms and principles.[61]

The term colour-music or visual-music came up in the 1920s and is still used today as a name for art-works that are looking for a strong link between visual and acoustic domains.[62] In the beginning the term merely described a point of departure or a source of inspiration when musical principles were applied to film. The method of translating an aspect from the acoustic domain into the visual or vice-versa is nowadays often realised with algorithmic procedures by using softwares that are able to translate parameters between the two media in real time.[63]

The social psychologist Hans Lorenz Stoltenberg (1888-1963) published in 1920 the book Reine Farbkunst in Raum und Zeit und ihr Verhältnis zur Tonkunst. Here, the emergence of a

---

[59] Weibel, Peter: “The Development of Light Art”, in: Light Art from artificial Light, ZKM/Hatje Cantz (2005), 162f.

[60] Synaesthesia describes the involuntary simultaneous response of various senses, while only one sense is directly stimulated. Synaesthesia is discussed in detail further below.

[61] for example Diagonal Symphony by Viking Eggeling (1924), Rhythmus 21, Rhythmus 23 and Rhythmus 25 by Hans Richter (1921-25), Opus I-IV by Walter Ruttmann, (1921-25), and Farbrhythmus by Leopold Survage (conceived in 1914).

[62] Also see chapter 5.2 (Definition of visual music) for a more detailed discussion on various definitions of visual music.

[63] Softwares that are capable of doing this include for example Processing, VVVV, Quartz Composer, Isadora, Impromptu, NodeBox, MAX/MSP/Jitter, Pure Data GEM and SuperCollider.

new Light Art can be sensed: the so-called “Absolute Film”. Theo van Doesburg (1883-1931) wrote in 1921 in an essay on abstract film:

> It could be insightful to compare abstract film with visual music, because roughly in the same way as with music, here the entire composition arises visibly within the open field of light.

The analogies between film and music were taken even further. Filmmaker Walter Ruttmann (1887-1941) created an acoustic film in 1930, a pure montage of sound-tracks, titled <u>Weekend – ein Film ohne Bilder</u>. Historically, this is the first soundscape composition. Oskar Fischinger (1900-1967), a pioneer in experimental film, also developed abstract films that were screened on several projectors at the same time. He was also trained as a musician and collaborated with musicians on various occasions (Alexander Laszlo in 1925-26 and John Cage in 1937). In 1955 he patented the *Lumigraph*, his version of a colour organ.

However, it turned out to be more problematic to establish consistent relationships between the visual and aural domain:

> Like the abstract painters, the color musicians envied music’s power of expression and believed that they could take over the “existing scales, the entire system of tonality, the intervals, chords, and the harmonic structure of music.” Also like the painters, each color musician invented his own, often arbitrary, scheme for assigning colors and notes to one another and his own methods for translating musical structures into visible forms. Obviously, many had to admit that the physical properties of light and sound and their perception by eye and ear were too different to continue being regarded as corresponding.[64]

Many of the above-mentioned problems concerning the correspondence between light and sound will be discussed in further detail later in this dissertation.

---

[64] Selwood, Sara: “Color Music and Abstract Film”, in: <u>Light Art from artificial Light</u>, ZKM/Hatje Cantz (2005), 414.

2. Different views of synaesthesia

2.1 Introduction to synaesthesia

The word synaesthesia comes from the Ancient Greek "syn", meaning "with", and "aisthesis", meaning "sensation". It describes a neurologically based phenomenon in which the stimulation of one sensory pathway leads involuntarily to experiences in a second sensory pathway.

Synaesthesia conflicts with the classical doctrine, first articulated by Aristotle (De Anima, II, 6, 418a; III, I, 425a-b), that each of the five senses has its own discrete area of operation. It also conflicts with Johannes Peter Müller's (1801-1858) more modern variation of this idea. Müller argued that sensation was dependent upon the internal character of the five senses, rather than on the nature of the external stimulus, so that the same stimulus acting on different nerves gives rise to different sensations. His comprehensive two volume large book on physiology Handbuch der Physiologie des Menschen (1837-40) placed this question into the centre of the psycho-physiological debate and had a long lasting influence on the general understanding of the subjective representation of the world.[1]

Another, yet more recent variation of this idea is known amongst philosophers and cognitive scientists as *Functionalism*. Functionalism says that mental states are constituted by their causal relations to sensory inputs and behavioural outputs. This model has been developed in analogy with computers, where a specific input yields a specific output. One popular formulation of Functionalism states that each subjective experience (*quale*, plural *qualia*[2]) is identical to the function with which it is associated. This implies that two functions could never produce the same *quale*, as it is the case with synaesthetes.[3]

While synaesthesia was at first considered to be a neurological defect,[4] then the trait of a special gift, it finally opened up some new insights into the general functioning of the brain. The modern neurological research in the domain of synaesthesia has not only challenged the understanding of the human brain, as will be discussed further below, but also basic philosophical concepts.

---

[1] Gage, John: Colour and Meaning, London: Thames and Hudson (1999), 262.

[2] *Qualia* is the ways things appear to us. They can be defined as qualities or sensations, like redness or pain, and are considered independently of their effects on behaviour and from whatever physical circumstances give rise to them.

[3] Cytowic, Richard E.: "Touching Tastes, Seeing Smells – and shaking up Brain Science", in Cerebrum, volume 4.3, Summer: 7-26 (2002), 19.

[4] Campen, Cretien van: The Hidden Sense, Cambridge, MA: MIT Press (2008), 1.

The earliest mention of synaesthetic phenomena is much debated. Even though analogies between senses are as old as mankind (see Chapter 1.1 "History of analogies between light and sound until the 19th century"), it is not always possible to differentiate between descriptions of holistic analogies and involuntary neurological responses. The first medical mentioning of synaesthesia is in an article in the journal Nature by Francis Galton (1822-1911) – a cousin of Charles Darwin – in 1880.[5] Before that time, scientists met synaesthesia with strong scepticism. By 1890 the number of reported cases of synaesthesia became so numerous that the *Congrès Internationale de Psychologie Physiologique* set up a committee to make systematic investigation on this phenomenon. In 1892 the distinguished French psychologist Alfred Binet (1857-1911) wrote that *audition colorée* had become a vogue in science, literature, poetry and theatre.[6] The synaesthesia discussion reached a preliminary climax with four conferences devoted to it that took place in Hamburg between 1927 and 1936. It was also in this time period that several books and articles about this phenomenon were written and that the term synaesthesia became established. After the 1930s, the first wave of euphoria for synaesthesia faded away all until the late 1970s, when Lawrence E. Marks published the book The Unity of the Senses (1978). During the 1980s there was again a growing public interest in synaesthesia, which has lasted until today. With the advent of new media and multi-media artworks the meaning of synaesthesia has gained new relevance. But also in neuroscience the investigation of synaesthetic experiences led to new insights into the functioning of the brain.

2.1.1 Influence on Artists

At the beginning of the 20th century synaesthesia was greeted with huge interest by artists like Wassily Kandinsky (1866-1944), Paul Klee (1879-1940) and Edvard Munch (1863-1944). The German artists group *Der Blaue Reiter* experimented with combinations of painting, music, dance and theatre with the goal of producing synaesthetic experiences.[7] While they were interested in a poetic correspondence between different media, other artists tried to create mechanic reproductions of visual elements in the acoustic domain. In 1926 the first films with sound were released and quickly pushed silent films off the market. In its earliest form, sound was not recorded magnetically on film, but optically. The waveforms that were transformed into sound by the projector were printed on a stripe next to the photographic image and were therefore visible. Artists like Oskar Fischinger, Rudolf Pfenninger (1899-1976) and Norman McLaren (1914-1987) were fascinated by the visual representation of sound and experimented with abstract film where the forms displayed were directly derived

---

[5] Galton, Francis: "Visualised Numerals", in: Nature Vol.22 (1880), 252-256, 494f.
[6] Gage, John: Colour and Meaning, London: Thames and Hudson (1999), 262.
[7] Campen, Cretien van: The Hidden Sense, Cambridge, MA: MIT Press (2008), 55.

from the wave-shapes of the accompanying sound. But they also reversed the process and drew the soundtrack directly on film. These works were the first forms of synthetic sounds. At the same time, similar experiments with drawn sounds were made in Russia, most notably by Arsenij Avraamov[8] (1886-1944), one of the most adventurous artists of his time. Drawing sound was the first attempt to directly link sound and light or image in a technological fashion. While these were manual and/or mechanical processes in their early days, the synaesthetic dream was attempted to be realised by electronic means in the second half of the 20th century.

> The development of electronic appliances to generate music and images – as well as of acoustic and visual synthesizers that could synaesthetically generate not only sound but also images – spawned completely unprecedented opportunities, not only to disseminate colour and light in a controlled manner in space, but to generate and modulate sound and image at will.[9]

The development of computer technology radically expanded these possibilities to greater extents and smaller budgets.

2.2 Definition of synaesthesia and *Ur-Synaesthesia*

The American neurologist Richard E. Cytowic (1952-) has done groundbreaking work in the research of synaesthesia. He proposed the following five criteria for an exact definition of synaesthesia:

- Synaesthesia is involuntary and automatic;
- Synaesthesia is spatially extended;
- Synaesthetic consistent and generic;
- Synaesthesia is memorable;
- Synaesthesia is affect-laden.[10]

According to Cytowic true synaesthetes are those who fulfil at least four of the five criteria, which makes synaesthesia a rather rare phenomenon. Estimates of the prevalence of synaesthesia vary dramatically: Francis Galton placed it at 1:20 (1880), while Simon Baron-

---

[8] Arsenij Avraamov is well known for his "Symphony of Factory Sirens" which was realized in Baku/USSR (today's Azerbaijan) in 1922. It involved, amongst other things, factory and ship sirens, bus and car horns, cannons, foghorns, artillery guns, machine guns and hydro-airplanes.
[9] Weibel, Peter: "The Development of Light Art", in: Light Art from artificial Light, ZKM/Hatje Cantz (2005), 208
[10] Cytowic, Richard E.: "Touching Tastes, Seeing Smells – and shaking up Brain Science", in: Cerebrum, volume 4.3, Summer: 7-26 (2002), 10.

Cohen (1958-) estimated a ratio of 1:2,000 (1996). Vilayanur S. Ramachandran (1951-) and Edward M. Hubbard, and in more recent publications also Cytowic indicated the ratio 1:200 (2001).[11]

Around the 1930s a lot of scientific research was undertaken in the field of synaesthesia. Most notably the Berlin Psychological Institute, led by the German philosopher and psychologist Carl Stumpf (1848-1936) and the Austrian ethnomusicologist Erich von Hornbostel (1877-1935) conducted significant research in synaesthesia involving the visual and auditory organs.

The psychologist Albert Wellek (1904-1972) introduced the term *Ur-Synaesthesia* for analogies between the auditory and visual domains that appear to be universal and cross-cultural. Wellek assessed six such basic cross-sensual correlations:

1.	a)	thin – thick	=	high – low (pitch);
	b)	sharp (pointy) – (blunt) heavy	=	high – low (pitch);
2.	fast, agile (light) – slow, ponderous (heavy)		=	high – low (pitch);
3.	a)	high – low (space)	=	high – low (pitch);
		rise – fall (space)	=	rise – fall (pitch);
	b)	line	=	sequence of pitches;
		horizontal	=	duration of note;
		wave-shape	=	trill or tremble;
4.	a)	clear – hazy	=	high – low (pitch);
	b)	glaring (shining) – pale, dull	=	strong – weak;
5.	a)	bright (white) – dark (black)	=	high – low (pitch);
	b)	warm – cold (also of colours)	=	high – low (pitch);
6.	colourful – monochromic		=	sonorous – monotonous.[12]

In the notation of music several of these archaic relics found their way in: high pitches are above the stave, low pitches underneath.[13] Crescendos start with a narrow distance between the lines which becomes bigger (small = soft, large = loud). Fast notes are normally also notated more narrowly than slow ones, grace notes are especially small but also quarter notes are smaller than half notes and half notes are again smaller than whole notes.

[11] Ramachandran, V.S. and Hubbard, E.M.: "Synaesthesia – A Window Into Perception, Thought and Language", in: Journal of Consciousness Studies, 8, No.12, (2001), 6.
[12] Wellek, Albert: Doppelempfinden und Programmusik, Vienna (1928), 75.
[13] However, according to Robert Francès (La perception de la musique, Paris: Librairie philosophique (1958), 310), the association of pitches in space is not cross-cultural and is reversed in Greek, Arab and Jewish music. See also: Nattiez, Jean-Jacques: Music and Discourse, Princeton: Princeton University Press (1990), 122.

A possible explanation for the *Ur-Synaesthesias* can be derived from basic experiences of live conditions. The opposition between the sun (high, bright, warm, light) and the earth (low, dark, cold, heavy) would be one example. Another one is that gravity is stronger the bigger the mass is, while at the same time bigger masses resonate with lower frequencies than small ones. Experiments showed that cross-sensual influences go beyond mere analogies. The contemporary German psychologist Karl Zietz found out that the colours of after-images become stronger and brighter, and that the flickering of after-images increases when a high-pitched sound was heard.

Ur-Synaesthesias can very well be observed with children. In their further development they usually become less obvious, because of the progressive pruning of connections between brain areas, which start after the age of 6 months (see below). Another reason why *Ur-Synaesthesias* decrease with infants' age might be because they are not actively supported in education.[14] While *Ur-Synaesthesias* seem to be consistent for non-synaesthetes, the responses of synaesthetes are apparently very personal. No general consistencies can be found.

In synaesthetic experiences the connection between letters and colours, and sight and hearing is most common. Many experiments have been made where people were asked to assign colours to pitches that were played with varying dynamics. Although it was not possible to conclude that a certain pitch would be associated with a certain colour, some tendencies became obvious that were mainly based on *Ur-Synaesthetic* phenomena:

> It became clear that the higher the pitch was, the associated colours became brighter. The louder the pitch was, the more saturated the colours were, showing a stronger component of red. Softer pitches showed stronger components of blue. Higher registers showed a tendency towards yellow, lower registers towards purple. The weaker the dynamic, the more black tended to go to gray, red to blue, and blue and green to light blue.[15]

While true synaesthesia is relatively rare, most people can make synaesthetic analogies, at least according to the *Ur-Synaesthesias*. It has been found out that drugs, especially mescaline, marijuana and LSD, can enhance synaesthetic experiences even with people that are usually not receptive to it. Marijuana consumers seem to be much more susceptible to

[14] Jewanski, Jörg: Ist C = Rot?, Berlin: Berliner Musik Studien Band 17 (1996), 98.
[15] Roth, Franz: Untersuchungen der Beziehung von Einzeltönen zu Gefühlen und Farben, Vienna (1951), 53f.

synaesthetic phenomena than the average.[16] However, it may also be that pharmacologically induced synaesthesia is not based on the same neural mechanisms as the congenital, lifelong experiences of synaesthetes, in spite of the superficial similarities. Also, not everyone who uses these drugs experiences synaesthesia. It is possible that a genetic predisposition is required for this perception to take place.[17]

Synaesthesia seems to be six times more frequent in females than in males.[18] One wonders whether this is in any way related to the fact that colour-defective vision is also a hundred times more common amongst white males than amongst white females.[19] There is also indication that there is a much higher incidence of synaesthesia amongst fine artists (23% according to certain experiments).[20] Also amongst people practicing Zen meditation on a regular basis there is a higher percentage, as a recent experiment has shown.[21]

People with one type of synaesthesia are more likely to also have a second or third type. It frequently runs in families, which indicates that it is genetically based. Family studies show that the trait seems to be passed along the X-chromosome.

2.3 Synaesthesia as a universal phenomenon

As mentioned above, children usually have stronger synaesthetic reactions than adults. According to researchers, the brain of newborn babies does not differentiate between the various senses, but rather experiences sensory impressions as a single whole. It is only after the 5th or 6th month after birth that the senses start to differentiate.[22] However, taste and smell never get entirely separated: they closely interact throughout the lifetime of a human.

Rather than looking at synaesthesia as a neurological oddity, several researchers[23] have more recently started to investigate synaesthesia as a mode of perception, which lies in the evolution of every human being. The study of synaesthesia has thereby revealed new neurological insights about the functioning of the brain.

---

[16] Tart, C.T.: On being stoned: A psychological study of Marijuana intoxication, Palo Alto: Science and Behavior Books (1971).
[17] Ramachandran, V.S. and Hubbard, E.M.: "Synaesthesia – A Window Into Perception, Thought and Language", Journal of Consciousness Studies, 8, No.12 (2001), 5.
[18] Ramachandran, V.S. and Hubbard, E.M.: "Synaesthesia – A Window Into Perception, Thought and Language", Journal of Consciousness Studies, 8, No.12 (2001), 6.
[19] Gage, John: Colour and Meaning, London: Thames and Hudson, London, 36.
[20] Ramachandran, V.S. and Hubbard, E.M.: "Synaesthesia – A Window Into Perception, Thought and Language", Journal of Consciousness Studies, 8, No.12 (2001), 17.
[21] Cytowic, Richard E.: "Touching Tastes, Seeing Smells – and shaking up Brain Science", in: Cerebrum, volume 4.3, Summer: 7-26 (2002), 26.
[22] Campen, Cretien van: The Hidden Sense, Cambridge, MA: MIT Press (2008), 31.
[23] For example Richard E Cytowic, Cretien van Campen and F. Scott Taylor.

Current studies have pinpointed areas in the brain that are responsible for synaesthetic perceptions. According to the nomenclature of the anatomist Korbinian Brodmann (1868-1918), these areas are called Area 39 and 40 (located in the angular and supramarginal gyrus respectively).

> In these areas, simplistically speaking, separate sensory sensations merge together synaesthetically and emerge as numbers, words, concepts and sentient feelings; that is, they emerge as understandings shared among and between human and human environmental forces, …. Synaesthetic cross-wiring occurs in many parts of the brain and body, and is thought to have originated as a general phenomenon in the limbic regions of the brain, but Areas 39 and 40 form the interconnected hub most involved with higher thought and expression. It is here, quite simply, that we find the unity of our senses.[24]

Cytowic has come to favour the model of a brain organisation called the distributed system. According to this model, functions of the brain are distributed in different, simultaneously and independently operating areas in the brain, while older models favoured the structure of a hierarchical cascade-like structure, where a transformation is completed before it is passed to another area of the brain. In the distributed system, so-called transmodal modules are relevant for synaesthesia. Transmodal means that they are not pertaining to a single sense, but:

> They construct multisensory representations of the world, they provide memory and affect to experience, and they critically participate in establishing categories via groups of coarsely tuned neurons. … The answer to synaesthesia will not be a where but a what.[25]

These discoveries suggest that synaesthetic perception is inherent in human nature. This does not answer the question of why some people have strong and involuntary synaesthetic perceptions, while most others do not. But the question emerging from these observations is not so much why somebody *is* a synaesthete but rather why and when everybody else ceased to perceive synaesthetically.

When understanding synaesthesia as a general intersensory connection, several traces of it can be discovered in basic brain processes:

---

[24] Taylor, F. Scott: "Synaesthesia and "The Name of Silence" in the work of Steven Heimbecker", in Heimbecker, Steve: <u>Songs of Place</u>, Montreal: Oboro (2005), 4f.
[25] Cytowic, Richard E.: "Touching Tastes, Seeing Smells – and shaking up Brain Science", in <u>Cerebrum</u>, volume 4.3, Summer: 7-26 (2002), 22f.

- The fact that drugs can induce synaesthetic perception shows that the separation between the senses is not a final one but that the connections can temporarily be reanimated (provided that the same neurological processes are involved as with true synaesthesia; see remark above).
- *Ur-synaesthesias* are an evidence of intersensory connections. They are reflected in countless figures of speech and linguistic synaesthetic metaphors.[26] The French phenomenological philosopher Maurice Merleau-Ponty (1908-1961) argued that synaesthetic metaphors are abstractions from a preconscious unified synaesthetic experience. His ideas were inspired by the German *Gestalttheorie*[27] and are supported by recent research by V.S. Ramachandran and E.M. Hubbard (see below).
- Scientists made tests where words in different colours are shown to people for a few milliseconds.[28] Even non-synaesthetes need more time to recognise the word 'green' when it is shown in a different colour than green or black. When the colour contradicts to the displayed word, the process of recognition is slowed down. This phenomenon is also known as interference in perception.
- Visual Thinking: means of visualisation have had a strong influence on the development of abstract ideas. The famous physicists Albert Einstein (1879-1955) and Richard Feynman (1918-1988) both reported that they had essential mathematical insights after trying to visualise abstract ideas.

Several scientists argue that synaesthetic brain processes are also responsible for the formation of linguistic metaphors. Metaphors have the potential to "introduce a sensory logic at the semantic level alluding to a more complex scenario of interrelated meanings and experiences of the world".[29]

These researches have gone so far as to argue that these processes led to the very formation of language. V.S. Ramachandran and E.M. Hubbard have proposed the existence of a sensory-to-motor synaesthesia; a better name might be *synkinesia*. They argue that lip, tongue and mouth movements might be linked to objects and events in close ways and that this might have led to the creation of a proto-language. Very often, words that refer to something small use sounds that make something small with the lips and narrow the vocal tract, like "tiny", "little", "petite" whereas the opposite is true for words denoting large or enormous objects.

---

[26] For example: *sharp cheese*, *bitter cold, dark voice, thick air, sharp sound etc.*.
[27] After Campen, Cretien van: The Hidden Sense, Cambridge, MA: MIT Press (2008), 98.
[28] These test are called Stroop tests, based on their inventor, the psychologist John Ridley Stroop (1897-1973).
[29] Cacciari, Cristina: "Why Do We Speak Metaphorically? Reflections on the Functions of Metaphor in Discourse and Reasoning", in Katz, Albert N., Cacciari, Cristina; Gibbs, Raymond W. Jr.; Turner, Mark.: Figurative Language and Thought. New York & Oxford: Oxford University Press (1998), 128.

Similarly, words referring to another person use sounds that involve an outward pout with the lips ("you", "Du", "toi/vous"), whereas words referring to oneself, tongue and lips move inwards ("me", "moi", "ich").[30] V.S. Ramachandran and E.M. Hubbard say:

> We are suggesting that these factors provided the initial impetus for language evolution, not that all modern language is synaesthetic in origin. The subsequent elaboration and refinement of the deep structure of language may have relied on other environmental selection pressures and biological constraints unrelated to synaesthetic metaphor (…). It is, however, the initial emergence of a complex multi-component trait that usually poses a challenge for evolution through natural selection, and that is what we are trying to explain here. That is, our theory really pertains to the origin of proto-language rather than Chomskyan universal grammar, but we believe that given the pre-adaptation provided by proto-language, Chomskyan UG [universal grammar] could have evolved more readily.[31]

2.4 Synaesthesia as a concept for creativity

Creativity can be described as the ability to link seemingly unrelated ideas and concepts, just like metaphor connects two unrelated semantic realms (for example "Juliet is the sun", W. Shakespeare). The cross talk between regions of the brain that probably causes synaesthesia is – in other words – excess information between brain-mappings. The theory goes that depending on where and how widely this phenomenon is expressed in the brain, the excess information can either lead to synaesthesia, or toward a different propensity in linking different concepts and ideas, which would manifest itself as creative talent. This would explain why the otherwise useless synaesthesia gene has survived in the population.[32] It would also explain why synaesthesia is more common amongst artists. Considering that one type of synaesthesia is often combined with another type it would also explain why synaesthesia is often paired with other types of creativity.

---

[30] Ramachandran, V.S. and Hubbard, E.M.: "Synaesthesia – A Window Into Perception, Thought and Language", Journal of Consciousness Studies, 8, No.12 (2001), 18f.
[31] Ramachandran, V.S. and Hubbard, E.M.: "Synaesthesia – A Window Into Perception, Thought and Language", Journal of Consciousness Studies, 8, No.12 (2001), 19f.
[32] Ramachandran, V.S. and Hubbard, E.M. (2001): "Hearing Colors, Tasting Shapes", in: Scientific American, May 2003, 57f.

3. Purity and musicality – searching for "dirty light"

The musicalisation of noise is a prominent aspect of the development of music in the 20th century. The same can be said of the inclusion of non-artistic materials in art objects in the field of visual arts. However, as we will see, these analogies cannot be easily applied to light as an artistic medium, since light is characterised by purity and can neither incorporate extraneous materials, nor can it be rendered dirty. In my work in which I attempt to find correspondences and compatibilities between the media of sound and light, noise therefore posed the biggest challenge as a direct translation into the visual domain did not seem possible. This led me to a more thorough investigation of noise and dirt and its implications beyond artistic disciplines.

In this chapter I start by looking at the general function that the distinction between purity and dirtiness takes in societies. Special attention is given to the manifestation of ideas about purity that emerged on a number of social levels, starting from the time of the Industrial Revolution. From there I will examine the role that the idea of purity took in music and the arts in the late 19th and the 20th century, giving special attention to the modernist discourse after World War II. Eventually, I will attempt to interpret light as a symbolic form. From this point of view analogies can be drawn between sound and light. With the help of a differentiated classification of three sorts of noise, also forms of 'dirty light' will become conceivable and aesthetically usable in the context of art-works.

3.1 Purity and Culture

Generally speaking, in societies hygiene and pathogenicity only have a secondary meaning in the notion of dirt. Rather, the idea of dirt reflects a certain order, which is to be maintained. Dirt is not an isolated event but an expression of a system with a set of ordered relations and a contravention of that order. Therefore, dirt is the by-product of a systematic classification of elements in the environment, in so far as ordering involves rejecting inappropriate parts.[1] According to the anthropologist Mary Douglas (1921-2007):

> …ideas about separating, purifying, demarcating and punishing transgressions have as their main function to impose system on an inherently untidy experience. It is only by exaggerating the difference between within and without, about and below, male and female, with and against, that a semblance of order is created.[2]

[1] Douglas, Mary: Purity and Danger (1966), London: Rutledge Classics (2002), 44.
[2] Douglas, Mary: Purity and Danger (1966), London: Rutledge Classics (2002), 5.

In this sense the differentiation between purity and dirtiness gives stability to a society as it defines a system in a world that it otherwise perceived as disorganised. As a consequence, it can be assumed that periods of turmoil and instability would ask for a stricter adherence to rules of hygiene. In fact, throughout history it can be observed that some periods articulated ideas of purity more strongly than others. In Western Europe, during the 19th and early 20th century a strikingly large number of concepts about hygiene and purity emerged on very different social levels.

> The demand for purity manifests itself in a multitude of partly very diverse forms. Advocators of social hygiene and alternative life-styles, eugenics and racial hygiene, nationalism and cultural and spiritual regeneration: they are all led by an idea of purity.[3]

In this chapter different forms will be presented of how ideas of purity manifested themselves during the 19th and 20th century in Western European countries. The scope of this dissertation does not allow detailed discussion of the origins and the – partly severe – historical consequences of the issues that will be mentioned. Here the objective is to show how the idea of purity can take many forms of appearance when striving for spiritual or cultural balance.

Prior to the French Revolution a person's identity was largely defined by society. According to the family background that a person was born into, the class, place and occupation of the father, the person's role and function in society was already largely predetermined. After the French Revolution the ideal of the *Bildungsbürger* (educated citizenry) emerged, where an individual would search for his or her identity through education and self-knowledge. The potential freedom of self-fulfilment came at the price of leaving behind the tight social net of the pre-revolutionary society.

With the Industrial Revolution, due to increasing unemployment in the countryside and growing population, many people migrated to cities that were exploding in size. In the urban life social bonds to the country life were weakened even further. The change of social climate and economic power that industrialisation entailed brought a decay of traditional values, including religious beliefs.

From the 18th to the 19th century the definition of a person's identity shifted from the social level to the personal and faced a person with a new set of questions and challenges. The changes that emerged from the French and Industrial Revolutions, the shift from a feudalist

---

[3] Labrie, Arnold: "Het verlangen naar Zuiverheid", in v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998), 17, my translation.

class system to a capitalistic one, left behind a society with a need to balance these new developments. It can be assumed that as a result of this a large set of concepts emerged that were led by a sense of purity.[4]

Already before the Industrial Revolution education gained higher relevance as it was considered to be one of the key elements in the process of developing an identity though insight and knowledge. In his function as minister of Education of Prussia, Wilhelm von Humboldt (1767-1835) introduced a new system of education that was very influential and emulated internationally. The goal of education was to give a person the capacity to fully develop his individual powers, and to shape his personality as an aesthetic and harmonious object. The idea of an aesthetic object was often used as an analogy for education. This reveals that a sense of purity was at play, along with a strong differentiation between the inner and outer world.[5] In a letter from 1790 Humboldt wrote:

> All of our happiness lies so strongly in this pure and ideal sphere of our emotions (…), where everybody shapes his own world and feels himself at home. (…) As soon as we try to exert influence on our environment, we are swept away as by a storm. We step outside ourselves, destroy the familiar hut in ourselves, but we remain an alien in the palaces that we build around ourselves.[6]

With Industrialization alternative lifestyles came into fashion. Homeopathic medicine, alternative beliefs (like theosophy, monism or Darwinism), macrobiotics, anti-alcoholism, vegetarianism, physical fitness and nudism, all enjoyed increased popularity.[7] These lifestyles were primarily seeking to return to the essence of life. Also sexuality became a strictly moralised field, especially during the Victorian Era in England. On the outside, sex took a rigidly codified form and was increasingly confined to the bedrooms of married couples for the mere purpose of reproduction.[8]

The drive towards purity took its most devastating and destructive form in a large number of ideas on genetic and racial purity. The 19th century was characterised by strong mixophobia that resulted in – and in turn fed itself by – various new "scientific" theories on races and

---

[4] Labrie, Arnold: "Het verlangen naar Zuiverheid", in v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998), 27.
[5] Labrie, Arnold: "Het verlangen naar Zuiverheid", in v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998), 22f.
[6] quoted after Labrie, Arnold: "Het verlangen naar Zuiverheid", in v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998), 23, from a letter from W.von Humboldt to C.von Dacheröden, 20/03/1790 from Wilhelm und Caroline von Humboldt in ihren Briefen (Berlin 1906-1916; edited by A. von Sydow) Vol.1, 103. (my translation).
[7] Segal, Joes: "Gestolde Identiteiten", in v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998), 194.
[8] Foucault, Michel: Sexualität und Wahrheit 1, Der Wille zum Wissen, Frankfurt a.M: Suhrkamp (1977), 11ff.

people. The French aristocrat Joseph Arthur de Gobineau (1816-1886) became the father of racist theories and clearly differentiated between pure and impure blood. Especially in France and in Germany there was a growing belief in the superiority of the native race, which had to be protected from being contaminated with foreign blood. Foreign and impure blood was most strongly associated with the Jew. Because Judaism was spread internationally, it was believed to be an impure, bastardized race, which posed a threat to the local pure breed. As a result anti-Semitism took on more and more outspoken and radical forms which much later led to the Holocaust during World War II.[9]

Rigid polarisations between pure and impure furthermore found a perfect metaphor in bacteria that was discovered between 1880 and 1885 to be the cause of many diseases. This supported the idea that a healthy and intact system can be penetrated and infected by extraneous matter which then leads to the former's decay and demise.[10]

*

The quest for purity was also felt in the arts. Some artists embraced a restorative return to national traditions and symbols. For example in Germany many such artists were strongly inspired by the book Rembrandt as an educator (1890) by the art historian Julius Langbehn (1851-1907). In this book Langbehn argued that German culture had become estranged from its national roots. In order to rediscover the origin of German culture, it was believed that art could play a leading role, by rediscovering and displaying its essence. Hans Thoma (1839-1924), Fidus (1868-1948) and Ludwig Fahrenkrog (1867-1952) were artists in the line of this thought that gained great popularity and partly an almost heroic status.

Contrary to the nationally oriented artists, the Expressionists sought to reveal the inner life of a person including their irrationality and contrariness, in opposition to the outside world.

> As opposed to the pretentiousness of the bourgeois culture's conformism based on external appearance, they [the Expressionists] attempted to show the true, although repressed and hidden nature of mankind.[11]

By exploring the Dionysian drives and the more chaotic and irrational emotional states, they questioned the values of the liberal society that were based on the virtues of the Enlightment:

---

[9] van der Velden, J.A.: Israël en het antisemitisme, Kampen: De Groot Goudriaan (1990), 44f.
[10] Leibovivi, Solange: "Zuiverheid als Utopie", in v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998), 85f.
[11] Oosterhuis, Harry: "Sexuele grensconflicten in fin-de-siècle Wenen", in v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998), 140, my translation.

rationality, social harmony and technological and economic progress. Even though the Expressionist indulged in the "darker" and less pure sides of mankind, their urge to find and display an inner truth in opposition to the commonly accepted, also revealed a quest for mental purity, as is expressed by the following quote by Franz Marc:

> We are struggling for pure thoughts, for a world where pure thoughts can be thought and articulated without becoming impure. Only then we, or more competent ones, will be able to show the other Janus face that is presently hidden and absent.[12]

3.2 Multimedia in the Modernist discourse

Romanticism emerged during the age of the Industrialisation. It was a reaction against the rationalisations of nature during the Enlightment period and the increasing social alienation that was the effect of growing cities and pollution. Romanticism expressed the longing to return to cultural roots that were associated with authenticity and purity. The writings of the art historian and archaeologist Johann Joachim Winckelmann (1717-1768) led to a rediscovery of Hellenist culture, in which it was believed that mankind lived in harmony with nature and itself.

Romanticism strove towards an immersive artistic experience where different art forms would come to a homogenous fusion. This ideal was expressed in the concept of Friedrich Schlegel's *progressive Universalpoesie* (progressive, universal poetry)[13] and even more clearly with Richard Wagner's *Gesamtkunstwerk*. The underlying idea referred to the antique tragedy where drama, poetry, music and dance supposedly formed a natural unity.[14] It was the alienation through cultural and technological development that – as it was believed – led to the segmentation of the drama into single art forms. Although the Romantics were well aware that it was impossible to turn back the wheel of time and to reinstate a 'natural society', in the *Gesamtkunstwerk* they sought to re-create the authentic experience of a unified sensual experience, which they thought was typical for the antique tragedy.

In the 20th century the idea of the *Gesamtkunstwerk* still lived on in numerous multi-sensory artistic attempts. However, the idea of reinstating an ontological art form like the Greek tragedy gradually faded away, in favour of an idea of art that was not confined to the

---

[12] Marc, Franz: Vorwort zur zweiten Ausgabe des Blauen Reiters (1914): Wir ringen nach reinen Gedanken, nach einer Welt, in der reine Gedanken gedacht und gesagt werden können, ohne unrein zu werden. Dann nur werden wir oder Berufenere als wir das andere Antlitz des Januskopfes zeigen können, das heute noch verborgen und zeitabgewandt blickt.

[13] Rainer, Cosima: See this Sound, Cologne: Walther König (2009), 17.

[14] Labrie, Arnold: "Het verlangen naar Zuiverheid", in v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998), 33.

traditional boundaries of its genres. Bauhaus, Dada and De Stijl for example were associations of international artists who formed in the early 20th century. They experimented with art forms that combined architecture, music, dance, poetry and eventually also film. This development was also supported by the advent of new technological possibilities that were not yet available in the earlier 19th century. Although the idea of a unified sensual experience was still the objective, the often experimental character of the works led to a rather loose and fragmented combination of diverse elements, which became characteristic of many multi-media art works in the 20th century.

Despite the popularity of mixing media in the 20th century, there were also scepticisms against it. Artists, critics and philosophers engaged in numerous discussions that were carried out on an international basis. The aesthetic consequence of the combination of different media has been put into question by a number of writers that were in the visual arts most strongly represented by Clement Greenberg (1909-1994) and Michael Fried (1939-). From a slightly different point of view, Theodor W. Adorno (1903-1969) expressed a comparable criticism that was primarily addressed to the realm of music. Although each of those writers built their criticism on a different basis, it can be said that they all upheld the idea that the integrity of an artistic idiom has to be preserved. Greenberg, for example, stated that in the modern era each of the arts had been progressing toward what is autonomous and irreducible in the medium itself, or even inherent *in* the medium. In other words, art has been progressing toward 'self-definition'. For Greenberg, 'self-definition' was also a main criteria for artistic quality in general. This concept he derived from Immanuel Kant's (1724-1804) claim that the aesthetic realm is autonomous and that it transcends social and moral considerations. According to this a work of art is therefore international, universal and part of human nature.[15]

Michael Fried thought along similar lines as Greenberg and caused much debate with his article "Art and Objecthood" that was published in 1967. Here he criticised minimalist sculpture, which had increasingly abandoned internal relationships in an object's composition in favour of finding a simplicity of form. According to Fried, this led to an "open-ended" situation. Because of the lack of self-sufficiency, minimalist sculpture depended on its external surroundings. The environment, the light, even the viewer became part of the artwork. As minimalist sculpture incorporated its surrounding it was in strong contradiction to the modernist claim that a work of art had to be self-sufficient.[16]

While Greenberg and Fried firmly believed that art's quality can only be maintained by keeping its autonomy, Adorno thought that a permeability of the genres of art can actually

[15] Sandler, Irving: Art of the Postmodern Era, New York City: Icon Editions/HarperCollins Books (1996), 2f.
[16] Sandler, Irving: Art of the Postmodern Era, New York City: Icon Editions/HarperCollins Books (1996), 10.

enable them to free themselves from outdated classifications and conventions. Being a student of Alban Berg (1885-1935), he believed that musical history provided a 'blueprint' from which the further development of music can be derived. Rather than treating history as a pool of masterworks, he believed that it had to be studied as a set of taboos. According to him, the further development of music has to be in opposition to a common notion of art, which shackles music to a set of conventions of bourgeois taste. In this sense Adorno welcomed attempts to combine various media since it questioned the traditional role of the single medium and placed it in a different context.[17] However, at the same time he emphasized that a true unification of different art genres, as was for example envisaged in the *Gesamtkunstwerk*, can only be an illusion. When working with various media, artistic ideas that are in some way related with each other are expressed simultaneously in multi-sensory ways. This entails repetitions or doublings at various levels. According to Adorno, the redundancy that results from this combination only weakens each individual medium.[18]

From Adorno's point of view, the friction that results from the incompatibility of the different media provides the interesting challenge in multi-media contexts. A homogenous multi-sensory experience however cannot take place because of the different nature of the senses. In the end – and this is where Adorno draws a similar conclusion to Greenberg and Fried – the individual medium is thrown back on itself, to its very immanent principles.[19]

In various ways Greenberg, Fried and Adorno emphasized that each artistic genre has to be treated according to its innate nature. A sense of purity is inherent in the idea of the "self-sufficiency" and medium-specificity of a work of art. They also believed in a linear historic development that predetermined how the arts have to develop. Hence, certain artistic approaches, specifically such that contradicted the historic development and the fundaments of artistic quality, were thought to be erroneous. This discourse carries on to support an idea of art that is distinguished by yet another sense of purity, a purity namely in the sense of a truth to a historic path. This purity has to be preserved and protected against the contamination of 'false' ideas, which would deflect from the essence of art.

3.3 Noise as a musical catalyst

In much the same way in which dirt is not an isolated event but a result of a system of ordering, the meaning of noise in music has not been a stable one but has constantly shifted

[17] Rebentisch, Juliane: Ästhetik der Installation, Frankfurt a.M.: Edition Suhrkamp (2003), 102f.
[18] Adorno, Theodor W.: Über einige Relationen zwischen Musik und Malerei, Berlin: Akademie der Künste (1967), 16f.
[19] Rebentisch, Juliane: Ästhetik der Installation, Frankfurt a.M.: Edition Suhrkamp (2003), 105.

through history. Especially the history of music of the 20th century can be read as an ongoing redrawing of the line that separates musical sound from noise. According to Douglas Kahn:

> Although existing in all music, the noise-element has been to music as sex to humanity, essential to its existence, but impolite to mention, something cloaked by ignorance and silence. Hence the use of noise in music has been largely unconscious and undiscussed.[20]

The question of what noise is also puts forward the question of what music is. According to the musicologist Jean-Jacques Nattiez:

> The border between music and noise is always culturally defined – which implies that, even within a single society, this border does not always pass through the same place; in short, there is rarely a consensus.[21]
>
> In definitions of noise, one is always brought back to such notions of fixity, purity and order.[22]

As Murray Schafer said, noise – in the most general meaning – is unwanted sound,[23] or sounds we have learned to ignore.[24] This could also be expressed by the equation:

Hearing – Listening = Noise

Other common understandings of noise are:

> *Unmusical sound.* The nineteenth-century physicist Hermann Helmholtz employed the expression *noise* to describe sound composed of non-periodic vibrations (e.g. the rustling of leaves), by comparison with musical sounds, which consist of periodic vibrations. *Noise* is still used in this sense in expressions such as “white noise” or “Gaussian noise”.
>
> *Any loud sound.* In general usage today, *noise* often refers to particularly loud sounds. In this sense a noise abatement by-law prohibits certain loud sounds or establishes their permissible limits in decibels.

---

[20] Kahn, Douglas: Noise Water Meat, Cambridge, MA: MIT Press (1999), 82.
[21] Nattiez, Jean-Jacques: Music and Discourse, Princeton, NJ: Princeton University Press (1990), 48.
[22] Nattiez, Jean-Jacques: Music and Discourse, Princeton, NJ: Princeton University Press (1990), 47.
[23] Schafer, Murray: Ear Cleaning, Vienna: Universal Edition (1969), 5.
[24] Schafer, Murray: The Soundscape, Rochester, Vermont: Destiny Books (1977), 4.

> *Disturbance in any signalling system.* In electronics and engineering, *noise* refers to any disturbance, that does not represent part of the signal, such as static in a telephone or snow on a television screen.[25]

While this is not the place to discuss in detail the different meanings that noise took on in the course of the 20th century, a few significant moments of music history will be pointed out. Here the objective is to demonstrate that noise is not only a sonic aspect of sound, but also – similarly to dirt in a social context – a contravention against an established musical practice. Also it will be shown that the gradual acceptance of noise as musical material not only liberated the range of available musical sounds, but also carefully maintained and redefined a set of prohibitions. Certain points in the history of western music in the 20th century have in various ways torn down the barriers between accepted musical sound and noise, like the music of John Cage, Fluxus, Punk or the Japanese Onkyo scene. The inclusion of noise as musical material acquired new musical territories that were hitherto beyond the customary and thereby widened the range of accepted musical sounds.

> The line between sound and musical sound stood at the center of the existence of avant-garde music, supplying a heraldic moment of transgression and its artistic raw material, a border that had to be crossed to bring back unexploited resources, restock the coffers of musical materiality, and rejuvenate Western art music.[26]

It is important to notice, though, that every new musical idiom that came forth through this development also depended on the establishment of a new set of taboos.

John Cage (1912-1992) for example placed the acceptance of all sorts of noise and activities into the centre of his work.[27] A second sort of noise – in the sense of an uncontrolled procedure – that he allowed to become part of the composition is chance, a method he used in order to eradicate the supreme position of the composer as the mastermind that governs the sounds.[28] However, in order to let chance and the formerly suppressed noises step to the foreground, he had to eliminate all sorts of traditional musical communication between performers, like gestural cueing, expressive signalling or any other form of narrative activities. The liberation of sound that Cage was after in his music could only work by turning musical communication between musicians into a taboo. When musicians start to connect sounds as musical phrases

---

[25] Schaffer, Murray: The Soundscape, Rochester, Vermont: Destiny Books (1977), 182.
[26] Kahn, Douglas: Noise Water Meat, Cambridge, MA: MIT Press (1999), 69.
[27] Here I am exclusively referring to Cage's music that used chance methods in the process of composition and/or realisation of the music. This is that case with most of his music after 1951.
[28] For another example of an artist who equates 'dirt with 'randomness' see: Linde, Almut: "Radical Beauty", interview with Oliver Zybok, in Kunstforum Vol.199, Ruppichteroth: Kunstforum International (2009), 190.

that are passed on amongst musicians in a chamber music manner, the sounds become part of a musical gesture. This undermines Cage's idea of liberating sounds, which functions only when the sounds are placed as isolated events. It could be said that communication between the musicians has become the "new noise" in the sense that it is a practice that is incompatible with the established idiom and therefore has to be kept outside.

At the same time it is striking that most performances of music by Cage – by others or by himself – were carried out with a sort of sensitivity and sublimity that is very characteristic of western classical musicianship and the cultural idea of classical musicality. The maintenance of a classical performance practice was therefore an important aspect to allow the environmental sounds to enter his music. It has been documented that at the premiere of 4'33" in 1952:

> The pianist David Tudor did not touch a single key of the grand piano, but *otherwise adopted a concert pianist's habitus*.[29]

Also, in order to communicate the idea of a liberated hearing, as in 4'33", he depended on maintaining the classical setting of a concert situation, which implies a certain behaviour and expectation on the behalf of the audience. It would have been difficult to put this idea across in a street performance or in a dance club.

Cornelius Cardew's (1936-1981) projects with the Scratch Orchestra, and other artistic movements like the Portsmouth Sinfonia, Punk, and – later – the Japanese Onkyo scene, abandoned the idea of musicianship as a defined craft. Even though all these artistic movements emerged from very different backgrounds they shared scepticism against musicianship as a trained craft. Already in the 1940s the artist Jean Dubuffet (1901-1985) described the 'classically trained' musician a *chien savant* – a dog that has been trained to perform tricks and gives the appearance of intelligence in so doing.[30] Accordingly, rather than being a universal skill, traditional musical training was considered brain washing, which alienated the musician from a genuine approach to music. The 'human error' that inevitably resulted when people performed on instruments that they did not master was understood as a source of authenticity and a true genuine expression, which had been lost in the over-cultivation of the performer as an athletic virtuoso. The perfect control and cultivation of instrumental skills was considered to be an important aspect of music as a high art. The aforementioned artistic movements questioned this role of musicianship and thereby introduced a 'noisy' aspect into music by radically changing the performance practice. As a

[29] Rainer, Cosima: See this Sound, Cologne: Walther König (2009), 106, my emphasis.
[30] Hegarty, Paul: Noise/Music, a history, New York: Continuum (2007), 92.

musical idiom this could however only work by consequently eradicating all sorts of virtuosity and traditional craftsmanship. In other words, customary skill has become the "new noise" that had to be kept out.

The relocation of the line between the aesthetically valuable and the banned, like in the two aforementioned examples, seems to be an essential aspect in the development of a musical idiom in western art. It seems as if at a certain point all taboos have been broken in Western music. However, no single musical idiom can be identified that does not establish a new set of taboos, even if the music appears to be as open and all-inclusive as for example does Cage's. Every musical idiom therefore relies on redefining the area of accepted musical sound. That area might include previously unacceptable elements but it also entails a new set of taboos. No idiom is all-inclusive. By positioning noise outside of the system, it is always challenging its border, looking to find its way back in. By challenging the established system it also forms its stimulus.

We are going to investigate how aspects of noise can be transferred to the realm of light, and how this can play a role when using sound and light as compatible media in a work of art. Before doing so, it is however necessary to further investigate the nature of cross-disciplinary works of art. Along the way, we will make a comparison of sound and light and map out where differences emerge in the human perception of the two.

3.4 Compatibility and differences between sound and light

As mentioned above, the combination of different media met with strong criticism from writers in the modernist line of thinking. In opposition to their claim that a work of art has to be self-sufficient and adhere to medium-specificity, the post-modern discourse proposed a different approach to evaluate and interpret art, and also the crossing of borders between media. As the art-historian Rosalind E. Krauss (1941-) wrote in her influential article "Sculpture in the Expanded Field" in 1978:

> …within the situation of postmodernism, practice is not defined in relation to a given medium… but rather in relation to the logical operations on a set of cultural terms, for which any medium… might be used.[31]

This means that the self-sufficiency of a single medium does not have to be the main criterion in its artistic use. Rather, a specific idea can be applied to different media at the same time,

[31] Krauss, Rosalind E.: "Sculpture in the Expanded Field" (1978) in The Originality of the Avant-Garde and Other Modernist Myths, Cambridge, MA: MIT Press (1986), 288.

while a common conceptual approach becomes the connecting element. A ‘metacontext’ is created that holds together the different arrangements of media.

Such appropriations of various media became common practice in the visual arts in the 1970s. In 1980 the art critic Craig Owens (1950-1990) wrote the article “The Allegorical Impulse: Toward a Theory of Postmodernism” in which he described appropriation to be a characteristic trait of post-modern art. He compares this aspect with allegory, which also builds references from a “metacontext”. Here the artistic idea is dominant as opposed to the laws and conditions of a material, and therefore allows movement across the boundaries of single media. According to Owens it is characteristic of the allegory to be “attracted to the fragmentary, the imperfect, the incomplete…”[32] and that it “is synthetic; it crosses aesthetic boundaries”.[33] All of these attributes also apply to art forms that combine different media. Owens summarizes that:

> Modernist theory presupposes that mimesis, the adequation of an image to a referent, can be bracketed or suspended, and that the art object itself can be substituted (metaphorically) for its referent. This is the rhetorical strategy of self-reference upon which modernism is based, and from Kant onwards it is identified as the source of aesthetic pleasure. … Postmodernism neither brackets nor suspends the referent but works instead to problematize the activity of reference. When the postmodernist work speaks of itself, it is no longer to proclaim its autonomy, its self-sufficiency, its transcendence; rather it is to narrate its own contingency, insufficiency, lack of transcendence. It tells of a desire that must be perpetually frustrated, an ambition that must be perpetually deferred; as such, its deconstructive thrust is aimed not only against the contemporary myth that furnish its subject matter, but also against the symbolic, totalizing impulse which characterizes modernist art.[34]

In the following chapter an approach will be proposed to analyse light and sound as a ‘symbolic form’. In that context it will be relevant to understand any use of those media as mimetic and referential – as described by Owens as characteristic of postmodernist art. Before that, this chapter will investigate the compatibility and difference between sound and light in more general terms, and how far ideas that are transferred from one domain to the other meet problems that are inherent in the auditory or visual perception.

---

[32] Owens, Craig: “The Allegorical Impulse: Toward a Theory of Postmodernism” in October, Vol.12 (1980), 70.
[33] Owens, Craig: “The Allegorical Impulse: Toward a Theory of Postmodernism” in October, Vol.12 (1980), 75.
[34] Owens, Craig: “The Allegorical Impulse: Toward a Theory of Postmodernism” in October, Vol.12 (1980), 79f.

As was shown in Chapter 1.1 ("History of analogies between light and sound until the 19th century"), already since Antiquity there have been numerous analogies between the visual and aural field, primarily concerned with colour. However, until the 19th century and the upcoming interest in Synaesthesia, none of these theories were based on experiments or empirical studies. Apart from the *Ur-Synaesthesias* (see Chapter 2.2 "Definition of Synaesthesia and *Ur-Synaesthesia*"), no universal associations between the visual and aural have been ascertained.

3.4.1 Colour

Analogies between tonal and visual colour have dominated the search for correspondences between sound and light. Many composers have expressed that they have synaesthetic reactions that pair sound and visual perception of colour. However, beyond the fact that some individuals have such involuntary responses, 'tone colour' is a commonly accepted term to describe shades in the timbre of a sound. Nikolai Rimsky-Korsakov (1844-1904) opens his book Principles of Orchestration (1891) with the sentence: "Our epoch… is the age of brilliance and imaginative quality of orchestral tone coloring".[35] Even though it is very common to speak of colour in the field of tone as well as vision, no universal correlations between the two have been found. It is also interesting to notice that there are substantial physiological differences in how the eye perceives colour information and how the ear processes sound.

The human eye contains about 120 million rods that are colour-blind and only distinguish light and dark. It also contains 7 million cones that are colour sensitive. Human vision is so-called 'tri-chromatic' as the eye contains three types of cones that detect colours with peaks at wavelengths of 419 nm (red), 531 nm (green) and 558 nm (blue) respectively.[36] This means that the human eye can only distinguish three colours. All other colours that we perceive are a compound of different degrees of stimulation of the three types of cones.

While the cones and rods in the eye are directly exposed to light, and therefore immediately convert the information via chemical processes to neuronal activity, the ear involves a number of mechanical steps before the acoustic information reaches the cochlea in the inner ear. The cochlea is filled with a liquid that is put into motion by vibrations. Along the cochlea is the spiral ganglion, a group of nerve cells that sends a representation of the acoustic information to the brain. Depending on the frequency perceived, a different portion of the ganglion is stimulated which enables the brain to distinguish different acoustic information.[37] Unlike the

[35] Rimsky-Koraskov, Nikolai, quoted after: Riley II, Charles A.: Color Codes, Hanover, NH: University Press of New England (1995), 283.
[36] Bruce, Vicki/Green, Patrick R./Georgeson, Mark A.: Visual Perception, Hove: Psychology Press (2003), 18f, 21.
[37] Pierce, John R.: Klang, Heidelberg: Spektrum der Wissenschaft (1985), 87ff.

eye, which derives colour information from the stimulation of only three types of cones, the ear translates acoustic information via a continuous band of nerve cells. It is worth mentioning that perception of colour strongly depends on context. The same colour can be perceived very differently depending on the colours that surround it.[38] No comparable inconsistencies in the perception of frequencies have been found in the aural domain. Also, superimposed colours lead to the perception of a new, mixed colour, whereas different simultaneous pitches can be readily distinguished as long as they do not fall inside the "critical band", which is the minimum interval necessary, in order to perceive two pitches as individual frequencies.

Even though there are no apparent similarities in how visual and tonal colours are perceived, colour remains a strong metaphor in the description of sounds. Several composers who were not necessarily synaesthetic described tone colour to be an important aspect in the compositional process, as for example Arnold Schönberg (1874-1951).

> Of all Schoenberg's accomplishments in integrating musical means, not the least was that he conclusively separated color from the decorative sphere and elevated it to a compositional element in its own right. It changes into a means for the elucidation of musical relationships.[39]

Since the eye and ear are physiologically very disparate, the correspondences that are perceived between tonal and visual colour must be taking place in the processing stages in the brain. According to the composer Wayne Slawson (1932-):

> Sound color is a property or attribute of auditory sensation; it is not an acoustic property. Similarly, visual color is a perceptual attribute, not a property of light. Sound color, like visual color, is abstract, no specific *source* of energy is implied by either term.[40]

Similarly, the film artist Malcolm Le Grice (1940-) sees the commonality between sound and colour not so much in a direct correspondence of tones but in the emotive effect they cause:

> When color has become abstracted, by losing its specific object association but retaining an emotiveness in unspecific association, it is able to provide us with one of

---

[38] This has been brilliantly analysed and illustrated in: Albers, Josef: Interaction of Color, New Haven: Yale University Press (1963).
[39] Adorno, Theodor W., quoted according to: Riley II, Charles A.: Color Codes, Hanover, NH: University Press of New England (1995), 279.
[40] Slawson, Wayne, quoted according to: Riley II, Charles A.: Color Codes, Hanover, NH: University Press of New England (1995), 290.

> those strong phenomenological stimuli, like musical sound, capable of opening up new imaginative space. And like sound, when it is separated from the utilitarian purpose to become music, *it becomes available* as the basis for structured abstract expression. This more general similarity rather than any one-to-one correspondence is color's main analogy with music.[41]

3.4.2 Time: Rhythm/Form

Rhythm is the perception of time on a micro-level of a musical composition. Form is the perception of time on a macro-level. The perception of time, however, is not the property of a single sense. Rather, we do not perceive time as such but only changes that take place in time and their temporal relations. Since we only perceive events as present, our experience of temporal relations between successions of events is based on our remembering the previous events by recalling them from memory.[42] Therefore, the experience of temporal relationships between aural or visual information does not directly depend on the properties of our sensual organs. This is true in the sense that rhythm and form provide a very powerful means to create interrelationships between sound and vision. However, visual and aural perception still behave differently in how they can process stimulation in time, especially in the domain of short time intervals.

> Sound perception and visual perception have their own average pace by their very nature; basically, the ear analyzes, processes, and synthesizes faster than the eye.[43]

The ear is an organ of eminently superior temporal resolution than the eye.[44] The eye's response to changes in light strongly depends on the overall brightness and also on the colours involved. Also different points in the visual system have different response times. Even though the ear has a much finer temporal resolution, also with auditory perception phenomena have been discovered where the detection of temporal relationships – even at relatively low speeds – become diffused. For example, experiments have shown that under certain circumstances people are unable to identify the order of sounds if the individual sound is shorter than 300ms,[45] and if the sounds follow each other without interruption.[46]

---

[41] Malcolm Le Grice quoted from: Zoller, Maxa, in "Sound in Expanded Cinema: Malcolm Le Grice's *Berlin Horse*", Audio.Visual – On Visual Music and Related Media, (ed.) Cornelia and Holger Lund, Stuttgart: ARNOLDSCHE Art Publisher (2009), 82.

[42] Poidevin, Robin de, The Experience and Perception of Time, Stanford Encyclopedia of Philosophy, plato.stanford.edu/entries/time-experience/ [accessed on October 25, 2009].

[43] Chion, Michel, Audio-Vision, New York: Columbia University Press (1994), 10.

[44] Shipley, T, "Auditory Flutter-Driving of Visual Flicker", in Science New Series, Vol. 145, No. 3638 (Sep. 18, 1964), 1328.

[45] Considering that the ear already detects temporal changes on the scale of 1ms for the detection of sound direction, 300 ms are a very long time interval. Also see: Pierce, John R.: Klang, Heidelberg: Spektrum der Wissenschaft (1985), 122 on the Haas-Effect.

Temporal relationships between sonic and visual events are a key-aspect in all artistic works that are trying to realise a sort of "visual music". While the synchronisation between auditory and visual stimulation are often used to create an evident relationship between the two, already in the earliest days of sound film artists have asked to use them asynchronously in order to create an "orchestral counterpoint of visual and acoustic images".[47] Melodic counterpoint is not only concerned about the melodic shaping of simultaneous voices but also about their harmonic relationship to each other. The harmonic relationship between voices could also be described as an interactive process. The harmonic backing of a melody actively changes the appearance of the melody as the individual notes are placed in reference to a changing harmonic scheme which places them in a more consonant or dissonant context. When speaking about a contrapuntal relationship between sound and image, the harmony in question would therefore address the interaction between the visual information and the music and vice versa, and how a change in one domain alters the perception of the other.

3.4.3 Space and Motion

When working with sound and light, the performance space becomes an important common denominator with a significant influence on the perception of either of them. Both sound and light are projected from singular sources and are emitted into the space in a three-dimensional way. Also, both are strongly affected by the environment they are placed in. The character of acoustics is shaped by the various reflections and absorptions by the materials and surfaces in a space. Similarly, the colours and reflective characteristics of the materials in a space determine the appearance of light.

The ear locates the direction of sound primarily in two ways: by measuring the difference of the intensity with which an acoustic stimulus reaches either ear, and the time difference with which it reaches them. A sound that is located left of the listener reaches the left ear at a louder intensity since the mass of the head weakens the signal before it reaches the right ear. However, at least as important for the determination of the direction of the sound is the time difference at which the sound reaches the ears. If the sound source is slightly closer to the left ear, the sound takes longer to travel to the right ear. Even though these time-differences are extremely small, they play an important role in the detection of direction. Furthermore, the perception of reflections of a sound from surrounding surfaces give the listener information about the placement of a sound source in relation to the space in which it is placed.[48]

---

[46] Warren, Richard M. and Roslyn P., "Auditory Illusions and Confusions" in Scientific American, Vol. 223, New York: Scientific American Inc. (1970), 30ff.
[47] Eisenstein, Sergei M./Pudovkin, Vsevolod/Alexandrov, Grigori, "Statement on Sound" in The Eisenstein Reader, (ed.) Richard Taylor, BFI (1978), 80f.
[48] Pierce, John R.: Klang, Heidelberg: Spektrum der Wissenschaft (1985), 121ff.

In binocular stereopsis also the difference between the image that is received by one eye is compared to that of the other, in order to derive spatial information. Due to the horizontal separation of the eyes, they receive a slightly different view of the world. By comparing these differences the brain can derive information about the position of an object in space. The closer an object is to the observer, the stronger the perception of depth becomes.[49]

The perception of motion in space is again an experience of time, and therefore not only the property of a sensual organ, but also of our memory. While our ears can process temporal information more accurately than the eyes, the latter are much more sensitive for the processing of spatial information.[50] Still, just as temporal relationships on a rhythmic or formal scale, the perception of motion in space can work as an effective means to create interrelationships between aural and visual information.

*

The comparison of visual and aural stimulation and the creation of so-called "inter-modal associations" is a fundamental principle of information processing. When experiencing visual and aural inputs at the same time, the brain tends to create a causal connection between the two.[51]

> Most events that attract our attention stimulate more than one sense at the time. We see somebody walk and hear his steps, or we hear him speak and see his face. We look at the things we touch and we experience the motion of our body kinaestetically as well as visually. In our mouth we touch what we taste and we feel the motion of our speech-organs when we hear the sound of the words we pronounce.[52]

A physiognomic interrelationship between the senses, as it was sought after in the research related to synaesthesia, is therefore not a necessity in order to create a coherent inter-modal relationship between various senses.

3.5 Towards dirty light, sound and light as symbolically charged idioms

As discussed in the Chapter 3.3 ("Dirtiness as cultural catalyst") the inclusion of sounds or materials in artistic works that have formerly been perceived as inacceptable has been a

[49] Bruce, Vicki/Green, Patrick R./Georgeson, Mark A.: Visual Perception, Hove: Psychology Press (2003), 171.
[50] Chion, Michel: Audio-Vision, New York: Columbia University Press, New York (1994), 11.
[51] Flückiger, Barbara: Sound Design, Marburg: Schüren Verlag (2001), 138.
[52] Neisser, Ulic: Cognition and Reality, New York: W.H.Freeman & Co Ltd (1976), 32f.

driving force in the development of music and visual arts. This was especially obvious in the 20th century, although it can be observed as a stimulating principle in much of the history of Western art.

When comparing sound and light, it becomes apparent, though, that light – as a medium – is reluctant to be placed within a polarity that distinguishes purity from dirtiness. Rather, purity seems to be an aspect that is in the very nature of the immateriality of light. In other words, light can neither be rendered dirty, nor can it expand its boundaries by including elements that were previously not part of it, in a way as music can internalise noise or visual art can incorporate "non-artistic" materials. This pure aspect of light is probably one of the main reasons why it has cross-culturally often been associated with the divine.[53]

When working with light in the context of contemporary composition, sounds with noisy qualities – in the many different forms that they can take – are likely to play a part. This section asks the question if there is any such thing as "dirty light"? Has the search for correspondences between sound and light reached a dead end when it comes to the question of noise and dirt? If this is the case, the coupling between the two would have a fundamental flaw, considering that noise and dirt have taken on a strong stimulating and aesthetic function in art and music of the last century and beyond.

3.5.1 *Contextual* noise and *liminal* noise

In this dissertation I am developing a set of categories of noise, where the terms noise and dirt could be used interchangeably, since the underlying meaning of both of them is the same, while noise rather refers to sound and dirt to matter. The following differentiation of noise is therefore equally applicable to aural as well as visual phenomena.

In order to get a better understanding of the different qualities that noise or dirt can take in the context of sound and light, I would propose to distinguish between three categories of noise. In this section I am going to introduce two of them: *contextual* and *liminal* noise.

Contextual noise is best described by what Mary Douglas said about dirt:

> There is no such thing as dirt; no single item is dirty apart from a particular system of classification in which it does not fit.[54]

[53] "Sonnenkult" in dtv Brockhaus Lexikon, Vol. 17, Munich: DTV (1989), 84 and also: Schürmann, Eva: Erscheinen und Wahrnehmen, München: Wilhelm Fink Verlag (2000), 124f.
[54] Douglas, Mary: Purity and Danger (1966), London: Rutledge Classics (2002), xvii.

Hence, within a particular system, dirt is defined by not being part of it. It cannot be thought as an absolute value or condition. Dirt is what is excluded from a set of order, since order includes the rejection of inappropriate elements.[55] Therefore dirt depends on relationships that are inherent in a system, in other words: it depends on the context. When working with sound and light, the term *contextual* noise describes the use of any material – musical or visual – that contradicts a certain order that has been established. What noise or dirt becomes in one context can be part of the accepted order in another.

Helmut Lachenmann's (1935-) composition Accanto (1975/76) for clarinet, orchestra and tape serves as a good example to illustrate this. Lachenmann wrote this piece in reference to W.A. Mozart's (1756-1791) Clarinet Concerto K.622. In his work as a composer, Lachenmann approaches music as a language where he tries to isolate the individual elements out of their context as defined by the tradition of Western musicianship. By rearranging them, other aspects of the sonic elements are emphasised and thereby an authentic expressivity is returned to them that has been lost in the habitat of repetitive use as a commodity.[56] In Accanto the sonic texture is dominated by the use of instruments with extended techniques (also sometimes referred to as *musique concrète instrumentale*), which yields a very differentiated palette of noisy sounds – noisy in the sense of primarily non-pitched sounds. A tape part is also included in the composition, which consists of an original recording of Mozart's Clarinet Concerto. That concerto is also the conceptual provenance of the orchestral material of Accanto. For an extended period of time the tape is only turned up for fractions of a second. Thereby it appears as short sonic bursts, too short to make the actual content recognisable. The first moment when the tape is played for a longer passage is at m.192, about 17 minutes into the piece, which has a total duration of approximately 27 minutes. Here, the utterly harmonic music of Mozart becomes recognisable. As the listener has become used to the abstract sonic idiom of Lachenmann in which very detailed instrumental noises with subtle nuances established an idiom in their own right, the sound of Mozart appears as a dissonance in the context of the composition. The Clarinet Concerto has become *contextual* noise despite its harmonic and sonorous character, which might otherwise be used as an example of the opposite of what is commonly associated with "noise". In the context of Lachenmann's *musique concrete instrumentale* the Mozart is "matter out of place".

The term *liminal* noise refers to the experience of noise that is less dependent on its context. It describes the direct experience of sensorial stimulation that is at the upper or lower limits of what our sensual organs can adequately process. Any sounds that are too loud or too soft, or

---

[55] Douglas, Mary: Purity and Danger (1966), London: Rutledge Classics (2002), 44.
[56] Lachenmann, Helmut: "Accanto", in: Helmut Lachenmann, Musik-Konzepte, Vol.61/62, München: Edition Text & Kritik GmbH (1988), 63.

too high or too low to be properly perceived, or any visual impressions that are too bright or too dark to be clearly recognised, are examples of *liminal* noise. Extreme speeds – either being too fast to enable the perception of details, or too slow for the perception of changes or contexts – can also function as *liminal* noise. The term *liminal* is used because the perceived information touches the limits of what the senses can handle. *Liminal* noise refers to a more immediate sensual experience than *contextual* noise, since it addresses the thresholds of what the senses can perceive. It is important to notice, though, that despite this direct experience, *liminal* noise can still be commoditised. By changing its meaning, dependent on the context it is placed in, it can become part of an established system. An example of this is how the perception of volume, or sheer sound-pressure has developed in Rock music. In the 1950s the electric guitar became the defining element of Rock n' Roll. Inseparable from the electric guitar is the amplifier that inaugurated the era of amplified music. As a result, loudness became a stylistic element.[57] The loudness was at first perceived as an expression of aggression and rebellion because of which Rock n' Roll has often been attacked as immoral, anti-social and – because of the loudness – damaging to the ears. Nowadays an average Rock concert produces peaks of 140 dBA in sound-pressure.[58] Sounds that exceed 85 dBA on average are considered to be damaging to the hearing system. Sounds beyond 120 dBA can even cause physical pain.[59] Nevertheless, the loudness of Rock concerts has long lost its offensive character. The volume has become part of a performance practice and style. Despite its threatening effect on the hearing system it has become an accepted commodity. The *liminal* noise has become accepted and therefore lost its 'noisy' aspect, even when it causes pain. However, as a category of noise, it is valuable to distinguish *liminal* noise from the other categories, even though it can loose its noisiness.

3.5.2 A semiological approach to music and art

In his book Music and Discourse the musicologist Jean-Jacques Nattiez (1945-) proposes a semiological approach to music analysis. In the understanding of semiologists,[60] every human action – and therefore also every work of music or art – is considered to be a "symbolic form". According to Nattiez

---

[57] Hegarty, Paul: Noise/Music, a history, New York: Continuum (2007), 59.
[58] Chepesiuk, Ron: "Decibel Hell", in Environmental Health Perspectives, Vol. 113, No. 1, Cary, NC (2005), A37.
[59] Chepesiuk, Ron: "Decibel Hell", in Environmental Health Perspectives, Vol. 113, No. 1, Cary, NC (2005), A36
[60] The semiological approach described here is taken from: Nattiez, Jean-Jacques: Music and Discourse, Princeton University Press, Princeton 1990. Other writers on semiology might use a different terminology with other meanings associated with it.

The symbolic is a constructive and dynamic phenomenon, characterized first and foremost by the process of referring; in this regard, it is *distanced* from reality, even as it is an element of the real.[61]

The symbolic function is generally spoken of as a "capacity to represent that which is absent".[62]

Understanding a work of music or art as a "symbolic form" means that any human expression entails a web of references that are open for interpretation. This approach coincides with the notion expressed by Rosalind E. Krauss and Craig Owens as described in Chapter 3.4 ("Compatibility and differences between sound and light"). In the interpretation of a work of art a "metacontext" is assumed, that reaches beyond the factual consistence of an expression and that cannot be suspended as it was argued in the Modernist tradition. The referential character of music is certainly different than in linguistics, but

…one cannot develop a semiology for a special domain such as music, except by agreeing to inventory *all possible forms of referring* without limiting oneself to the single example of referential modalities in verbal language.[63]

Human beings are symbolic animals; confronted with a trace they will seek to interpret it, to give it meaning. We ascribe meaning by grasping the traces we find, artworks that ensue from a creative act. This is exactly what happens with music.[64]

In contradiction to human language, musical discourse does not strive to convey conceptually clear, logically articulated messages.[65]

In musical and artistic contexts, two basic types of references have to be distinguished – *extrinsic* and *intrinsic*. To different degrees, they are both present in every work. *Intrinsic* references are inherent in the formal manifestation of a work. For example, motivic cells that occur at different times and in different forms and contexts in a musical composition create a web of references. All material-inherent affinities in a work that form a compositional structure are *intrinsic* references. In contrast to this, *extrinsic* references point beyond the materiality of a work. All sorts of programmatic music deliberately use extrinsic references. They can be mechanical imitations of nature, psychological effects or physiological gestures.

[61] Nattiez, Jean-Jacques: Music and Discourse, Princeton, NJ: Princeton University Press (1990), 34.
[62] Nattiez, Jean-Jacques: Music and Discourse, Princeton, NJ: Princeton University Press (1990), 35.
[63] Nattiez, Jean-Jacques: Music and Discourse, Princeton, NJ: Princeton University Press (1990), 116.
[64] Nattiez, Jean-Jacques: Music and Discourse, Princeton, NJ: Princeton University Press (1990), 128.
[65] Nattiez, Jean-Jacques: Music and Discourse, Princeton, NJ: Princeton University Press (1990), 127.

But also musical elements like the beginning of Alban Berg's Violin Concerto, which begins with the open four strings of the violin, is an *extrinsic* reference, since it emphasizes the tuning of the solo instrument as a culturally grown phenomenon. Also a historic reference is *extrinsic*. For example, in the first Etude op.10, Frédéric Chopin (1810-1849) hints at the first Prelude of the Well Tempered Piano I by Johann Sebastian Bach (1685-1750), by opening a large work with a solemn harmonic field. When a musical work places itself in a certain stylistic tradition it is automatically creating an *extrinsic* reference to a body of work that also raises an expectation in the experienced listeners. For instance, when a composition is recognised as following the scheme of a classical sonata, anticipations of the following development are likely to be made. Their fulfilment or denial will then cause an additional emotional response in the listener that is not solely provided by the *intrinsic* references in the work, but also by a knowledge of a tradition that functions as a blueprint in the mind of the listener. The acquaintance with the *extrinsic* references is most of the time not crucial for the understanding of a work. However, being familiar with and understanding them opens an additional channel of interpretation.

Intrinsic and *extrinsic* references form two superimposed semiological systems. Even though they are often intricately intertwined, they function on two completely independent levels.[66]

3.5.3 *Extrinsic* noise

The *extrinsic* quality of artistic material can form a third category of noise, which is referred to as *extrinsic* noise. *Extrinsic* noise is at hand if neither of the aesthetic criteria of *liminal* or *contextual* noise are fulfilled, but a sense of noise is evoked by creating an association with an impure extrinsic experience.

A good example of *extrinsic* noise is the opera Heptamerone by the Austrian composer Gerhard Winkler (1959-). In this work, various sounds of human digestion and flatulence were processed in the electronics. Aesthetically these sounds are well integrated in the overall idiom of the work. Therefore they form neither *liminal* nor *contextual* noise. However, since they are associated with secretion, they are part of a highly conditioned aspect of social behaviour. Sex and secretion are human activities that are probably the most regimented and demarcated by taboos. Therefore, in the context of the opera these sounds are experienced as impure and as a disturbing element in the composition, which classifies them as noise. It is neither an aesthetic aspect nor a particular response of the senses that makes them function as noise, but the association with a specific outside experience.

[66] Nattiez, Jean-Jacques: Music and Discourse, Princeton, NJ: Princeton University Press (1990), 117.

Another example of *extrinsic* noise is Nicolas Collins (1954-) composition Broken Light for skipping CD and string quartet from 1991-92. Here Collins combines a string quartet with a manipulated CD player, which plays string music by the Italian Baroque composers Corelli, Torelli and Locatelli. As a result of the manipulation of the CD player, the playback of the CD gets stuck in loops.[67] Such loops are a common error that is likely to happen with scratched or dirty CDs. For the regular consumer of recorded music this is as familiar as a phenomenon as the regular thumps resulting from scratched records on turntables. Hence it evokes the feeling that a malfunction is at hand and that a piece of equipment does not behave in the way that it is meant to. A lack of control seems to be imminent and as such it carries aspects of noise (also see below: Chapter 3.5.5 "Sound and light as "symbolic forms" – searching for "dirty light" "). However, the sonic results of the loops do not carry noisy sound characteristics in any traditional sense. Rather they create a lush harmonic texture that is completely congruent with the harmonic idiom of the rest of the piece. The noisy quality that remains is neither *liminal* nor *contextual*. It is based on the association with malfunctioning media and is therefore *extrinsic*.

3.5.4 The *extrinsic* quality of simultaneous audiovisual events

As mentioned in Chapter 3.4.2 ("Time: Rhythm/Form") aural and visual events can take on manifold temporal relationships with each other. One specific mode – and vastly exploited in films and video that are in the tradition of "visual music" – is their exact synchronisation. The human brain tends to connect visual and aural information when they occur at the same time or in a short temporal interval. It tries to understand the aural and visual stimulation as different manifestations of the same event.[68] In the context of film, the composer Michel Chion (1947-) has coined the term *Synchresis* for this phenomenon:

> *Synchresis* (a word I have forged by combining *synchronism* and *synthesis*) is the spontaneous and irresistible weld produced between a particular auditory phenomenon and visual phenomenon when they occur at the same time.[69]

Synchresis provides the basis of much sound design in film, where visual scenes are "reorchestrated" with new sounds that often add new or emphasize already existing qualities. The fusion that happens between aural and visual stimulation is never as strong as in the case of exact synchronisation. This is due to the empirical experience that sound (aural) is always caused by some sort of motion (visual). Since in a *synchretic* experience the aural and visual

---

[67] Collins, Nicolas: Hacking the CD Player (2009), 3, PDF downloaded at http://www.nicolascollins.com/texts/cdhacking.pdf [accessed on May 30, 2010].
[68] Flückiger, Barbara: Sound Design, Marburg: Schüren Verlag (2001), 138f.
[69] Chion, Michel, Audio-Vision, New York: Columbia University Press (1994), 63.

are presupposed to be different manifestations of the same event, a common cause is assumed. This common cause gives an *extrinsic* quality to synchronised events since it is imitating a natural phenomenon. A common external force is presumed that results in an aural and a visual event.

3.5.5 Sound and light as "symbolic forms" – searching for "dirty light"

The semiological approach shows that the expressive content of a work functions on levels that are beyond its factual materiality. In the case of light, this means that its potential meaning does not have to be constrained by its apparent pureness. Since dirtiness represents a stark contrast to light's medium-specific characteristics, this chapter will investigate how far its expressive range can be stretched. The question will be pursued whether something like 'dirty light' – metaphorically speaking – is conceivable.

As was laid out in Chapter 3.1 ("Purity and Culture"), the cultural connotations with purity and dirtiness are manifold. The following list shows terms that are commonly associated with pureness and dirtiness and that also include light and darkness:[70]

Pureness =	Order =	Light =	Control =	Spirit =	Virtue =	Joy
Dirtiness =	Chaos =	Darkness =	Loss of Control =	Matter =	Evil =	Sadness

Since defilement of light in the literal sense is not possible, the other pairs of terms may offer a more suitable lead to the use of light in combination with sound. Especially 'order' as opposed to 'chaos', and 'control' as opposed to 'loss of control' are aspects that are closely related to noisy phenomena in music. While it is not possible to imagine that light is rendered dirty, it is certainly conceivable to use it in such a way that the impression of chaos or loss of control is evoked. How this could be obtained brings us back to two sorts of noise that have been distinguished in Chapter 3.5.1 ("*Contextual* noise and *liminal* noise"): *contextual* and *liminal*. Furthermore *intrinsic* and *extrinsic* references have been differentiated as two substantially different sorts of references. The latter entails the third category of noise that we have defined, namely *extrinsic* noise. When these terms are combined, the following chart can be composed which displays how these are related with each other, and how a single light or sound element can function in an artistic work:

[70] Groot, Jan Willem de: "Gnosis en raszuiverheid", in v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998), 224f.

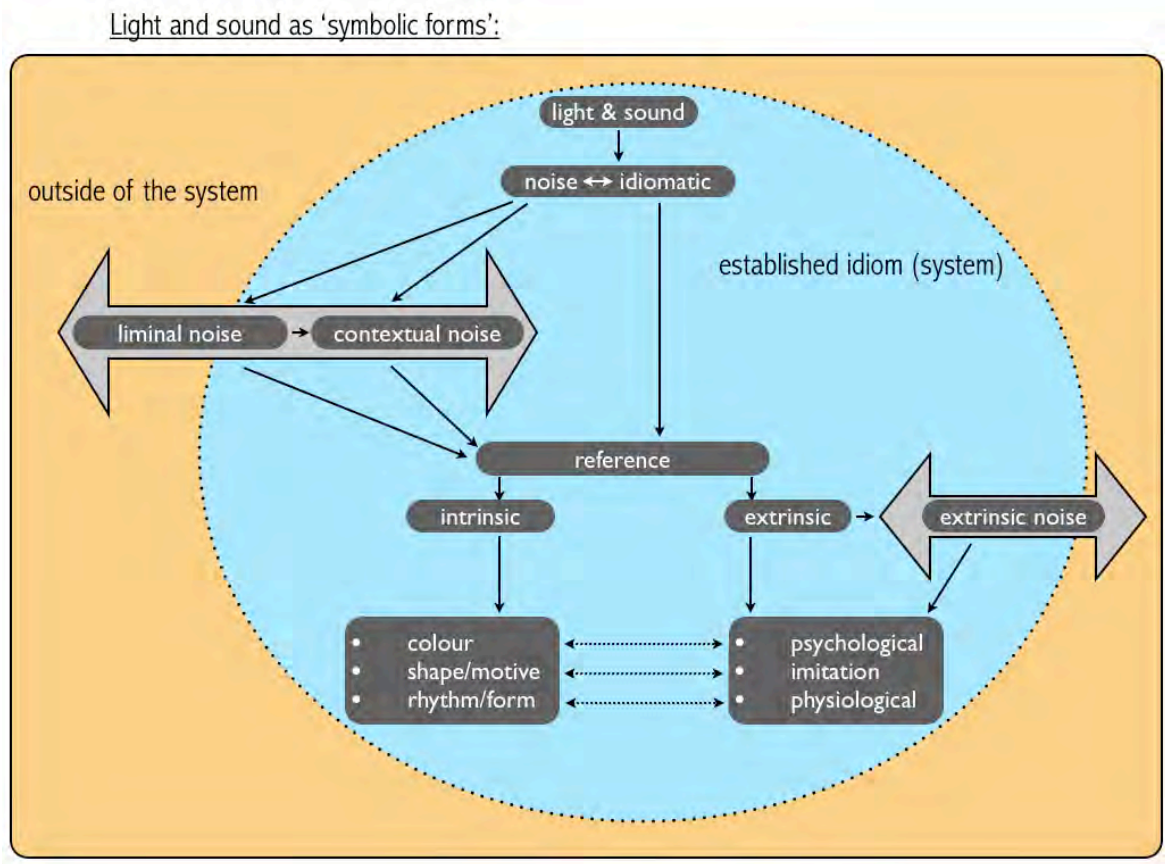


Fig.3.1: Light and sound as symbolic forms, graphic layout of the used terms.

Here are the different connections in the chart:

Within a particular work, the use of light and sound either fits or contradicts an established idiom. If it lies within the idiom, it also has referential qualities. If it is not part of the idiom and its particular order, it is noise. In that case it can either be *liminal* noise, which addresses the senses at the thresholds of their capabilities, or *contextual* noise. In the latter case, it does not pose a challenge to the capacity of the senses, but it appears to be aesthetically incompatible with the established idiom. *Contextual* noise is always in a dynamic process with the established idiom since it challenges its boundaries and often eventually becomes part of it.[71] If it becomes idiomatic despite its contextual noisiness it also gains referential qualities. It is reintegrated into the system.

Since *liminal* noise has a direct irritating effect on the senses, it forms a more autonomous experience. Its noisiness does not depend on the context. But while being *liminal*, it can at the same time also be *contextual* noise, if it is in an aesthetic contradiction to the idiom at hand. As shown with the example of volume in the presentation of Rock music in Chapter 3.5.1 ("*Contextual* noise' and *liminal* noise"), it can however also become integrated as part of an

[71] Hegarty, Paul: Noise/Music, a history, New York: Continuum (2007), ix.

idiom and thereby as well become referential. Both *contextual* and *liminal* noise are always at danger to completely fall out of the system, if their respective noisiness is too much in contradiction to the idiom at hand.

Being referential, sound and light can either form an *intrinsic* or an *extrinsic* reference. The former refers to all relationships that are based on the material of a work and the structures that are generated by manifold medium-specific cross-references. *Intrinsic* structural relationships can for example be created by the use of motivic, colouristic, rhythmic or formal elements. *Extrinsic* are those references that point beyond the structure-immanent relationships in a work. They can either be imitative (naturalistic), psychological or physiological (gestural). The extrinsic aspect brings yet another sort of noise into play, namely *extrinsic* noise, which does not depend on either sensual noisiness (*liminal*) or material-based noisiness (*contextual*), but which entails a noise aspect through association. Remember the example of Nicolas Collins' work Broken Light where a skipping CD player creates harmonic layers that are completely in harmony with the idiom of the work that also do not contain a significant amount of noisy sound characteristics, but where it is still conceived of as a noisy element because of the association with malfunctioning equipment. Also *extrinsic* noise can fall out of the system if it cannot be reintegrated into the idiom.

*

By investigating sound and light as 'symbolic forms' it has been possible to establish a differentiated vocabulary of various sorts of noise/dirt that function on separate perceptual levels. It reveals the numerous ways in which they can function in artistic contexts. This has opened the door to conceiving ways in which also light can appear as noisy or dirty despite of its medium-specific purity. A factual dirtiness is therefore no prerequisite for the creation of experiences in artistic contexts that are analogous to dirt. "Dirty light" therefore *IS* possible.

In the practical part of this dissertation, the chart displayed above will often be referred to and various examples will be given of how – within a particular context – a case of "dirty light" can be generated.

4. Practical Research

4.1 Compositions for sound and light

The works that I have composed as part of this research investigate the relationship between sound and light in concert settings. All of the compositions involve one up to six performers. They are fixed in length and therefore have an identifiable beginning and end. All of the works are written for closed spaces that can be darkened, even though some have also been realised in open-air settings. The lighting equipment used is predominantly theatre lighting. Two compositions make use of laser.

As a general rule, by using lighting in the context of a concert it is my intention to emphasise the space that a performance is taking place in. Whenever possible, I try to set up the lighting equipment in a way that emphasizes architectural particularities in a space.[1] Thereby I try to intensify the present situation, by highlighting the relationship between the performer(s) and the environment. By the use of lighting I try to design an environment where the experience of the live event is intensified.

These objectives describe the difference between my use of lighting and traditional video-art. The latter most of the time uses projection screens that are reminiscent of painting canvases or windows. The Renaissance writer and artist Leon Battista Alberti (1404-1472) coined the term "finestra aperta" for the type of painting that emulates a view ("prospettiva") into a different reality. This Renaissance tradition is continued by the predominant part of video-art by isolating the image from the space they are placed in and by taking the viewer into a virtual reality. Even though lighting-design and video both work with light as their tool and therefore sometimes use the same technology, the most significant difference between the two can be found in the former's concentration of the present space and the latter's creation of a virtual one.

In my work with sound and light, I am primarily transferring musical ideas onto light designs in order to create an additional channel of sensual communication, which adds to the music in a homogeneous way. The combination of light and sound thereby opens the possibility of countless potential relationships between the two. The following descriptions of the individual compositions will refer to sound and light as "symbolic forms", as proposed in Chapter 3.5.4 ("Sound and light as "symbolic forms" – searching for "dirty light" "). Another important aspect that will be reflected on is the temporal relationship between sound and

---

[1] However, normal concert venues often allow very limited possibilities to emphasize architectural particularities. See Chapter 4.2.1 ("Limitations in concert venues") for a detailed discussion of the problems encountered in concert situations.

light. Roughly, three sorts of temporal relationships can be distinguished, with many shades in between:

- Doubling of form and development through synchronisation in order to clarify them by adding redundancy. This includes *syncretic* aspects.
- Formal correspondences that are not aligned in time, therefore creating a counterpoint-like relationship between the two.
- Conspicuous differences between the two. Common material in misaligned introducing additional levels of contrast and complexity.

Graphically they can also be displayed as follows:

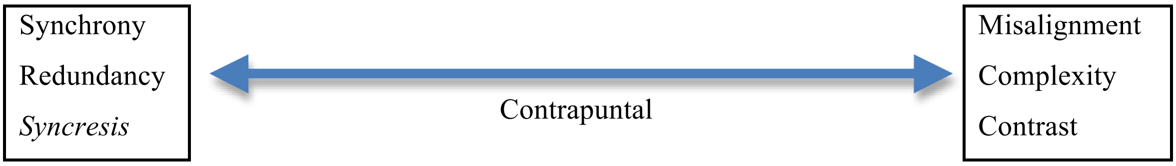


Fig. 4.1: graphic display of temporal relationships between sound and light

An exception to the things stated above is the audiovisual installation Planetary Runway, which I included as an appendix (Chapter 4.1.8). This work is not fixed in duration, it does not depend on closed spaces that can be darkened, nor does it use theatre-lighting technology. However, I included it in this dissertation because it came as a result of the reflection on the media sound and light that I was undertaking.

4.1.1 My Ultradeep I

for six performers, live electronics and lighting, 2006-07 (65').

I composed most of My Ultradeep I before I started my PhD research. It is, however, the first substantial work where I worked with a larger light setup and where I pursued a number of more complex relationships between sound and light. Therefore I consider it part of the research that I am undertaking as part of this dissertation. The relationship between sound and light in My Ultradeep I will not be discussed in detail. However, I would like to address some formal compositional aspects, as they are precursors to approaches that I further developed in later works.

In My Ultradeep I the idea of individuality as the "in-divisible" entity in society is artistically investigated. Individuality lies at the core of Western culture where it holds the status of one of the most basic human rights. This project poses the question to what degree the uniqueness of an individuality is truly authentic and how far is it a product of non-reflected influences and manipulations coming from the outside.

Descartes' renowned sentence "I think, therefore I am" expresses that the identity of the "self" is allocated in the spiritual realm, detached from the body. This is a notion that was characteristic of the Enlightenment period. However, it is the physical human senses that form the interface between the individual and the outside world and enable us to relate to our environment. It is through the differentiation to the "other" that a sense of the "self" is born.

Based on this idea, the piece is divided into sections according to the human senses. It starts out with a large block consisting of five sections, each dedicated to one of the five senses: Skin, Smell, Taste, Hearing and Sight. The second block is based on the more nebulous 6th sense, which is here understood as the metaphysical sense of the "I", the sense where the feeling for identity – the "I" – takes shape. The order and durations of the individual sections are:

1. Touch 14'
2. Smell 5'
3. Taste 3'
4. Hearing 11'
5. Sight 7'

   -----

6. I 25'

My Ultradeep I was originally written for sopranino-saxophone/didjeridu, electric violin/acoustic viola, electric guitar, electric bass, percussion/voice/musical saw and live electronics. Since the musician playing sopranino sax and didjeridu became unavailable in 2007, due to relocation to California, I made a new version of the piece where these instruments were replaced with electronics. This version was performed in all concerts from the fall of 2007 on.

The light setup of My Ultradeep I consists of three screens that are positioned in the back of the stage and left and right of it. Each of the screens can be colourised monochromatically, using red, green and blue mixtures. In addition, three balloon-shaped objects are positioned in front of the musicians that were specially designed for this project by artist Kyoko Inatome. Inside these balloons are three LED lamps that can also mix colours using red, green and blue LEDs. Hence, a total of six independently controllable light units are used in this piece.

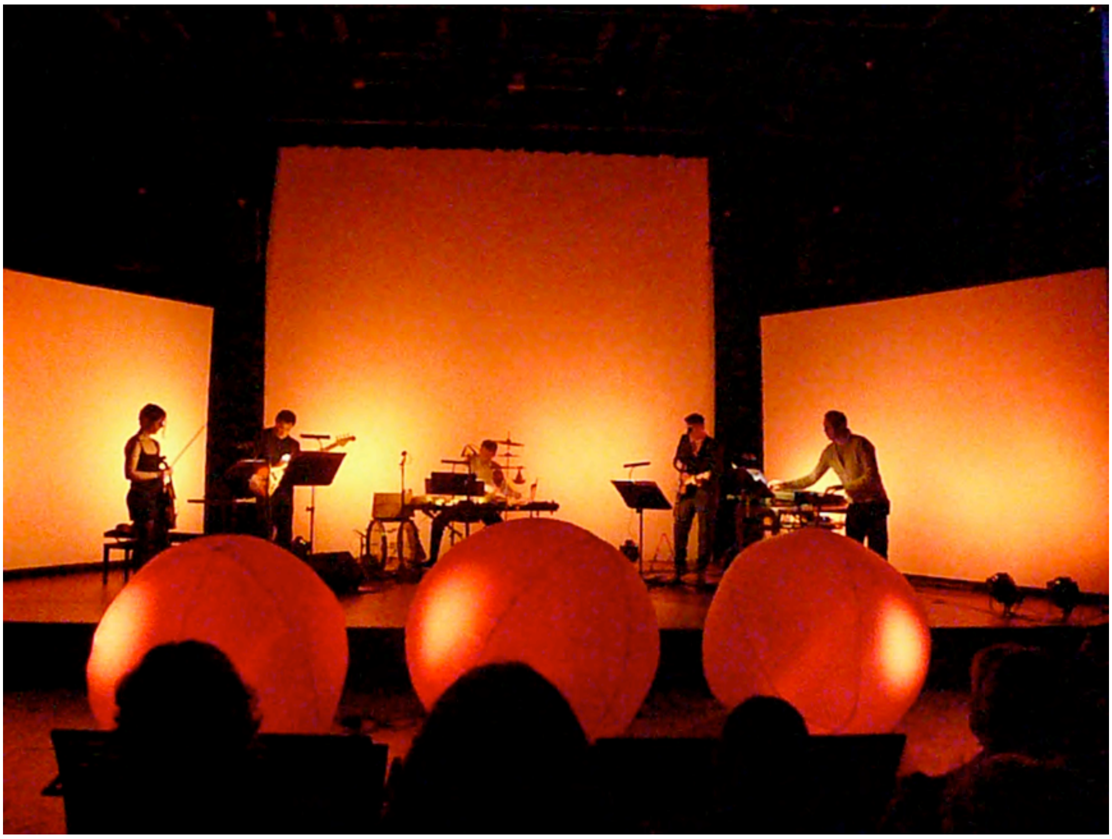


Fig. 4.2: Most recent performance of My Ultradeep I on February 6, 2009 at the Kubus of the ZKM in Karlsruhe/Germany.

While the lighting in sections 2 ("Smell") and 3 ("Taste") is static and monochromatic, the remaining sections make use of a changing and rather elaborate light design. Here, various rhythms are applied to music and light that are composed according to the same principles. However, the light only very incidentally doubles the temporal structure of the music. A shifted contrapuntal relationship between the two is the predominant principle.

The first large block, consisting of the first five sections, is characterized by the use of fully saturated colours. In it, colours are often gradually changing their hue. In an early version of the piece, I obtained the colour-sweeps by simply fading between the individual start and end values of the red, green and blue component. This method, however, entailed colours of very different saturations during the cross-fade. Therefore colours of various coloristic qualities became visible which to me looked unsatisfactory. In a later version I applied an algorithm to the colour changes that performed the sweeps by moving along the colour wheel. The following example should illustrate the difference:

If a cross fade from blue to yellow has to be performed, the red–green–blue components are 0%–0%–100% for blue and 100%–100%-0% for yellow, as a blend of green and red yields yellow. When these values are cross-faded, halfway during the fade the values are 50%–

50%–50%. This results in dimmed white light. The fade from blue to yellow would therefore take place by gradually taking away all blue colour information and re-emerging from the dimmed white to yellow. When the same cross-fade is performed according to the colour wheel, the saturation of the colours remains consistent during the entire fade. Instead, the colour blue would either slowly change through magenta and red to yellow, or – if the colour wheel was used in the other direction – through turquoise and green to yellow.

Fig. 4.3: a colour wheel. Along its edge are the fully saturated colours. Towards to the middle of the wheel the colours desaturate. White is at the centre.

For formal reasons, I found it important in My Ultradeep I to exclusively use fully saturated colours in the first five sections. Therefore the use of the colour wheel for the cross-fades had to be the preferred choice. The use of unsaturated colours was reserved for the second block of the piece, which consists of the sixth section titled “I”.

While the first five sections dealt with the five bodily senses, the idea of the last section was to metaphorically investigate the flowing together of sensual stimulation on a rather psychological level. Here, the idea was that sensual information is processed as a totality, not distinguishing from which sense it originates. Hence, it seemed logical to also let go of the directness of the saturated hues and to favour a blend of all colours, which yields to colorations of lower saturation. This also explains why it was necessary to use colour changes in the first 5 sections that perform the cross-fades according to the colour wheel, keeping a consistent saturation and reserving colours of lower saturation for the 6th section. Hence the last section also gained an overall look, which clearly distinguishes it from the rest of the piece. At the same time, colour sweeps were still possible, this time by keeping a consistent level of lower saturation while wandering through the changing hues. Also on a temporal level, the same rhythmic principles could be applied to the lighting as in the previous sections, without giving up the coloration that became characteristic of the last section.

The different handling of colours created a light design that visually emphasised the special position that the sixth section took within the composition. A corresponding approach was found in the music by using thick, block-like sonic textures, where individual musical elements became absorbed as part of a larger sonic totality. Hence, sound and light formally worked hand in hand.

The use of lighting in My Ultradeep I is an example of exclusively *intrinsic* references. The correspondence between the music and the light takes place on a temporal basis – formal and rhythmic. Within the lighting design, global formal relationships are expressed by associating the first five sections with intense saturated colours, which are then amalgamated in the last section, yielding tones of lower saturation. All of these references take place on a medium immanent level and are therefore *intrinsic*. In this work no form of "dirty light" has yet been explored.

4.1.2 Alias

for electric violin, live electronics, lighting and laser, 2007 (20').

The temporal organisation of this work is an example of "doubling of form and development", although it also contains freer passages that rather fall into the category of "counterpoint-like relationship".

Alias is inspired by various techniques that are used in film. I was specifically interested in the phenomenon called "persistence of vision", which describes that when the eyes are exposed to an image for a fraction of a second, the brain holds the image for longer than it is actually visible. As film is based on a fast succession of images, that – at least in analogue techniques – are separated by a moment of blackness caused by the "shutter",[2] the "persistence of vision" bridges the black gaps and enables us to see the succession of images as an uninterrupted continuous motion. Thereby the succession of images must occur with a frequency that is above the so-called Flicker Fusion Rate (FFR), which is the minimum speed the brain needs in order to fuse single images to a continuous motion.

Stroboscopic effects are successions of images that are presented at a frequency below the FFT. The brain can therefore still recognise the information as single images. I was interested in the fact that it depends on only a slight variation of speed, whether or not the brain manages to fuse the individual images into a continuous motion. Contrary to the rather minute variation of speed, the perceptual difference is a large one. Stroboscopic visual impressions

[2] The shutter in a film projector closes the lens during the moment when one image of a film is pulled through to the next one.

cause much more strain on the processing of the visual information than visual perception above the FFR. Due to this stress, I consider stroboscopic light a form of *liminal* noise (see Chapter 3.5.1 "*Contextual* noise and *liminal* noise"). While we perceive film as a continuous motion, the sound of a projector still reveals the mechanisms at work. Its rattling clearly exposes the work of the shutters. Here, the higher temporal resolution of the aural processing becomes evident (see Chapter 3.4.2 "Time: Rhythm/Form").

The fixed frame-rate of film brings along another phenomenon that I found interesting to explore, namely the so-called "spinning wheel effect". Rotating wheels seen on film sometimes appear to move slower, to stagnate or even to move backwards. This is caused by the quantization of the visual material that the fixed frame-rate entails as film only captures snapshots of an otherwise continuous motion.

Digital technologies break down images into grids of pixels. Yet another sort of quantisation-related artifact that is typical of the digital domain, is the Moiré[3] effect, which is related to the appearance of jerky lines. Theses errors are also often referred to as "aliasing" and are caused by the transfer of repetitive shapes onto a digital pixel grid. I have translated such phenomena into music by composing repeating patterns. Through the application of rhythmisised gatings[4] single notes are isolated from the repetitive stream of notes and sent to a distortion effect, which makes them distinguishable from the original timbre. Thereby new patterns, a sort of "aliasing" of the original pattern are formed.

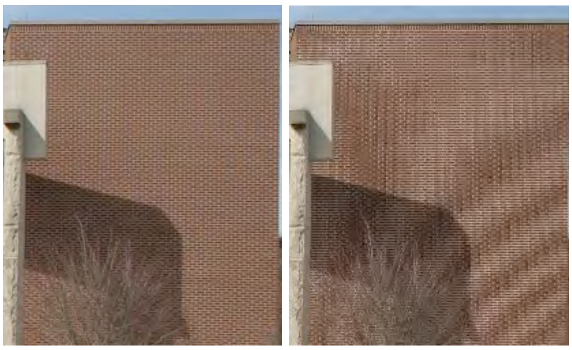


Fig. 4.4: original image (left) and a downsampled version of the same image (right) that reveals the Moiré-effect, which is a result of the superimposition of the brick-pattern on the image and the low pixel resolution of the digital image. (source: http://en.wikipedia.org/wiki/Moiré, [accessed on June 9, 2010])

[3] The Moiré effect, or Moiré patterns are interference patterns of two superimposed grids. With digital photography a pixel grid provides such a grid. When a second patterned texture is photographed, undesired artifacts in forms of wave-like interferences result.

[4] Gating is a technique used in sound signal processing that opens or closes an audio channel. Traditionally, gates open whenever the level of passing sound goes above a chosen threshold level. It is thereby used to shut off background noise in a channel that would become audible when the audio signal pauses. Alternatively, a gate can also be triggered by an external sound source that can remain inaudible which is usually referred to as 'side-chaining'. This method is used in the composition Alias.

In Alias, I was furthermore interested to compositionally use acoustic elements that originate from film by using manipulated and processed recorded material from film-projectors. In addition to the gating techniques mentioned above, I also used tremolo effects on the violin. By superimposing two fast tremolos at slightly different speeds, I was able to achieve shifting micro-rhythms that resemble the phenomenon of Moiré-patterns in digital photography.

Next to the recordings of the rattling sound of projectors, I used sound excerpts from Japanese Mangas[5] as sound material. Although cut up and processed, these materials are easily recognised as sounds that originate from cartoons. Thereby film, as a medium for entertainment, gains a presence throughout the piece, despite its visual absence. This absence is visually substituted by a composition for lighting and graphic laser projections.

The visual setup in the performance consists of two tungsten lamps that are placed on the far left side of the stage and two on the right. They are projected onto bright surfaces in the performance space, or onto projection screens, if the space does not offer appropriate surfaces to project on. One of the lamps on each side has green gels, the others magenta or pink. The green has a similar colour tone to the laser, which is also green. Magenta is the complementary colour of green. It is used in order to create the greatest possible contrast in terms of colour. Since the vast majority of the visual design only uses the colour green, the moments when magenta or pink is used comes as an almost violent contrast. This I consider an instance of *contextual* noise. Naturally, a magenta-coloured light is not less pure than a green one. However, when it is placed in such a predominantly monochromatic context, it appears momentarily as "matter out of place", hence: noise or dirt.

The performer is positioned on the left half of the stage,[6] relatively close to the front edge. The laser is set up in such a way that it projects from a point close to the performer, diagonally across the stage area to the back right side of the stage. The laser beam is supposed to come from a similar direction as the violin bow. Ideally it should appear as its visual extension.

One of the techniques that is used most consistently in Alias is the gating of the violin's signal, according to changing rhythmic patterns. The unprocessed sound of the violin is panned slightly to the left, mirroring the soloist's position. In contrast to this, the gated and

[5] Manga is the Japanese word for comics and print cartoon (literally "whimsical picture"). Outside of Japan, the Japanese word Manga is commonly used to refer to the specific aesthetic quality of the Japanese cartoon.
[6] Left and right are here always referring to the audience's point of view, which is the traditional nomenclature in audio-design, as opposed to light-design where left and right are defined from the actor's position looking into the auditorium.

processed signal is panned to the right. This creates an ongoing left-right motion of the sound. It is this spatial polarity that is explored also by the lamps on the left and right of the stage.

As mentioned above, the magenta/pink lamps are only used to accentuate certain moments in the piece. During most of the duration of the composition, only the green lamps are used. Their changes of intensity are usually arranged in an alternating fashion, so that an illusion of motion from left to right is created. For example, the left lamp might decrease its intensity from 100 to 0% while the right lamp increases its intensity from 0 to 100%. The light thereby "shifts" from the left of the stage to the right and creates a sense of movement.

The following excerpts are discussed in greater detail in order to exemplify the use of the light:

- The principle of alternating increase/decrease of intensity is used for example from mm. 3-24 at varying speeds. While the left lamp is making a triangle shaped increase and decrease of intensity, the right lamp swells to 100% and suddenly goes down to 0% (saw-tooth shape). At that moment the intensity starts to increase again on the left side. This creates the illusion of the light wandering from left to right only and not the other way round:

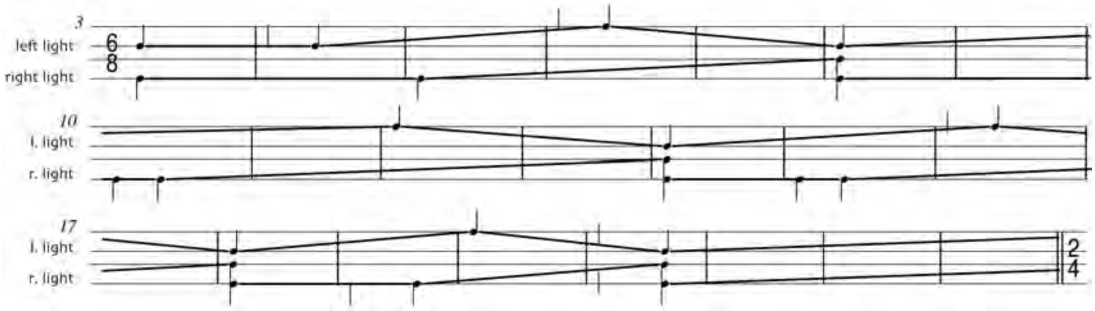


Fig. 4.5: changes of light intensities from Alias, mm. 3-24.

- At a later point, mm. 71-88, both lamps are synchronized in saw-tooth shapes of varying lengths which gives them a much stronger rhythmic profile:

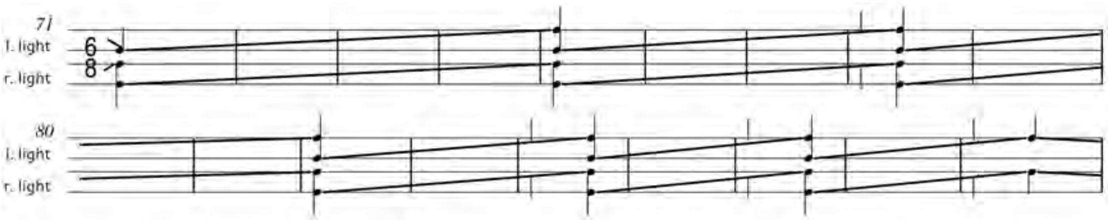


Fig. 4.6: changes of light intensities from Alias, mm. 71-88.

- From mm. 216-258 the lamps again start in synch with the saw-tooth shaped change of intensity. However, here they gradually run out of synch. This principle is also derived from the music, where the patterns that are obtained by the rhythmisised gatings are often arranged in periods of different lengths than those of the live part, for example mm. 89-102:

Fig. 4.7: changes of light intensities from <u>Alias</u>, mm. 216-258.

- From mm. 436-471 the lamps again change their intensity in saw-tooth shaped manners, but this time reversed, thus starting with 100% and falling off to 0% and from there switching to maximum again. At first they are shifted in relation to each other in irregular ways, before they rhythmically line up again in m. 462. Here the left side keeps the sawtooth shape that starts with 100%, while the other side uses the original sawtooth shape, starting with 0%. Here, a similar effect of left-right motion is obtained as in the beginning but at a faster pace.

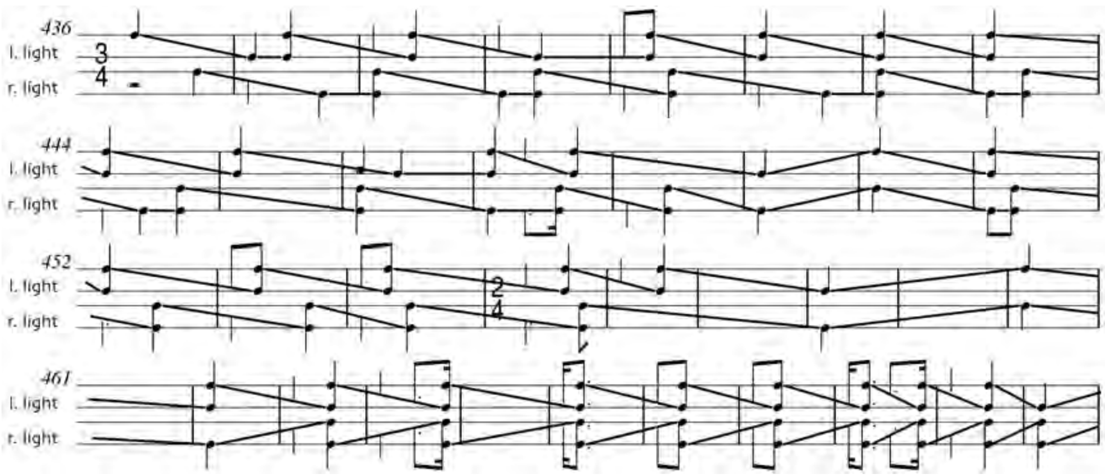


Fig. 4.8: changes of light intensities from <u>Alias</u>, mm. 436-471.

The role of the laser is much more prominent than that of the lights. As a medium, laser has a strong intensity and immediately draws attention. I considered the laser to be a visual counterpart of the solo performer, which is also the reason why I chose the position of the laser source to be an extension of the soloist.

In order to make the laser visible as a beam of light and not only as a projected image on a surface, I use a fog machine on the stage. The fog creates a texture in the air that reflects the laser beam and therefore creates a three-dimensional object. However, the fog is never distributed regularly in the space. There are areas where it is more condensed as thicker clouds as opposed to areas where it is thinned out. This variability creates a texture in the air that is also visible in the light projections and which evokes a sense of impurity. This I refer to as *extrinsic* noise. The smoke-like texture is not introducing an element that stands in contradiction to the other visual material, which would be characteristic of *contextual* noise. Also, it does not pose any challenge to the eye, characteristic of *liminal* noise. The association with impurity only stems from the association with smoke, which is a result of some sort of disintegrating material. It comes from an experience of the outside world and is not immanent in the material as such. Therefore it is an instance of *extrinsic* noise.

The laser uses simple geometric shapes that consist exclusively of horizontal and vertical lines: neither curved or round shapes are used, nor angled lines. The used shapes are:

- vertical/horizontal single lines;
- vertical/horizontal multiple lines;
- squares;
- crosses;
- single points.

I confined myself to these shapes as I find them characteristic of the framing of film screens and the pixel-based digital quantisations of visual material that are the source of all aliasing effects. With the laser I am reintroducing a graphic element back into the piece, with a much higher degree of abstraction than realistic film usually has. As in this piece the filmic elements have been deprived of their visual content and only left their trace as acoustic material, the visual aspect is reintroduced by abstract laser projections.

Another function that the laser holds within this composition refers back to the thin threshold of flicker frequencies that separates the strenuous sensation of stroboscopic visuals from the homogeneous filmic one. Similarly to film, laser generates the smoothness of a projected image by a fast succession of images. While film works with a constant rate of changing images that are fixed, laser draws the different curves and lines of its image with a single laser point. This takes place with such a high speed that the image ideally appears to be smooth to the eye. Depending on the quality of the laser projector, and especially on the size and the complexity of the image, more elaborate graphics tend to create visible flicker. This happens when the laser point does not manage to pass all curves and lines of the image fast enough, so that the image starts to disintegrate to the eye. In more extreme instances this flickering can turn into a stressful sensation which is analogous to that of stroboscopes. I consciously used this flickering quality of the laser as yet another visual representation of the stroboscopic principles that I transferred into the music.[7] Furthermore, the laser fits well to the eccentric, extroverted and glaring quality of the Manga, which is present throughout the piece.

Since the laser appears as an extension of the solistic element and extends the soloist's role into the visual realm, the soloist hardly ever plays when the laser is in action. Generally speaking, the light and laser are often synchronised with acoustic events. Especially during the longer electronic interlude from mm. 602-619, laser and light are completely linked with the sound. This is also a reference to the pop-like world of the Manga, where sound and visual information almost exclusively support and reinforce each other, rather than go into contrapuntal relationships.[8] As such, light and laser clarify the form of the composition, and at certain points develop an almost spectacular quality.

The various techniques that are translations of phenomena from film techniques into the acoustic field or the light design are *extrinsic* references, as they are referring to concrete phenomena that are taken from a different medium. At the same time, they are also *intrinsic* since they are structurally connected on a material immanent level. This also creates the bridge between the music and the flickering quality of the laser.

In 2009 I realised an alternative light design that makes use of four moving-head lamps instead of the four tungsten lamps. Their position is still the same: two lamps on the left side of the stage area, two on the right. Since moving head lamps are capable or panning horizontally as well as vertically, these features are used in order to support the sense of motion that is already implied in the changes of light intensities that were analysed above. The course of changes of light intensities remained unchanged, only the motion of the lamps was added in the 2009 version.

4.1.3 Rational Cantilenæ in Nine Triads

for a roaring pianist and lighting, 2008 (16').

When I started to work on this piece I was interested in Heavy Metal and its affinity to ancient cults and occultism. While doing research on this subject-matter, I discovered that not far from my house in Amsterdam there is a private library with the world's largest collection

[7] The laser that I own and that I exclusively use for performances of Alias is a relatively inexpensive model and shows clearly more flicker than more expensive ones. This is due to the mechanically superior scanning system of laser projectors of higher quality. However, in the context of this piece the technical shortcomings of my laser are beneficial.
[8] Amongst film-makers, the tight synchronization between sound and image is also referred to as "mickey-mousing", as is it considered to be characteristic of the cartoon medium.

of hermeneutic and alchemist literature. There I read with fascination about the world-view of Middle Age and Renaissance alchemists. Various ideas of the alchemist philosophy I found very fascinating and I used them as analogies to construct the form of this piece. These concepts include:

- the holistic understanding of the universe as inherently bi-polar (matter and soul);
- the spiritual aspect of science;
- the circular aspect of time;
- the aspect of purification of soul and matter through ritual.

I do not share these beliefs, but I am fascinated by Alchemy because of its complex mixture of science, Christianity and occult beliefs based in Hellenism. In my opinion it accumulates very diverse aspects of Western history and religion that seamlessly led to our present understanding of science. I wonder how many alchemistic ideas still exist today in an altered and subconscious form.

Another interesting aspect I found was the role that Alchemists assigned to light:

> It was believed that God enacted his will on the earth through the agency of the stellar spheres and planets. In alchemy the inter-relationship of spirit and matter was represented by the marriage of the Sun and the Moon...[9]

Some Alchemists also believed that matter was condensed light. But since light was divine, matter was also pervaded by spirit.

Apart from the grand piano a total of 5 lamp fixtures and a fog-machine are used in Rational Cantilenæ in Nine Triads. The set-up models a pre-Copernican geocentric cosmology:

The main body of the grand piano represents the world as a flat disc. Underneath its flat surface is Hell. It is represented by a yellow and an orange coloured lamp of 1 kW that are pointed away from the audience. The fog machine is also positioned underneath the piano. It runs at low intensity and creates fog in order to better reflect the orange and yellow light. The intention is to create a “glowing” texture underneath the piano, as if the piano was floating on a fireball. Similarly to the composition Alias, the fog creates a texture that forms a sort of *extrinsic* noise.

[9] Szukalowska, Ursula: The Alchemy of Light, Leiden: Brill (2000), 14

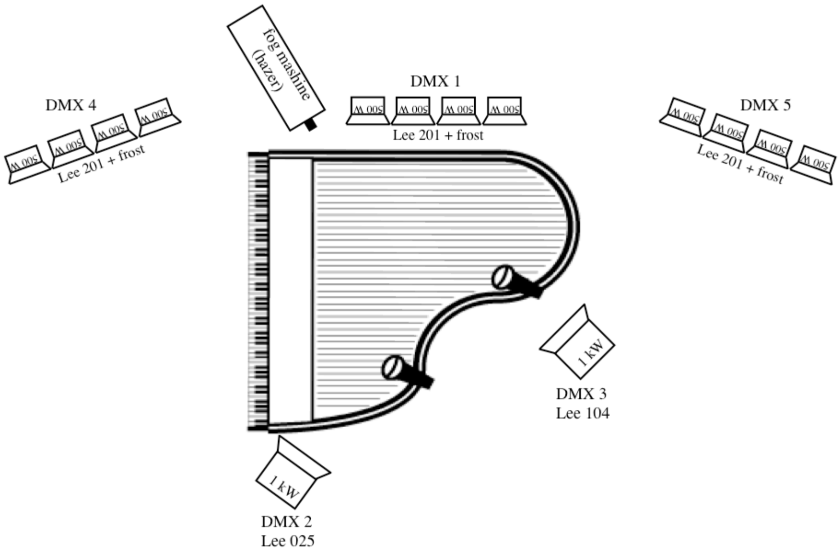


Fig. 4.9: the set-up of <u>Rational Cantilenæ in Nine Triads</u>

As a result of the positioning of the lamps, the legs of the piano are extended into the space as shadows. The appearance of the piano thereby grows significantly in size. Furthermore there are three sets of lamps left, centrally behind, and right of the piano. These lamps only have a light blue correction filter (and hence appear to have a cold white light) and are pointed at the audience. Whenever these lamps are used, they are blinding to the audience and therefore form a sort of *liminal* noise. These lamps symbolise stellar constellations around the 'earth' (the grand piano). Medieval and Renaissance alchemists believed that light was the sight of God and that through light God exercised a concrete influence on the world. Hence, alchemists gave special importance to stellar combinations as they were read as messages from God.

Throughout the piece, the lamps are mainly used in three constellations:

- a 'trio' between the yellow and orange lamps and the central fixture directly behind the piano;
- a 'trio' between the three sets of white lamps left, centrally behind, and right of the piano;
- a 'duo' of the yellow and orange lamps.

I derived rhythmic structures from proportions within a triangle and used them as the basis of the rhythmic organisation of the lighting as well as for the rhythmic and melodic organisation of the music. For the following reasons the triangle appeared to be a fitting analogy in this piece:

- the shape of a piano can be reduced to a triangle;
- the setup of the piece represents three realms: earth, hell and the stars;

- the triad carries strong symbolic meanings – many religions are based on triadic constellations of power.

In this piece I used a right triangle with the proportions of the length and width of a Steinway Model D concert grand piano in order to calculate the rhythms that were subsequently used in the piece (length 274 cm, width 156 cm). Using these measurements in a triangle yields the value 315 cm for the hypotenuses.

The rhythm was derived by calculating the paths that a fictitious ball would roll when bouncing around within a triad with the given measurements. I developed a computer program that returned the lengths of those paths and the sides of the triad that the ball touched. I imagined an ideal situation without any friction so that the ball would never slow down. The following image displays how the first 9 values were derived.

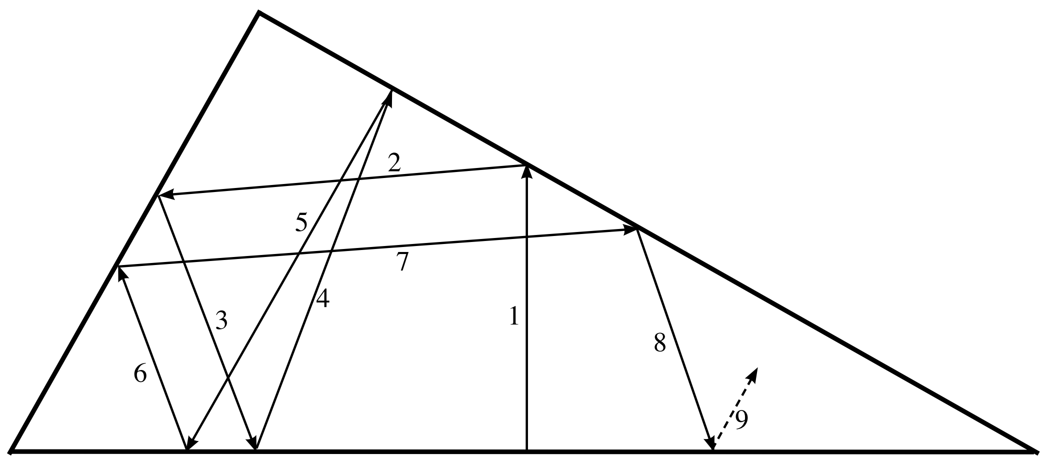


Fig.4.10: the first 9 rhythmic values derived from a right triangle.

The lengths were subsequently used as durational values; the sides were applied either to different lamp fixtures or different pitches.

What I find appealing about the rhythms that were derived with this method is that they do not contain any sort of periodicity. Despite that they do carry an inherent logic that is a result of the physical constrains of the triangle. In my opinion, this inherent logic can clearly be felt, although the underlying principle does not reveal itself. The presence of a sensible order, which is at the same time too complex to be predicted I found aesthetically appropriate for a piece that refers to a complex body of knowledge like Alchemy, which sought a basic principle of order that the entire universe can be reduced to.

Here are two examples that show how rhythms derived from this method were applied to light. Each line in the first example represents a lamp fixture. The accents designate short and bright flashes:

Fig. 4.11: light changes from mm. 82-91 in Rational Cantilenæ in Nine Triads.

In the following example rhythms derived from the triad were applied to melody:

Fig. 4.12: melody from mm. 39-48 in Rational Cantilenæ in Nine Triads.

With the melodic example the original rhythmic values were quantised[10] to a value of a quaver. The rhythm gained from the triad calculation was sometimes used in its pure form but also often altered during the piece. The alterations mostly took place by quantising, stretching and compressing the rhythm.

Furthermore I used an alteration that I call “periodising” which is for example used in the first light sequence from mm. 1-38. Due to the principle of how the fictitious ball moves within a triangle, its shortest side is touched more rarely than any other. I altered the rhythm in such a way that the beats that fall on the shortest side always occur on a rhythmic grid of quarter notes. The values in between those “main beats” are stretched or compressed accordingly, but they are not quantised. The result is a mixture of periodic sensations and the a-periodic bouncing. In the first light sequence the “main beats” are visualised as short and intense flashes on the white light fixtures behind the piano that are pointed towards the audience. The other light changes are prolonged and form an irregularly pulsating smooth texture.

Once the piano part starts in m. 39, the light sequence changes to a regular pulsation, which slowly fades away until m. 47. The identical light sequence is used again from mm. 82-128. The light sequence from mm. 129-170 and the sequence from mm. 243-274 are based on the unaltered rhythm, while the former uses again three lamps. The latter however uses only two lamps. The values belonging to the previously emphasised value of the shortest side of the triangle are ignored.

[10] Quantisation is a process common in MIDI software. When a complex rhythm is quantised, its values are rounded to a predefined metric grid. A quantization to a quaver uses the duration of a quaver as the smallest unit.

Also in the music, the triadic rhythm went through various interpretations. Contrary to the manifold rhythmic variations that were applied to lighting, the rhythmic structure that underlies the music runs almost throughout the entire piece. However, in the course of the work it was applied to different aspects of the music.

From mm. 1-94 the rhythm is applied to changing cells of three notes:

Fig. 4.13: different 3-note cells to which the rhythm is applied (from Rational Cantilenæ in Nine Triads).

From mm. 95-103 the rhythm is not applied to melodies anymore but determines the pace at which the pentatonic cluster is expanded. Similarly, from mm. 104-119 the accents on the pentatonic cluster are taken from the rhythm. From m. 95 the three different “sides” of the triad are not differentiated anymore. From m. 129 however, the rhythm resurfaces again by being applied to a three-note cell, this time in the highest register of the piano.

As pointed out, the organisation of light as well as music is based on the same principle. In other words, the light constitutes a visual representation of the same material that is sonically present in the music. While arranging the lamps in such a way that the rhythmic qualities of the sequences become apparent, I imagined that the context would enable the light sequences to convey a musical quality in addition to its visual. My intention was to assign an emotional content to the music that stands in contrast to the light. For most of the time the music remains quiet and restrained in its character. In opposition to that, the light is at times meant to be quite aggressive. This is also the reason why the three sets of white light are pointed towards the audience. By blinding the audience at certain moments they are exposed to *liminal* noise. This more aggressive aspect is reflected in the music by the occasional use of the pianist’s voice. At certain moments (mm. 65-70, mm. 123-128, mm. 306-328) the pianist has to utter texts in a fashion described as follows:

> The text should be "shouted" by the pianist by emulating a vocal style, which is typical for death metal, namely harsh, non-pitched, guttural, growling vocals (also sometimes referred to as Sesame Street's Cookie Monster vocals). This shouting should be aggressive in its quality, but nevertheless soft in its dynamic.

While remaining within soft dynamics, this use of vocals still conveys a tense emotional content. In the manner in which it relates to the piano texture, I conceive it as a corresponding element to the blinding lighting. This use of voice is also an example of *extrinsic* noise. Even though the sound has acoustic qualities that can be described as noisy in the sense of non-pitched material, the timbre also conveys a rather disturbing emotional content that adds to the noisy quality. Since this emotional association is neither inherent in the material nor a result of context but rather of a worldly experience, it is *extrinsic* noise.

As I imagined the light to have a strong "sonic" quality, I composed sections where the music is practically silent: mm. 1-38, mm. 289-305, mm. 391-444. Accordingly there are also sections where the light is inactive: mm. 48-64, mm. 182-224, mm. 307-327.

Apart from the rather abstract triadic rhythms, there are also rhythmic motives that are shared in the music and the lighting. These include fast flashes that are changing between the white sets of lamps (mm. 170, 181, 238-239, 243-244, 248-249, 252-253, 256-257, 261-262, 267, 272-273). They form a visual analogy to percussive actions on the tuning pegs in the piano (mm. 252, 164, 175, 187), short glissandos with the ruler on the keyboard (mm. 170, 178, 184) and repetitious motives on the muted keys g5 and a5 (mm. 64-69, 123-128, 174-191, 238-241, 275, 281, 287-288).

The accented chords in mm. 171-172

Fig. 4.14: accented chords in mm. 171-172 (from Rational Cantilenæ in Nine Triads).

are 'quoted' by the light in mm. 253-254.

Fig. 4.15: transferred to the lighting (from Rational Cantilenæ in Nine Triads).

By using such similar motives in the music and the lighting, I am intending to create a tight link between the two, which helps to perceive the music and the light as a unity, despite their contrasting appearances in terms of emotional content. The relationship between the sonic and visual elements is primarily based on rhythm, which is an aspect immanent to both media. Therefore this is an instance of *intrinsic* references.

In this particular piece the entire setup of the lamps as well as the structuring of the rhythms has been derived from the number three, which in the context of Alchemy carries symbolic meanings. Also the entire stage setup is derived from the pre-Copernican geocentric cosmology. All of these are obviously *extrinsic* references. As is it often the case, the same material can easily function *intrinsically* and *extrinsically* at the same time, even though they perceptually function very differently.

4.1.4 Jeanne of the Dark

for five performers, lighting and video, 2008 (56').

The work Jeanne of the Dark was inspired by the actress Jeanne Roques (1889-1957) who rose to popularity through the film series Les Vampires in 1915/16. When Les Vampires entered the movie theatres in France it was first banned by the police for glorifying crime. When finally released, it became a huge success. Les Vampires follows the exploits of a group of criminals who rob the rich and mesmerise the elite of France. The core gangster figure is the attractive woman Irma Vep (an anagram of "vampire"), personified by the actress Jeanne Roques. As she entered the screens in a tight black body dress, with heavily kohled black eyes and sinister makeup, she created a landmark in film-history, by being the first vamp on the cinema screen.

Jeanne of the Dark deals with the image of the vamp. The vamp personifies a complex crossroad of cultural images of gender and power. The idea of the femme fatale – synonym of the vamp – is transcultural and goes back far in history. The composition Jeanne of the Dark consists of four sections, each lasting precisely 12 minutes, except for Section 4 which lasts 18 minutes. They are titled:

1) Vampire
2) Eroticism
3) Cannibalism
4) Vamp

In this work the idea of the vamp is decomposed into three aspects that are hypothetically used as the carrying pillars of the *femme fatale*: vampirism, eroticism and cannibalism. Each of the first three sections is dedicated to one of them:

1) "Vampire"

A vamp is a woman with an irresistible sex appeal who seduces males, deprives them of self-control, and drives them to death while giving them sexual satisfaction. She is also referred to as man-eater and/or vampire, which carries cannibalistic connotations. The idea of the vampire went through innumerable variations through history. Today, however, the look which became popular at the beginning of the 20th century (Nosferatu for example) is also often associated with vamps. It is characterised by black clothes, often tight, while combined with a wider coat or cloak.

Vampires subsist by feeding on the blood of the living, and thereby killing their victims who are then reborn as vampires. Drinking the victim's blood carries cannibalistic as well as parasitic aspects. It is typical of parasites that the victim's life is not simply terminated. In the case of vampires the victim's life is transformed into the temporally unrestricted life form of the un-dead. Hence, there is also redemption at hand. With the vamp the act of redemption also takes on erotic and sexual aspects.

2) "Eroticism"
Eroticism is an aesthetic focus on sexual desire. Erotic depictions have been created by nearly every civilisation, ancient and modern. In early times, erotic depictions were often part of the indigenous or religious art of cultures and as such were not set aside or treated differently than any other type. The modern concept of pornography did not exist until the Victorian Era. The seductive power of eroticism has since early times been associated with evil, as which it is also found in the image of the vamp. Every civilisation has developed a complex codex of behaviours in order to control the power of eroticism and sexual drive. Erotic attraction is an essential aspect of the vamp, which functions as prey in order to catch the victim.

3) "Cannibalism"
Cannibalism as "sympathetic magic" is a subset of the general idea of eating a totem to absorb its distinctive power, much as a tiger penis might be eaten to promote virility. By consuming an enemy, it is often assumed that his powers are absorbed. Some also consider this idea to be at the root of the Catholic ritual of symbolically consuming the flesh of God at Holy Communion. In contrast to this, cannibalism was often unfairly attributed to other cultures in order to emphasize their low moralistic value – especially in colonial times when it was used as an argument to subdue other tribes. In this sense it is referred to as a barbaric act that is deprived of any sense of moral values.

The idea of cannibalism adds an interesting aspect to the idea of the "Vamp" as the man-eating female, which is for example evident in the idea of the *Vagina Dentata*.[11] This expresses the potential danger of sex – which is again a cross-cultural idea.

---

[11] "The *vagina dentata* or "vagina-with-teeth" is an ancient, widely known, if not widely discussed, mythical theme. It is also the subject of twentieth-century male dreams and fears. It is one of the most basic notions

4) “Vamp”

The last section of Jeanne of the Dark is titled “Vamp”. Here, the aforementioned aspects – vampirism, eroticism and cannibalism – are recomposed to restate the idea of the Vamp. Formally and musically this takes place by a literal superimposition of the previous three sections. Stylistically the first three sections are very different from each other, each deliberately making reference to a different style of music. What makes the fourth section special in comparison to the remaining three is that the diversity of the previous sections is annihilated through the superimposition in which the details of each music mesh and lock in with each other. Figuratively speaking, each section becomes the counterpoint of the others. During “Vamp” the first three sections are played back as soundtracks. Two instrumental “insertion” segments are subdividing the section. Except when playing these “insertions” the musicians are idle during “Vamp”.

The section “Vamp” is a resolving moment in the entire work as it literally brings back all the musics that were already heard but places them in an unexpected context. In reference to the Vamp this points out that despite the disparity and partly contradictory nature of its single aspects (vampirism/eroticism/cannibalism), they coexist in an apparently coherent form.

Alongside music, Jeanne of the Dark makes use of a video clip and light design. The video lasts three minutes and consists of various scenes taken from the original film series Les Vampires. The scenes were taken from different moments of the total 7 hours of film material, but chosen in such a way they form a short narrative. Excerpts from this video are already displayed during the first (“Vampire”) and second (“Eroticism”) sections. The video is shown in its total length only during the last section (“Vamp”). The video is displayed on a screen that is relatively small and therefore not too dominant (see picture underneath). It is incorporated in the setup of the total light design. Lighting is used in Jeanne of the Dark in order to support and illustrate the structural relationships of the musical materials. Primarily, it is used to visually anticipate the superimposition that musically takes place in the last section. Secondarily it is used to transfer changes of lighting in film sequences to changes of light intensities of lamps. Further below, this will be explained in greater detail.

Setup of the lighting

A white backdrop is used at the back of the stage area. Horizontally the backdrop is divided into five vertical strips that are illuminated by LED bars with mixable red, green and blue LEDs. A LED bar hanging above each strip illuminates its upper part, while the lower part is

---

underlying men’s fear of women. The *vagina dentata* visualizes, for males, the fear of entry into the unknown, of the dark danger that must be controlled in the ambivalent mystery that is woman.“ Raitt, Jill: “The *Vagina Dentata* and the *Immacultaus Uterus Divini Fontis*”, in The Journal of the American Academy of Religion, Vol.48, Nr.3 (1980), page 415.

illuminated by a LED bar that is placed underneath. This creates ten independently controllable colour fields. In addition, five LED-par lamps are hung around the backdrop and directed onto the walls and the ceiling of the concert space. They are used so that the light composition is not restricted to the stage area but that it can expand into the concert venue and better integrate it visually.

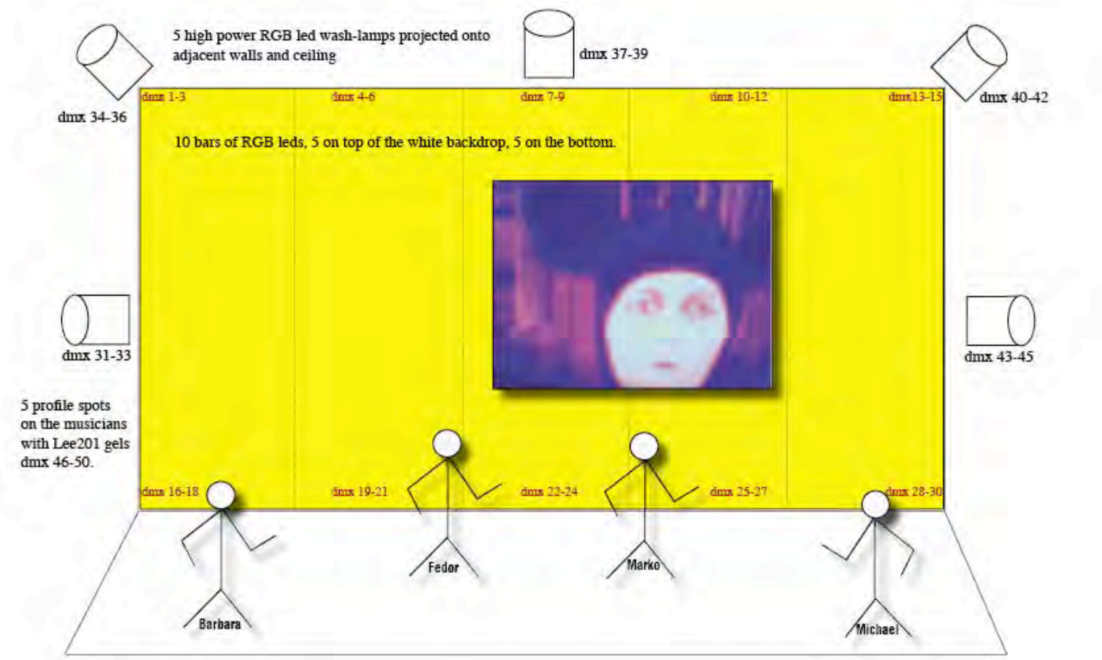


Fig. 4.16: schematic display of the setup of Jeanne of the Dark.

Fig. 4.17: photo from the premiere of Jeanne of the Dark on November 27, 2008 in Huddersfield. Here the various light sources can be recognised.

Use of lighting in Section 1 "Vampire"

Blue was chosen as the colour of this section. Vampires are active at night and blue is often associated as a colour representing nighttime. The reason of this lies in the higher light sensitivity of the eye's cones responsible for the detection of blue colours.[12] Therefore, at nighttime's low light intensities human tend to see everything in a bluish tint.

The music in this section makes use of analogue electronics, electric guitar and percussion based on sounds from a Rock Kit. It is predominantly upbeat. The reference to Rock music in "Vampire" comes from the fact that the clothing that is typical for vampires also bears many similarities with the so-called biker's look, a popular clothing codex in Rock and Heavy Metal music.

As mentioned above, film is a reoccurring element in Jeanne of the Dark and the medium from which the idea for this entire project evolved. In Section 1 the video that was composed of various scenes and that is displayed in its entirety in the last section ("Vamp") is transferred to the light. This takes place by assigning the changes of light intensities of certain areas of the film screen to the lamps. Hence, the entire lighting system serves as a large irregular film screen with a crude resolution of 15 pixels – the 5 par lamps and the two rows of 5 light bars. The following image displays the scheme of how the film screen (4:3) was transferred to the 15 lighting units in blue colours:

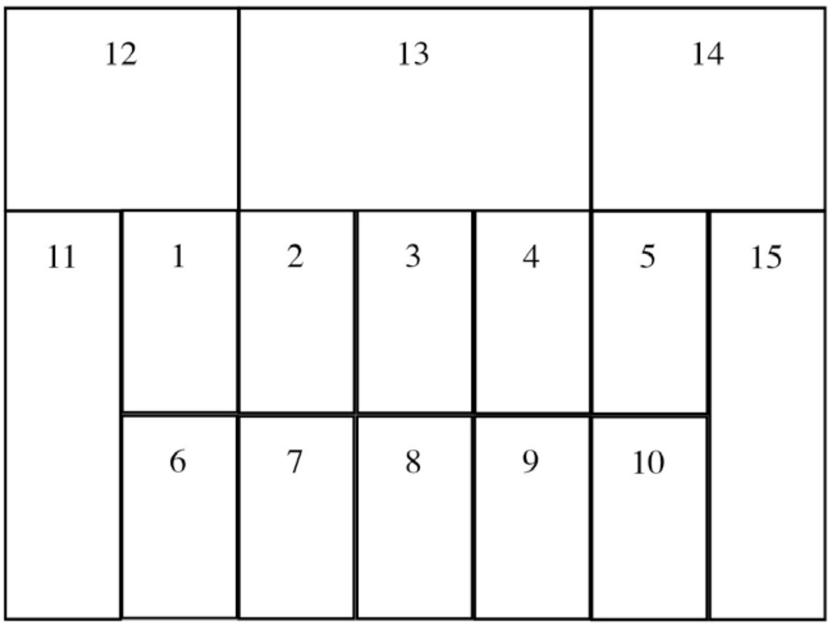


Fig. 4.18: The areas 1-5 and 6-10 are representing the light bars on top and bottom of the backdrop. Areas 11-15 are transferred to the LED pars.

Since the entire film is only 3 minutes long, as opposed to the 12 minutes of Section 1, the light changes were transferred to the lighting at a much slower speed. This speed was varied throughout the section so that the cuts of the scenes in the film were aligned with formal changes in the music. Thereby a formal correspondence between light and music was achieved, while the gradual light changes remain unrelated to the music. Naturally, it is not

[12] Gehring, Ulrike: Bilder aus Licht, Heidelberg: Kehrer Verlag (2006), 36.

possible to recognise any elements from the film. What remains from the transfer of film to lighting is a blue monochromatic field with irregular and changing intensities. Sometimes a shadow hushes across the field but no objects can be recognised as such. Most obvious are the moments where cuts occurred in the film. Then the light intensities of the blue colours change instantly, while gradual shifts are predominant during a single film shot.

What is the point in transferring film material to the lighting even though it neither has a direct correspondence to the music nor does it remain recognisable as a film? The lighting design that resulted from this procedure is very smooth and subtle. Formally, the intention was to keep the light relatively unobtrusive in the first section as it becomes more prominent in the sections to come. At the same time the objective was to create a connection between the filmic material and the lighting. Although this relationship is not recognisable on a conscious level, it is assumed that the aesthetic principle can be carried over to the lighting. This principle can be described as the opposition between the sudden changes in the moment where cuts in the film took place and the subtle shifts of intensities and movements of shadows within the shots.

<u>Use of lighting in Section 2 “Eroticism”</u>
The colour of Section 2 is red, the colour of love but also the colour of prostitution districts where sex is a commercial product. The music in this section refers to muzak, a style of music, which is supposed to control consumer behaviour and stimulate expenditure of money. Similarly, sex is used in advertisement in order to attract attention.

The music of Section 2 is often calm and restrained, always sweetish, almost sappy. However, in contrast to the music, the lighting is rather restless and active. The entire light-design in this section is a direct translation of the music from the first section onto light changes. Since Section 1 was rather active and dynamic, it leads to a result that is a strong contrast to the music of Section 2. At the same time all the sections 1, 2 and 3 are composed in such a way that they correspond with each other formally and rhythmically, so that they fit together in Section 4. As a result of that also the lighting that is visible in Section 2 formally corresponds very well to the pace and changes of the music.

The music from Section 1 was transferred to the lighting by translating the changes of dynamics in the music to changes of intensities in the light. A loud sound leads to a high light intensity, a soft sound to a soft light intensity. This process was not applied to the overall music but to every individual instrumental part. Furthermore each instrumental part was split up in the dynamic activities of the high register and the low register. The electronic part was even split up in three parts, for the high, middle and low register. In Section 2 the following arrangement from Section 1 was transferred to individual sequences of light changes:

- Electric violin high register;
- Electric violin low register;
- Electric guitar high register;
- Electric guitar low register;
- Percussion high register;
- Percussion low register;
- Electronics high register;
- Electronics middle register;
- Electronics low register.

The generated light sequences were then applied to the red lights of the individual lighting fixtures in the following way:

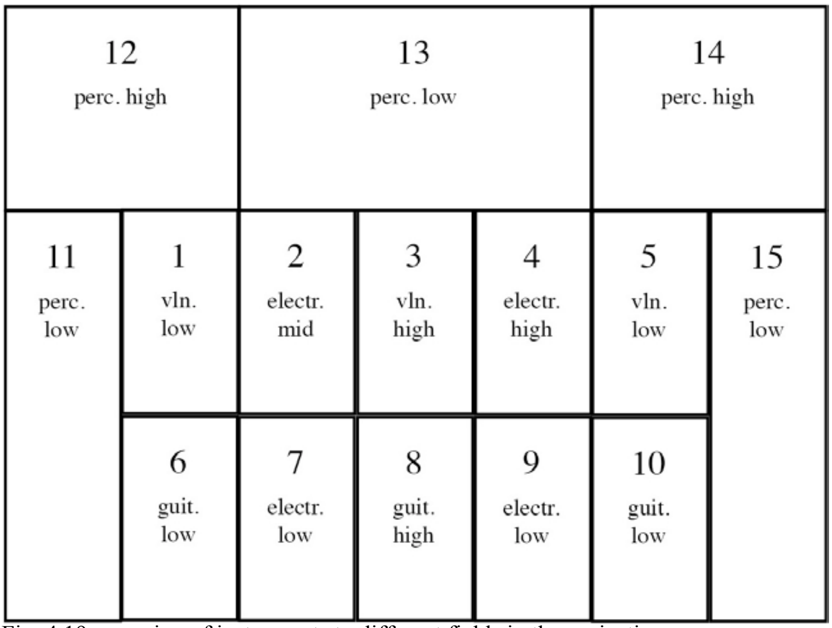


Fig. 4.19: mapping of instruments to different fields in the projection area.

The percussion part is placed exclusively on the LED pars that illuminate the walls and ceiling of the space. Since the percussion part here consists of only loud sounds and many single hits, the choice of lamps emphasises the dramatic character of this part by projecting it into the space and not merely on the backdrop. The percussion part also contains many rests, hence the flashes into the space turn out to be even more striking.

In ‘Eroticism’ the light design creates a counterpoint-like texture in relation to the music. As it was explained above, it is very contrasting in terms of activity, speed and intensity. At the same time it is closely linked to the pace and formal structure of the music.

Potentially, the rhythmic motives from Section 1 might at times even be recognised by the attentive viewer and listener. Hence, the lighting already prepares and anticipates the musical superimposition that is going to happen in Section 4. By doing this, it has a significant structural function in the overall work.

Use of lighting in Section 3 “Cannibalism”

The colour for Section 3 “Cannibalism” is yellow. Unlike the previous sections, where the colours blue and red respectively were added to a non-illuminated background, white light is the point of departure in this section. Technically, the white light is obtained by mixing red, green and blue LEDs in the fixtures. In Section 3 various shades of yellow are obtained by reducing the amount of blue that is mixed in the white light, which leaves red and green to predominate. The mixture of red and green yields yellow.

This section distinguishes itself from the former two sections in yet another significant point. Just like ‘Vampire’ and ‘Eroticism’, it is composed in such a way that it will fit exactly with the other sections when it is superimposed, but only when it is played in reverse.
Hence, the entire formal build-up is mirrored when compared to the other sections. Since it is only revealed in Section 4 that the previous sections fit together when played on top of each other, the fact that the form is reversed in Section 3 does not play a role when hearing this section by itself. It does play a role, however, for the light design.

In Section 3, it would have been a logical step to apply the same principle to the light design that was used in Section 2, where Section 1 was displayed visually while Section 2 was played musically. But since the structure of Section 3 is reversed, it would also have been necessary to reverse the light design to make it fit with the music. It is an important aspect of the light design in Section 2 that it can at least potentially be recognised as being derived from Section 1. If the light design was reversed, this would in my opinion make it impossible to draw the connection to the music that was previously heard. Therefore a different approach for the light design was chosen for Section 3.

Music that is played in reverse can most easily be recognised by percussive sounds with an attack and decay. When played in reverse, these sounds are characterised by a dynamic shape of a reversed saw-tooth: they start out from silence, gradually become louder and stop with a cut-off accent that often has a suffocated quality. This is the most typical backward sound and is almost impossible to realise in the same way in “forward-time”. The music of Section 3 also contains many percussive sounds that return in Section 4 with exactly that character.

The light design in Section 3 was composed by making a compilation of all percussive musical events from Section 1 as well as 2. Therefore all these sounds – when translated to light – would have appeared as a sudden upward jump in intensity, followed by a fade-out of different durations. In order to make this fit formally with the music of ‘Cannibalism’ all light sequences that were derived by this principle were reversed. Hence, on a visual level the same change of intensity that is typical for backward-sounds was obtained: a gradual increase of intensity starting from a low point and a sudden cut at a higher intensity. This visual “backward sound fingerprint” already alludes to the reversion of the music that is following in Section 4. In my opinion this reversed saw-tooth shape of intensity is so clearly recognisable, that a connection can be drawn from its visual to its acoustic manifestation.

While excerpts from the aforementioned film were used in Section 1 and 2 – each time tinted in the colour that was chosen for the section – no film was used in Section 3. Instead, another conversion of the film was translated to the lighting, similarly as in Section 1, but now at the original film speed. The light design in Section 3 therefore combines the two principles that were used in the light designs of the previous sections: the translation of sonic events to lighting and the translation of cinematic light to the light setup.

For the reversed sounds that were turned into light sequences, only the light bars on the white backdrop were used, not the lamps pointed into the space. For the ‘film sequence’ lighting, however, the entire light setup was used. Through this, a spatial expansion is achieved when switching from the first principle to the second.

Use of lighting in Section 4 “Vamp”

As was mentioned above, Section 4 “Vamp” consists of a simultaneous playback of the first three sections, while Section 3 is played in reverse. The musicians do not play during the playback except for two so-called “Insert” segments that are interwoven in Section 4. This is why Section 4 lasts 6 minutes longer than the previous three sections. These insertions emerge out of the playback texture in a seamless way. They function as marking points, dividing the entire section “Vamp” into three blocks.

As in Section 3, white light is used as the basic lighting on the backdrop. While the musicians are not playing, the 5 LED bars at the bottom of the backdrop are not used. As a result, the active visual area is above the musicians: the 5 LED bars on the top of the backdrop and the 5 lamps pointing into the space. This draws the visual attention away from the playing area:

Fig. 4.20: photo from the premiere of <u>Jeanne of the Dark</u> on November 27, 2008 in Huddersfield. The lower part of the stage where the musicians are standing is not illuminated in the beginning of Section 4. In this photo the fixtures that are pointed into the space cannot be seen.

In Section 4 the individual layers of the music – which consist of the preceding Section 1, 2 and 3 – are paralleled by the lighting one at a time. For this purpose again the single dynamic extractions of the individual instruments are used, like in Section 2 and – partly – in Section 3.

The light units project white light as a point of departure. Until the first instrumental interlude, Section 3 is visualised with its characteristic yellow colour – again achieved on the backdrop by reducing the blue component of the white. Between the first and second interlude, Section 2 is visualised with its characteristic red colour, which is achieved on the backdrop by reducing green and blue, leaving red as the predominant colour. Eventually Section 1 is visualised with its blue colour, achieved on the backdrop by reducing red and green, leaving blue as the dominant colour. The fixtures that are projecting into the space do not use white light as a point of departure but use the colours yellow, red and blue directly. Therefore these lamps are flashing more erratically, while the colour changes on the backdrop appear as more homogeneous shifts in the colour spectrum.

The direct doubling of sound and light in this section was chosen in order to isolate the single musical layers. Thereby the superimposition that provides the basis for this section is visually emphasised. In Section 4 also the film comes back, now in its complete form. Here the film is in black and white. Live-spoken dialogues are added to the interactions of the characters in the film, which underlines the feeling in this Section that something has come to completion – metaphorically, the Vamp has been recomposed.

The doubling of sound and light creates *intrinsic* references between these two media. Since the lighting is a direct translation of either film or dynamic behaviours of physical instruments, all the elements are *extrinsic* as well, since they are referring to something which is not immanent in the medium itself.

4.1.5 Corrosion

for analogue electronics and laser reflections, 2009 (13').

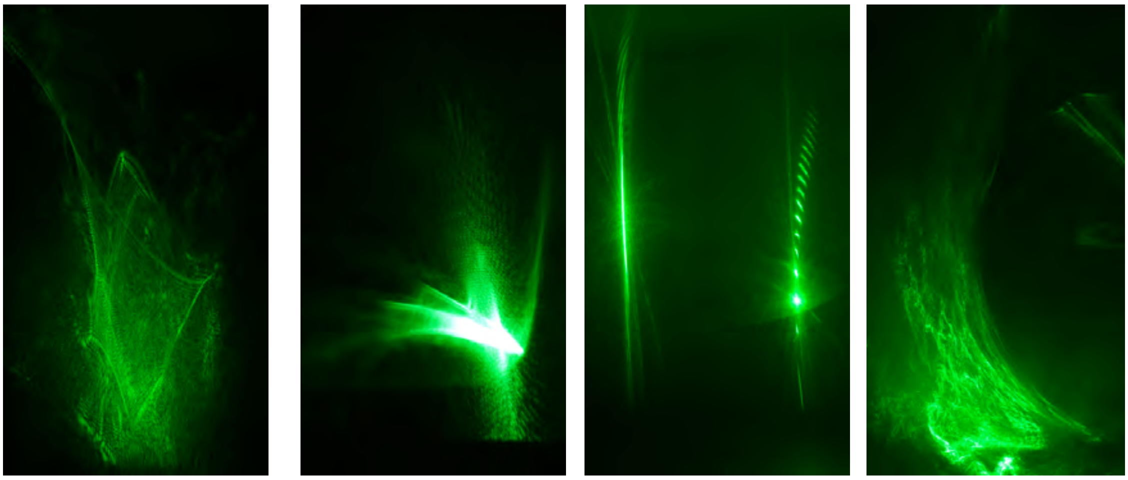
Laser tends to be a rather dominant medium with a tendency to the spectacular. In Corrosion I am deliberately using it in a simple and low-scale fashion. Scanning[13] is used rather minimally; instead, the visuals are primarily obtained by reflecting a point-shaped beam of laser from four different materials onto a larger projection area. The visible result is a large augmentation of the small surface of material hit by the laser beam. The four different materials used for the reflections in Corrosion are:

- A liquid of a 50/50 water and vinegar mixture,
- a black wax-crayon,
- the reflective surface of a CD and
- a glass cylinder.

The former two are dynamic materials. The water/vinegar mixture is vibrating because it is exposed to some wind coming from the ventilation inside the laser projector. Therefore the projected image is always in a slight motion. Furthermore the liquid entails a constantly alternating texture. This is due to the fact that water and vinegar do not mix, therefore the surface of the liquid is inconsistent and contains bubbles of the vinegar in the water. When the laser hits a vinegar bubble it reflects differently than from water. The black wax-crayon on the other hand is also a dynamic material as it slowly melts when it is exposed to the laser and therefore also changes its surface structure. The colour black is chosen because it absorbs best the energy of the laser beam and therefore builds up heat. As the surface structure changes due to the increase of temperature, so does the reflected image.

Contrary to the liquid and the wax, the CD and the glass are static. Because of their strong reflective qualities, they are dispersing the laser light over a larger area and are therefore used as expansive materials, while the former two are contractive.

[13] The laser beam itself only emits the light as a concentrated point-shaped beam of light. The scanning device in a laser projector consists of two mirrors that can direct the laser point to different directions. Through fast motion it can create the illusion of smooth graphic images. See also the remarks about laser in Chapter 4.1.2.



Reflections from wax water/vinegar CD glass cylinder

Fig. 4.21: reflections of a laser beam from various surfaces as used in Corrosion.

In Corrosion the performer is integrated in the visuals by standing in the centre of the field where the laser projections are reflected. His[14] silhouette can be recognised most of the time and some of the reflections are displayed also on the body and clothes. The effect of the visuals works best when the piece is performed in complete darkness. This means not only that the performer has to play it from memory but that he largely has to control the synthesizer blindly, knowing exactly where to find which button or switch on the synthesizer's control panel and navigating on it by relying on the sense of touch.

In Corrosion I am exploring sound and light textures while searching for "haptic" qualities. The haptic quality is the impression that different material surfaces give to the skin. Along the visual and aural senses I am therefore including a third one as a frame of reference, namely touch. As both sound and light are immaterial, the reference to haptic impressions can only serve as a poetic or metaphoric idea, not as a concrete experience.[15]

Haptic impressions primarily distinguish the following three qualities:

- Rough/sharp;
- Soft/smooth;
- Continuous/irregular or spiky.

Translated to the sonic range, this can lead to a multitude of sound textures.

In the first two sections I am working with quick pulses, often at irregular speeds. These pulses are at first very short and fast, giving a grainy and porous impression without revealing

[14] I have composed this piece for myself and it is not likely that it will be performed by any other person. Therefore I am referring to the performer as male.

[15] Sound can very well be experienced haptically when the vibrations are strong enough to be felt by the skin or the bones. However, the volume levels at which Corrosion is performed do not entail this experience of sound in a substantial amount.

the actual sound source. The pulses gradually get longer. With the increased duration it is revealed that recordings of ambient sounds are the underlying sound source. It is noteworthy that the pulses by themselves function *intrinsically* in the piece as a whole, as they refer to various rhythmic variations of pulsating textures that are yet to come. At the same time the recording that underlies the pulses is *extrinsic.*[16] During these pulses, a laser beam is reflected from a small and flat container filled with the water/vinegar mixture. Here, the laser beam is scanned so that it forms a straight line that reflects from the liquid surface, instead of a single point. As mentioned above, the liquid is positioned in front of the laser beamer in such a way that it is exposed to the ventilation wind of the device. Hence, it is irregularly vibrating. As a result the laser light is not reflected as a straight line but as a wavy line in continuous motion. In this section I am deliberately combining sonic and visual textures in such a way, that the brain keeps constructing causal connections between the two. The irregular gliding motion of the water surface gives the impression as if the laser reflection was a direct visualisation of the smoothly shifting irregularities in the sonic pulses, even though there is no interactive process at hand.

The first section lasts almost 2 minutes and 30 seconds and only works with the pulses that are based on ambient recordings made at a baseball game. This ambient recording contains social interactions, people talking and cheering, and some background music. Only by the end of the first section is pitch material slowly introduced in addition to the recording. The first section is separated from the next one by a high pitch, followed by 5 seconds of tightly cut up segments of different ambient recordings. The cut up character connects well with the preceding pulses but also introduces more diverse sonic material. The laser is turned off during this transition – hence the space is dark.

The second section is slightly shorter than 2 minutes and is based on similar visual material, only now the line shaped by the laser is more actively moving to different positions on the liquid surface and the line is flipped by 90 degrees. This entails different reflections and a different pattern of movement. The music is also still pulsating but more regularly. The sound material is now predominantly pitch-based and moves through a succession of justly intoned chords. The chords are based on interval ratios that are adjacent harmonics. They start with higher harmonic ratios and descend stepwise: 8:9:10, 7:8:9, 6:7:8, 5:6:7 and 4:5:6 while the lowest note of each chord is always a c#. In between each of the chords, the 4:5:6 ratio is always played, but then with different notes as its root. The complete chordal series is:

[16] The *extrinsic* quality is given as long as the sound source is recognisable. During a certain period of *musique concrète,* some composers generally tried to camouflage the sound's origin in order to emphasize its sonic quality and prevent the listener to categorise it according to its origin. This working method intentionally circumvents the perception of the *extrinsic* quality of a sound.

Lowest note:	c#	e	c#	f#	c#	g#	c#	c#
Interval ratios:	8:9:10	4:5:6	7:8:9	4:5:6	6:7:8	4:5:6	5:6:7	4:5:6

During all chords that are not in the relatively consonant 4:5:6 ratio, ambient sounds are also combined along with the pulsating pitch material. Here the ambient sounds stem from recordings made in an amusement park. Again social interactions can be heard, people talking and children screaming for joy on carousels.

Again, a high pitch and 5 seconds of tightly cut up segments of various ambient recordings separate the second section from the following one. The laser is again turned off during this transition.

In the almost 4 minute long third section the black crayon is used as the reflecting material for the laser. The laser beam is static, and only briefly diverts every 47 seconds to other materials. During this diversion, lasting 5 seconds every time, the laser beam quickly jumps across the glass cylinder. For the first time the laser beam is visually expanded by using one of the static reflection materials. This condensed visual texture appears as a translation of the transition sections, where sonic material was cut up. This is a typical example of a contrapuntal use of light and sound. Corresponding textures in light and sound are used in relative temporal proximity without being aligned. They are carrying characteristics in their own medium that can well be associated with the other. While the laser alludes to the transition section, it also already anticipates the upcoming two sections that concentrate exclusively on the static reflection materials. All of these references are of *intrinsic* nature.

During the 47 seconds that the laser beam rests on the crayon, the melting process of the wax results in organic changes of textures. Here, the music consists of long single notes that are joined by two additional ones, adding up to three-part harmonies. No pulses are applied, although the harmonies are chosen in such a way that beatings are resulting from the chosen intervals. The harmonies are again in simple ratios, namely 9:10:11, 8:9:10, 7:8:9, 6:7:8, 5:6:7 and 4:5:6. While the middle note of a chord sequence remains static, a ring modulation of the other two is added to the harmony. Ring modulations of intervals in just intonation create frequencies that mix with the original pitches relatively harmonically.

The complete chord sequence used in section 3 is:

Middle note:	c#	c#	c#	c#	c#	c#	e	e	e
Interval ratios:	9:10:11	8:9:10	7:8:9	6:7:8	5:6:7	4:5:6	6:7:8	5:6:7	4:5:6

then the middle note is replaced by a fast pulse

fundamental for other notes:	g#	g#	g#	g#	g#	g#
Interval ratios:	9:(10):11	8:(9):10	7:(8):9	6:(7):8	5:(6):7	4:(5):6

Once again, a high pitch and 5 seconds of tightly cut up segments of various ambient recordings separate the second section from the following one. The laser is again turned off during this transition.

The next two sections altogether last about 2 minutes and further develop regular pulses, similar to what was already introduced in section 2, but now at a higher tempo and with a strong sense of groove. Also the dynamics and the brilliance of sounds are increased. The harmonic scheme draws from the same harmonic principles. Here again the middle frequency is fixed:

Middle note:	c#	c#	c#	c#	c#	c#	c#	c#
Interval ratios:	7:8:9	6:7:8	9:10:11	5:6:7	11:12:13	4:5:6	13:14:15	3:4:5

This chordal progression is repeated twice (thus played altogether three times), each time with a more condensed rhythmisation. During the fourth section the laser is alternatingly using the CD and the glass cylinder as reflection materials. After the rather long section 3, where primarily the spatially constrained reflection of the wax crayon was used, this expansion of light comes as a rather dramatic change. During the fifth section – which also contains the last repetition of the harmonic progression – the laser returns to the liquid. It remains restless, jumping rapidly between two areas on the liquid surface. The motion is intensified because of the aforementioned vibration of the liquid surface and the inconsistent mixture of water and vinegar. Similarly to the beginning of the piece, the combination of pulsating music with the quickly moving laser reflections comes across as a direct correspondence between the music and the visuals.

The concluding two sections last again slightly more than two minutes. The laser remains on the dynamic materials, first returning to the wax crayon and then concluding the piece on the liquid. In the sixth section the music is a variation of the first section, where ambient recordings were played back as quick and short impulses. Here the ambient recording originates from traffic noise, again interspersed with sounds from interacting people. After this relatively brief section, pitched pulses are added to the ambient sounds that are now unprocessed. The same chordal sequence is used as in the third section:

Lowest note:	c#	c#	c#	c#	c#	c#
Interval ratios:	9:10:11	8:9:10	7:8:9	6:7:8	5:6:7	4:5:6

Similarly to the otherwise more static third section, the pulsating chords are combined with a ring modulated sound of the upper two pitches.

The composition ends in darkness with the sound of the ring modulation and the ambience sound that is now passed through a pulsating filter. Both sounds gradually fade out.

In two different ways, the use of laser in Corrosion gives an example of visual noise. Firstly, the quick movements of the reflections, most notably in the fourth section, are a form of *liminal* noise, as the speed surpasses the ability of vision to follow it in detail. Secondly, the reflections from the wax crayon give a strong impression of impurity. The visualisation of the slow disintegration of the wax in the laser beam directly translates the material's melting condition. Can this be called a form of visual dirt? It is certainly not an example of *liminal* noise since the visual sense is in no way offended or challenged in its perceptual capacity. It is also not an instance of *contextual* noise as there is no material introduced that stands in opposition to the rest of the applied visual "vocabulary". What is visible is associated with haptic experiences of materials that are in a state of decay. It is the recollection of tactile experiences made in the past that are reawakened by the image of the wax. The reflection of the wax is *extrinsic* because it displays the interplay of a material condition and heat, aspects that are neither inherent in the visual nor in the auditory medium. That chemical process entails associations with a different category of haptic experiences. The result is therefore *extrinsic* noise.

4.1.6 Dromomania

for two pianos, electronics and three moving head lamps, 2009 (40').

From the program notes:

> In the composition Dromomania, travelling represents the modern metaphor for the ephemerality of being, which was the traditional theme of the Still Life in Renaissance painting. Through technology today's travelling times have shrunk from matters of months to hours. However, the frequent traveller has thereby become the passenger of a transitory space, suspended between departure and arrival point, in often crowded but nevertheless uninhabited transit zones like airports, train stations or bullet-shaped vehicles. The ease of travelling tends to turn the arrival point into just another transit zone, and the traveller into a displaced subject – liberated from a stationary existence but also alienated through the lack of arrival. The frequent voyager experiences the temporality of space and location and how the profanity of travelling can turn metaphysical. Metaphorically speaking, the trip becomes a Still Life in incessant motion.

Dromomania is divided in 7 sections, with three main sections that are played live by the pianists. The remaining four sections are short pre-, inter- and postludes for pre-produced electronics. Each of the three main sections is dedicated to one means of travelling:

1.	"Preludium",	electronics,	± 2 minutes
2.	"Wheel",	two pianos and electronics,	± 10 minutes
3.	"Interludium #1",	electronics,	± 3 minutes
4.	"Wing",	two pianos and electronics,	± 10 minutes
5.	"Interludium #2",	electronics,	± 3 minutes
6.	"Prow",	two pianos,	± 10 minutes
7.	"Postludium",	electronics,	± 2 minutes

"Wheel" represents travelling by land, "Wing" by flying and "Prow" by the sea. The light design in this piece is realised by three LED moving-head lamps. In order to make the various colours and shadings of light visible, a white backdrop is hung at the back of the stage area. The LED lamps have red, green and blue LEDs and are therefore capable of producing all RGB based mixtures of colours. The moving-head technology allows remote panning and tilting of the lamp. Hence, in this piece motion is an additional aspect of the light design. During the instrumental sections the use of lighting is very reduced, usually confined to a single movement or type of movement of a single moving-head lamp that is stretched over the entire duration of the movement. The pre-, inter- and postludes are the sections where the lighting is more elaborate.

Since Dromomania contemplates the passing of time during the process of travelling, the light design is based on two types of motion that are derived from time measuring or signalling devices: the clock and the bell. Derived from the clock is a clockwise horizontal pan motion, emulating the motion of clock-hands. Derived from the bell is the vertical pendulum motion. These basic types of motion are on one hand generic, on the other hand also *extrinsic* in their references.

The lamps are positioned on the floor in one line parallel to the front edge of the stage area with a distance of 2-3 meters from lamp to lamp. When pointed at the pianos, various shadows of the instruments become visible on the white backdrop at the back of the stage area.

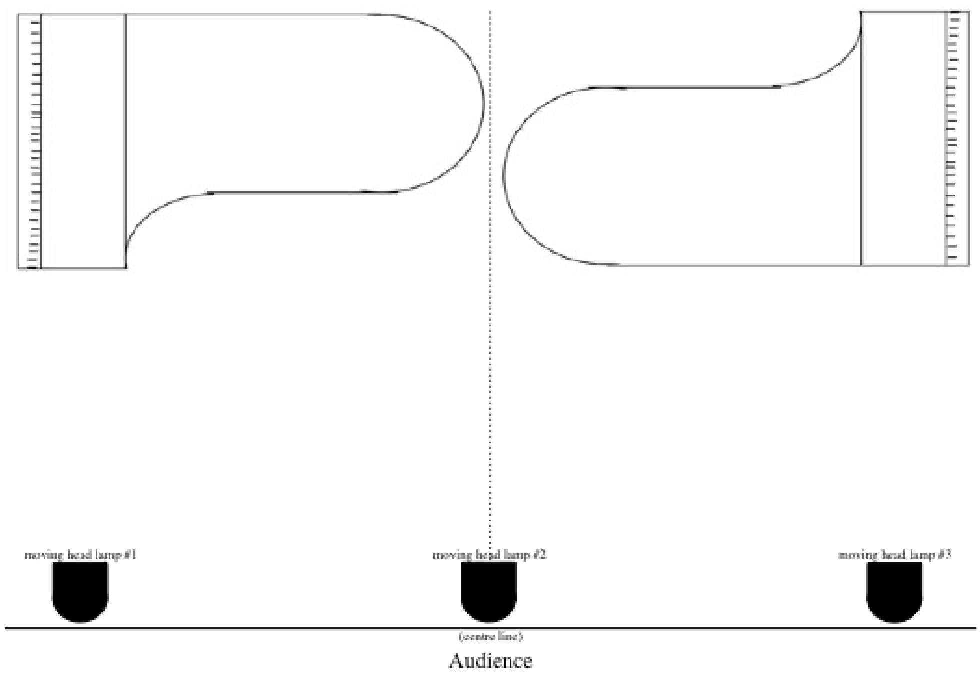


Fig. 4.22: position of grand pianos during the section “Wheel” from Dromomania.

While this is the set up of the grand pianos during “Wheel”, the pianos are moved during each of the interludes. During “Interlude #1”, the left piano is turned away from the other instrument, which is also the set up with which the section “Wing” is performed:

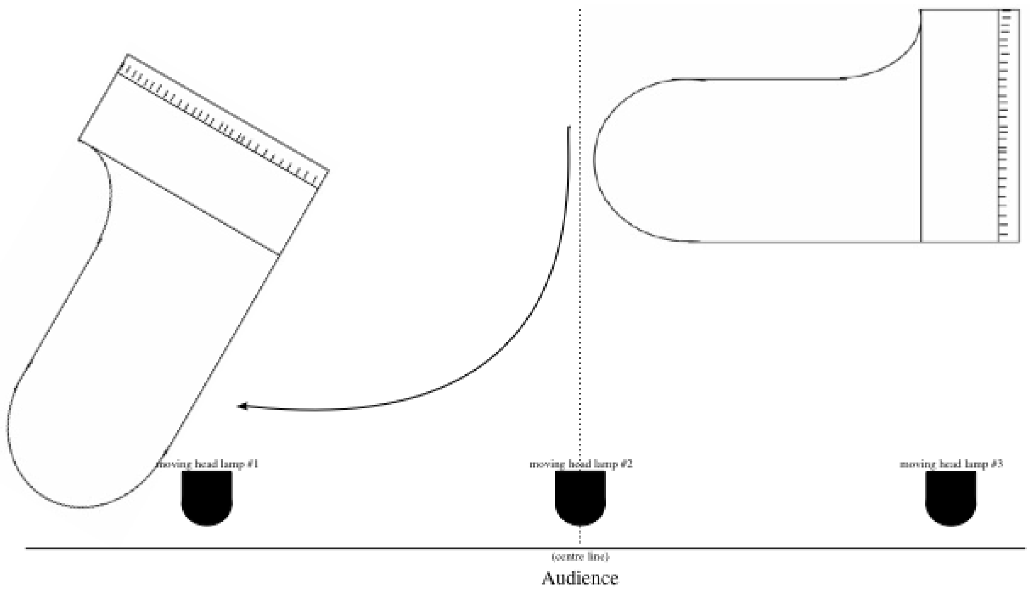


Fig. 4.23: position of grand pianos during the section “Wing” from Dromomania.

During “Interlude #2”, also the right piano is turned away, which remains the position of the instruments during the section “Prow”:

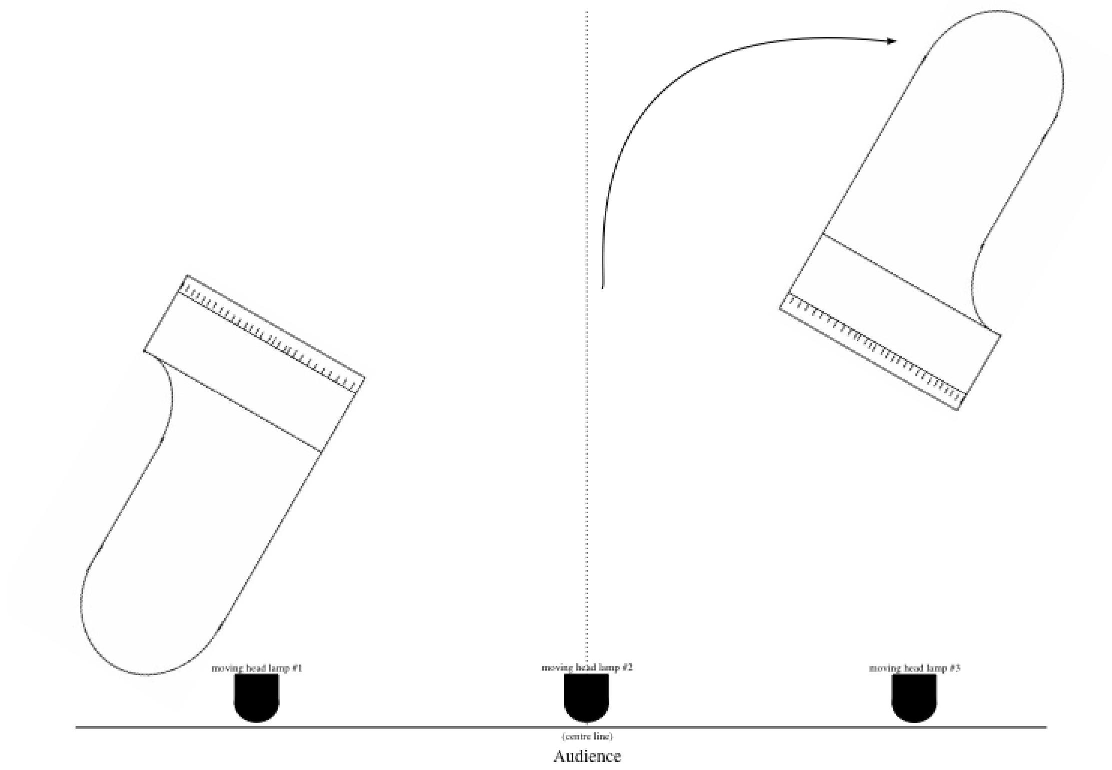


Fig. 4.24: position of grand pianos during the section “Prow” from <u>Dromomania</u>.

The different positions of the pianos also cause different constellations of shadows to occur. Furthermore, they entail other modes of communication between the players. During “Wing” the pianist at the right piano can still read the motions of the pianist at the left piano but not the other way around, as the latter is turned with the back towards the former. In “Prow” neither of the players can see the other one. The timing of the sections has been composed by taking these modes of communication into consideration.

The use of lighting in <u>Dromomania</u> will be exemplified by taking a detailed look at “Wing” and “Interludium #2”.

As mentioned before, the light design is mainly concentrated on the pre-, inter- and postludes. A large part of “Wing” is performed by both pianists playing the left piano at the same time. The section is characterised by sounds that are produced inside the piano, which are amplified by microphones that the pianists operate manually. It is not until m. 115 that also the right piano is used. During the predominant part of “Wing” (mm. 1-207) only lamp 3 is used which performs a single, very slow vertical tilt, with turquoise colour. The tilt starts with the lamp being pointed to the audience but at a very low intensity, so that it does not cause blinding. The tilting motion ends by pointing at the left side of the backdrop, opposite to where it started. The slow performance of this simple motion was chosen in allusion to stellar changes of light, that also express the passing of time and that happen at a very slow pace.[17] In the last five measures of this section (mm. 207-211) an electronic pre-produced sound fades in that is eventually cut off with the beginning of "Interludium #2". This *crescendo* is accompanied by a slow fade-in of all three lamps with yellow colour that are now pointed at the backdrop. Like to the music, the lights are suddenly cut off with the beginning of "Interludium #2".

"Interludium #2" starts with a melodic phrase that has also played an important role in the preceding section "Wing". However, at the beginning of "Interludium #2" it is arranged as a joyous dance music, reminiscent of amusement parks. Stylistically this creates a blunt contrast to the often detailed and delicate sonic textures of "Wing". At m.7 a non-synchronous fast-moving melodic variation of the phrase is added and until m.12 the dance music has fallen to the background while a pulsating synthetic sound was introduced which carries on in the following segment. This new segment starts with m.12 and is introduced by a 5-note motive, which comes back several times. During mm. 1-11 the moving-head lamps are pointed at the grand pianos. Lamp 1 is producing a stroboscopic flickering with a strongly dimmed yellow colour. Lamp 2 is not flickering and initially set to a red colour at a larger intensity than lamp 1. Hence, the red colour field dominates but contains a rather subtle flicker. From mm. 7-11 the red colour is gradually intensified and desaturated until it becomes white. With the last note of the 5-note motive it reaches its peak in intensity and leads to the second segment. Lamp 3 remaines turned off until that moment.

Fig. 4.25: Image from "Interludium #2" of <u>Dromomania</u>, performance in Theater Kikker in Utrecht on 20/11/09.

[17] Since this section refers to travelling by air, the allusion to stellar constellations was also chosen, since planes can also look like flashing stars, when viewed from the ground.

The flickering of lamp 1 during the opening measures creates two connotations. In combination with the joyous music, it evokes the image of amusement parks that also often use quickly changing light patterns on carousels and in galleries. However, once the pulsating synthetic tone comes up after m. 6, the flickering also connects with the pulsation as a direct visualisation of the sound. The flickering therefore simultaneously carries an *intrinsic* reference, because it connects with the sound on a structural level, and an *extrinsic* reference, as it takes up the atmosphere of amusement parks.

The second segment of "Interlude #2" lasts from mm. 12-32. The 5-note motive leads into this segment, is repeated three times and eventually leads with a motivic variation to the next segment. In between the 5-note motifs, a processed, unintelligible speaking voice is heard. These two elements – the 5-note motive and the speech –refer to announcements in train stations or airports. Often public announcements are introduced by a simple melody. Accordingly, short melodic motifs are a reoccurring element in all of the pre-, inter- and postludes. Towards the end of the piece they also provide the basis for a larger segment in the 6th movement "Prow" (mm. 185-241). The speech refers to the actual announcements made in public places, which also often have a low sonic quality and are therefore hard to understand.

The lighting during this segment is still composed of flickering and static light sources. Lamp 2 changes back to static red and is now flanked by lamp 1 and 2 that are set to white flickering light. The flicker frequency is not the same with lamp 1 and 3 so that the result is rather a restless texture than a rhythmisized image. While lamp 1 and 2 were pointed in the same direction during the opening of "Interludium #2", lamp 1 and 3 are now turned slightly towards the sides of the stage area. This results into a rather static colour field in the middle of the backdrop that overlaps with the flickering light sources on the sides. The flickering remains unchanged until m. 27, while lamp 2 gradually changes the colour from red to white and then quickly back to red. These colour changes are lined up with the blocks of speech that are divided by the 5-note motive and that are also harmonised differently with the pulsating synthetic sound. From mm. 27-31, also the flickering lamps slowly change from white to red. The flickering light retains its two-fold meaning in this segment: on one hand it carries on the amusement-park association (the joyous music is still present in the background although strongly filtered and at a low volume). On the other hand it is still a direct visualisation of the pulsating synthetic sound that provides the harmonic texture in this segment.

The third segment lasts from mm. 32-62. Here the voice, the dance music and the pulsating harmonic field stop. What remains is a regularly paced smooth alteration of harmonic fields. At the beginning of this segment lamps 1 and 3 turn off. Lamp 1 fades back in as a static yellow light from mm. 34-37. It is panned all the way to the left side of the backdrop and during the entire duration of this segment (almost 40 seconds) very slowly pans to the right side. Lamp 2 retains the colour red and also its middle position but also performs a slow pan from the middle to the right for the entire duration of the segment. Slightly later, from mm. 40-42, lamp 3 fades in as a static turquoise light. It is also panned all the way to the left and pans to the right during the course of the segment. At the beginning of the segment the backdrop is yellow on the left (lamp 1) and red in the middle (lamp 2). After m. 40, when lamp 3 starts to fade in, lamp 1 has already moved a little to the right. When lamp 3 is fully turned up the backdrop is therefore divided into three colour fields: turquoise on the left (lamp 3), yellow next to it (lamp 1) and slightly to the right of the middle red (lamp 2). By the end of the segment all three lamps point roughly at the same area on the right side of the backdrop. The mix results into a whitish colour. As the singular colours gradually start to overlap, various colour mixes become visible before all three merge to white. All the slow pans from the left to the right are instances of the clockwise-motion element that is one of the aforementioned principal design patterns of the lighting, used in this work.

The fourth and final segment of this interlude lasts from mm. 62-98. It is introduced with yet another variation of the 5-note motive from segment 2, which is here extended to seven notes. Musically, the entire segment is harmonically static. Slowly a pulsating sound fades in, which is the dominant sonic component by the end of the segment. Also the processed voice rejoins, this time at an even lower dynamic level. In this segment all three lamps are switching from the horizontal lighting to the vertical pendulum motion, which – as mentioned above – is the second principal design pattern for the lighting in this work. All the lamps are set to white colour. In the beginning of the segment, they are at first pointed straight to the ceiling and very gradually start to perform the pendulum motion, each lamp at a different speed and with differently paced increments of the pendulum motion. After the pendulum motion reached a certain intensity it is again reduced stepwise until the lamp comes to a halt. Again, each lamp has its own pacing with regard to how the pendulum motion increase and decrease again. Lamp 1’s first pendulum phrase lasts from mm. 62-75 and moves the quickest of all three. After a rest of three measures it performs a second pendulum phrase, which lasts from mm. 78-90. A third phrase starts at m. 92 but is then interrupted at the end of the section at the height point of the pendulum motion. Every 4 measures lamp 1 also performs a short burst of stroboscopic flickering for the duration of a sixteenth note. Lamp 2 moves the slowest in this segment and contains only a single pendulum phrase lasting from m. 62 until the end of the section. It also performs a short stroboscopic burst every 22 quarters. The pendulum phrases of lamp 3 last from mm. 62-79 and 83 until the end of the section. Stroboscopic bursts are performed every 16 quarters. In this segment all three lamps are consistent in their colour and the motion patterns, yet the motions and the stroboscopic bursts are not lined up, but arranged in shifting phases. As mentioned before, the pendulum motion alludes to the movement of ringing bells that have historically been used as a time measuring and time signalling device.

The relationship between sound and light in “Interlude #2” goes through different phases. The stroboscopic flicker maintains a tight connection between the lighting and the pulsating sound during the first two segments, while the flicker is also reminiscent of the atmosphere of amusement parks. Generally speaking, stroboscopic light is a form of *liminal* noise, since the rapid changes of light intensities are challenging for the eyes to process. By creating the *extrinsic* reference to amusement parks, though, it is associated with an environment where light patterns of this kind are not perceived as offensive but rather as part of a relaxing ambience. Hence, also in the context of this piece the experience of the flicker is tamed. Through the connection with the pulsating synthetic sound it furthermore becomes structurally embedded and therefore part of the idiom.[18]

During the third segment the slow pannings of the light are not exactly timed with the harmonic changes in the music. However, since the music has a rather floating character, the light does not appear as a contradiction to the musical pacing. In the last segment the sound and light are most independent from each other. Even though the phrasings of the music were partly rather long in the segments 1-3, the underlying tempo could clearly be felt at all times. Musically this is not the case anymore in the last segment. Instead, the tempo is now present in the light design. The various phrasings of the lamps are not synchronised, but they are all lined up with the tempo. The short flickering that is repeated at regular intervals supports this and at the same time reuses the stroboscopic element in a different context.

4.1.7 Appendix: Planetary Runway

Audiovisual installation for 8 loudspeakers and 8 light diodes, placed along a straight line of at least 25 meters, 2009.

This audiovisual installation consists of 8 loudspeakers that are placed on a straight line of at least 25 meters (longer distances are preferred). Next to each loudspeaker is an LED diode. A

---

[18] However, the flicker entails yet another quality. It is often embedded in rather subtle ways in otherwise more static light constellations. Often it is creating a texture within an otherwise static colour field, or the flicker only bursts up for very short moments, as during the pendulum motion towards the end of this section. Precisely because of its subtle occurrence, it is sometimes not clear to the viewer whether a flicker is actually taking place or whether it is a visual illusion. This creates an irritation that questions the capability of the visual sense. Even though irritations that are based on limited capabilities of the senses are typical of *liminal* noise, it can be argued that the phenomenon at hand also carries characteristics of *extrinsic* noise. This is because the knowledge of visual illusions in strongly based on past experiences of the viewer. The feeling of irritation during the performance of the piece can therefore potentially evoke these memories and therefore form a sort of *extrinsic* noise.

pulse sound is played through the 8 speakers and the LED diode next to each speaker flashes up in exact synch when the impulse is emitted through its associated speaker.

This installation focuses on the time that sound needs to travel, and uses this phenomenon musically. Because of the rather large distance from the first to the last speaker (at least 25 meters, preferably more), the time difference between sounds emitted through the closest and farthest speaker can well be perceived. The output of the impulses is delayed for each speaker in such a way that all 8 impulses will be heard exactly at the same time, when the listener/viewer is positioned at the position of the first speaker. Since the flashing light diodes of each speaker will be delayed exactly in the same way as the impulses, they will not light up at the same time. Because of the large difference in speed between the sound and the light (speed of light: ±300.000 km/s, speed of sound: ±0.343 km/s), the light flashes will be visible as running from the farthest position to the closest, while the pulses will arrive simultaneously at the position of the first speaker. A discrepancy will therefore be revealed between what is heard and what is seen.

Once the listener/viewer leaves the position of the first speaker and wanders in between the remaining speakers and diodes, the acoustic alignment of the impulses gets lost. They become scattered and create micro-rhythmic structures that change with the position of the listener/viewer. This is because the delay times for every speaker have been calculated in such a way that the impulses only coincide at the position of the first speaker. At other positions the delays will form rather erratic rhythmic constellations. However, at the same time as the listener/viewer approaches each individual speaker/diode, it becomes apparent that each flashing lamp is in fact synchronized with each adjacent speaker and that the misalignment of the visual and acoustic signals that was experienced at the position of the first speaker is solely a result of the runtime differences between sound and light.

This installation attempts to isolate a natural phenomenon and put it in a poetic context as an aesthetic experience. The title of the work refers to the Pythagorean tradition, where observations of the motion of planets were perceived as correspondent with harmonic musical relationships. The distances between the individual speakers were also chosen according to the distances between the planets as they were presumed in Antiquity.

4.2.1 Limitations in concert venues

When working with light design in concert situations, a number of problems are often encountered that demand adaptability and compromise in the realization of the light plans. As mentioned above, my general goal is to include the space with its architectural characteristics and particularities through the use of lighting. However, often concert venues do not offer many possibilities to do that. Most of the time the area around the stage is designed in a very neutral way, without any distinguishing architectural features. Furthermore, music and theatre venues are often painted with a dark grey paint, which makes it unsuitable for light projections, as colours and light intensities are largely absorbed. A common workaround is to use projection screens to better reflect the lighting. While this is often a practical solution, screens create an artificial space within the actual space and therefore rather distract from the room in which the performance is taking place.

Concerts that take place in unusual locations, like industrial spaces, museums, churches, barns or outdoor places often offer much more interesting architectural structures and textures that can nicely be integrated in the light design. However, such places often entail other disadvantages. Since the spaces have not been designed for music, the acoustics are often unsatisfactory. Certain setups that depend on the possibility of hanging light fixtures are sometimes also often difficult to realize if no lighting grid is present. Also it is often difficult to completely darken the space, which makes it necessary to plan the performances for after sunset.

4.2.2 The choice of equipment

Music and especially theatre venues often have a fair amount of lighting equipment available that can readily be used. However, the equipment that is suitable for theatre and concert venues is not always appropriate for the light designs of my compositions. When I started to work with lighting I tried to use whatever was available in a particular venue and to adjust my ideas and light designs accordingly. After a number of disappointing experiences I realized that it is necessary to be much more specific about the choice of lighting equipment.

LED lamps have become the lighting equipment that I prefer for most purposes. LEDs are a relatively young technology still in development. Its most obvious disadvantages are the often-artificial hues of the colours that frequently cannot provide the warmth that tungsten lamps have in combination with gels. Another disadvantage is that dimming at low intensities often looks crude. The digital steps between the lowest intensities are visible, which makes a smooth fade-in or fade-out impossible. Most unsubtle of all these gradients is the first step from complete darkness to the lowest intensity, which often looks like as if the lamp is switched on rather than faded in. However, the advantage of LEDs is their almost instant response, which is equal at all intensities and which makes it possible to perform very exact timings. Tungsten lamps always respond with a noticeable delay. If that delay was consistent, it would not be so difficult to work around it. Since the delay gets larger when lower intensities are used it is very difficult to use tungsten lamps if rhythmic accuracy and synchronization are required. Furthermore, the delay of tungsten lamps also gets larger the more powerful the lamp is. A 1kW flood light for example responds slower than one of 500W.

Another advantage of LED lamps is that colour mixing using red, green and blue is easy, since many LED lamps have red, green and blue diodes built in. This results in a rather homogeneous colour field where elegant colour sweeps are possible. With analogue lamps, this is often obtained by using three tungsten lamps with red, green and blue gels that are projected at the same area. Since the lamps are physically much larger than the single diodes in an LED lamp, it is almost impossible to position the lamps in such a way that a truly homogenous colour field is obtained. In my opinion the mixing possibilities of lamps using dichroid filters are the best choice. They yield the smoothest colour changes and colour fields of all theatre lamps I worked with. However, lamps with dichroid filters usually use discharge lamps that cannot be dimmed. Hence the light intensity is regulated by mechanisms in the lamps. As a result the lamps build up a lot of heat so that ventilation has to be used that can be noisy and very bothersome when music at chamber-music levels is performed.

Ventilation is a problem that also occurs with many other types of equipment, including high power LED lamps and laser beamers. The design of lighting equipment developed for club situations often ignores the noise that a cooling system produces, since the equipment is targeted at music performances at very loud levels. Sometimes the noise can be reduced by replacing the fans with more silently operating models, or by building in electronic circuits that measure the actual temperature in the lamp and accordingly reduce the speed of the fan whenever possible. I have had to resort to both of these solutions. Obviously they can however not be applied with rented equipment and if the gear is new, tampering with its inner components renders the warranty void.

Demanding specific lighting equipment for a particular piece can be expensive. Especially LED lamps are not part of the standard inventory of music venues and theatres. Therefore, the equipment often has to be rented which can be costly. Another solution that I have often taken resort to is to buy the equipment myself. Apart from being able to use the identical equipment at various performances, this gives me the possibility to experiment with it during the compositional process, through which I can gather valuable experience. My restricted personal budget makes it however necessary to purchase inexpensive equipment, which is practically always inferior to more valuable models that can be rented. Also, when concerts have to be performed at locations that can only be reached by flying, owning the equipment is of little benefit, since the transportation can easily become more expensive than renting it on location.

4.2.3 The problem of Notation

The purpose of notation is usually twofold. On one hand notation provides a static text version of an otherwise ephemeral sonic and visual event. This makes it possible to experience a work by merely reading it. Furthermore a written version of a time-based work of art also makes it easier to analyse.

Another purpose of notation is to make it possible to reproduce a work. In order to fulfil this function, a score has to provide all information necessary to enable interpreters to recreate an artistically valid version of the work at hand.

Since the light designs that I am developing for certain compositions stand in a direct relationship to the music, it would be appropriate to notate them in the scores. What would be the purpose of such scores? Their function as a guideline for the reproduction of the light design would not be any concern. This is because the light designs that I develop as part of my compositions are usually relatively complex. In practicality, it is not possible to realise them in the performance venue by programming a lighting control console.[19] Instead, I am preparing the light designs beforehand as a computer programs and bring them to the venue on a laptop. The light designs therefore exist as a self-contained software version. Using a DMX[20] interface I can then directly connect the computer to the venue's light system and control it.

The purpose of a score that includes music and lighting would therefore be its documentary aspect. When relatively simple lighting setups are used, they can relatively easily be included in the notation by assigning a special staff to each lamp and graphically indicating changes of its intensities. When rhythmic accuracy is required, rhythmic notation can easily be incorporated as well. This is how I notated the light designs in the compositions <u>Alias</u> (see 4.1.2) and <u>Rational Cantilenæ in Nine Triads</u> (see 4.1.3). However, when the light set-up becomes larger, very soon it becomes senseless to notate the lighting, since the notation would become so complex that it would loose any suggestiveness. Especially when working with lamps that are capable of creating mixtures of red, green and blue, it would require three staffs to accurately display the colour of a single lamp. In the composition <u>Jeanne of the Dark</u> (see 4.1.4) for example, I am using 15 LED bars and par lamps, each capable of producing red, green and blue. Therefore it would require 45 staffs to accurately notate the light design. To display the lighting with such a huge number of staffs would hardly evoke an impression

[19] A lighting control console is used in theatres and clubs as the main interface to control all lighting equipment. It usually offers the possibility to program different settings as presets and freely manoeuvre from one scene to another.

[20] DMX512-A is a standard for digital communication networks that is commonly used to control stage lighting and stage effects.

of the way the light design actually looks. Also when moving head lamps are used, two additional staves would have to be used for the motion on the x- and y-axis. It would take a lot of practice on behalf of the reader to translate such notations into imaginary movements of lighting fixtures.

Furthermore it is not an elegant way to display for example the colour yellow by raising the curves of the red and green components, even though the experienced reader might quickly recognise that the mixture of red and green yields yellow. A better solution would be to use colours in a score in order to display the colour of a lamp. While this is nowadays technically possible, it is still not easy to accomplish since there are unfortunately no common notation softwares that offer the possibility to print graphic elements in different colours. It would be necessary to add coloured layers to an existing score with a graphic program or manually which would be very labour intensive. Furthermore the reproduction of the scores would require the use of colour printers, which can be costly.

The notation of laser can only be realised in a descriptive manner since the graphics and motions are so specific and often rapidly changing that an accurate notation is not practical. Both works in which I use laser actually included the visuals in the score (see 4.1.2 Alias and 4.1.5 Corrosion). These are however only vague descriptions of the resulting image and can therefore only give an impression of it rather than precise information.

For the above-mentioned reasons, I have refrained from notating the lighting in all works that make use of more complex lighting setups. These include My Ultradeep I (see 4.1.1), Jeanne of the Dark (see 4.1.4) and Dromomania (see 4.1.6). Since these are compositions for music and lighting, the scores might therefore be considered to be incomplete. In that sense, lighting faces a similar problem as the majority of electronic music. Until today, no comprehensive system has been developed for the notation of electronic or electro-acoustic sounds. Either the notations remain descriptive, or they are so complex that they suffer from too great a deal of suggestiveness.

5. Music in an Expanded Context

I have attempted to describe sound and light as media that – in the context of a work of art – have the potential to complement each other to a high degree. Thereby, I paid special attention to the phenomena of noise and dirt, as I found that this is where the largest contrast between the two media arises. That is because noisy sonic phenomena are readily associated with impurity, while a corresponding form of dirty light is hard to imagine. Eventually, I came to distinguish three different sorts of noise (*contextual*, *liminal* and *extrinsic*) that take account of the larger context that noisy phenomena are placed in, and their specific characteristics, rather than only looking at them as isolated events. From this perspective, also "noisy" applications of light became very well conceivable and applicable.

Asking what noise is also entails the question what music is. Even though noise is a slippery term that evades simple definition,[1] its traditional understanding regards it as unmusical sound. However, when noisy sonic elements are assimilated in an established musical idiom, they often challenge an existing order and stimulate the creation of a new palette of expressions.

In the following chapters, one stream of thought will address the question of how music can be defined in basic terms. Furthermore, silence will be discussed as an inherently musical element, which is characterised by the absence of sounds and can thereby potentially undermine the existence of music. In this context the idea of a silent music will be reflected, partly by looking at the concept of *harmonia mundi*, which can be traced back to Pythagoras and which has been discussed in greater detail in Chapter 1.1.1 ("The Harmonical Pythagoreism"). Departing from such silenced forms of music, I will discuss definitions of visual music.

The overall question raised in those chapters is whether a definition of music is conceivable that does not confine itself to sonic events but that can consistently include certain visual phenomena.

5.1 Definition of music – logic of music vs. function of music

There are roughly two distinct approaches to the definition of music, the musicological and the anthropological. While the former is primarily preoccupied with music as a sonic

---

[1] Kelly, Caleb: Cracked Media, Cambridge, MA: MIT Press (2009), 62ff.

phenomenon and searches for its medium-specific logic, the latter sees it as a social event and therefore investigates its function in a larger context.

5.1.1 Sound vs. Silence

What all definitions of music that I came across have in common is that music is preoccupied with sonic events. Pauses in music, however, are in one way or another part of most musical styles and are usually not perceived as something that contradicts the music. Some compositions of the 20th century have drastically changed the proportions between sound and silence in comparison to previous musics of the Western culture. In this chapter I would like to briefly discuss some examples of almost or completely silent musics.

John Cage (1912-1992) fundamentally questioned what silence is, based on an experience he made in an anechoic chamber in Harvard University in 1951. Entering the chamber he expected to hear complete silence and was surprised when he heard two distinct sounds – a low one and a high one – that were later interpreted to be his nervous system and the circulation of his blood. This led Cage to the conclusion that there is no such thing as silence that is completely devoid of sonic experience. As long as we live, there will always be sound.[2] His famous work <u>4'33"</u> was at least in part a reaction on this experience in the anechoic chamber.

The use of silence in Cage's works evokes a different sort of listening than pauses in traditional Western music, which are mostly gestural, agogical or rhetoric silences. However, despite Cage's broadened concept of silence, it remains legitimate to raise the question how long a musical pause can be before it ceases to be musical. It seems obvious that there can be no precise answer to this question. Exploring the different qualities that silence can have is one of the main interests of the composer's group *Wandelweiser*. In 1992 this group was set up by Burkhard Schlothauer (1957-) and Antoine Beuger (1955-), who were soon joined by others. What all these artists had in common was that they were specifically interested in "the evaluation and integration of silence[s] rather than an ongoing carpet of never-ending sounds".[3] The composers of the *Wandelweiser Group* have written works that include many minutes of silence and have thereby thoroughly investigated the many different meanings and effects that silence can take in the context of a musical work. Even though the composers of the *Wandelweiser Group* share a common interest in silence, their ideas about silence can

---

[2] Cage, John: <u>Silence</u>, Middletown, CT: Wesleyan University Press (1961), 8.
[3] Malfatti, Radu: quoted by Dan Warburton in "THE SOUND OF SILENCE: the music and aesthetics of the Wandelweiser Group", <u>Signal to Noise</u> (2001).

differ strongly.[4] The sonic void of silence is open to be filled with many different meanings. Silence can therefore very well be a musical quality, although not a stable one. Even though it is characterised by absence of sound, silence is defined by a potential presence of sonic events.

There are also examples of compositions that are completely inaudible, where the potential presence of sonic events is never realised, like for example La Monte Young's (1935-) Composition 1960 #5:

> Turn a butterfly (or any number of butterflies) loose in the performance area.
>
> When the composition is over, be sure to allow the butterfly to fly away outside.
>
> The composition may be of any length, but if an unlimited amount of time is available, the doors and windows may be opened before the butterfly is turned loose and the composition may be considered finished when the butterfly flies away.[5]

It is certainly arguable whether this is music. The title indicates that it was conceived as a composition. Even though it does not state that it is an explicitly musical composition, the piece fulfils many essential criteria for a musical event. It describes a performance in a clearly defined "performance area" with a beginning and – at least in the alternative version – also an end. Butterflies are moving the air and causing it to vibrate, which is a characteristic of sound, although in this case, the produced sounds are very likely to be much too soft to be perceived by human ears. Since this work creates a situation that does not differ from a more conventional concert setting, it is an example that might very well fit the criteria of an anthropologist's definition of music but less so a musicologist's one.

This work can be placed in the tradition of US American and English experimental music that emerged after 1950. In general terms, an idea of music was pursued where the outcome was less precisely defined than the situation from which a musical event started out. Music was therefore conceived to be processual, a set of activities that take place during a certain frame of time. In how far the outcome would fulfil traditional ideas of music or be of sonic nature at all was less important. Robert Ashley (1930-) said in 1961:

---

[4] Warburton, Dan: "THE SOUND OF SILENCE: the music and aesthetics of the Wandelweiser Group", Signal to Noise (2001).
[5] quoted from: Kahn, Douglas: Noise, Water, Meat, Cambridge, MA: The MIT Press (1999), 237.

> It seems to me that the most radical redefinition of music that I can think of would be one that defines 'music' without reference to sound.[6]

The list of inaudible musical events can also be continued beyond the immediate tradition of Anglo-American experimental music. The Norwegian and Australia-based electronic performer Inge Olmheim for example has given performances where he used exclusively sounds that are above or below the human hearing range. Clare Cooper, a guzheng player who performed with him as a duo on several occasions, reported in a personal conversation, that although the sounds he made were not audible, she still had the feeling of being accompanied by a second player. Other examples of silent music are some performances of the Japanese guitarist Taku Sugimoto (1965-). He gave concerts entering the stage with an electric guitar, taking on a playing position but not producing any sound for 20 to 30 minutes before walking off the stage again. This seems identical to an extended version of Cage's 4'33". It is noteworthy, though, that Sugimoto's performances took place in club-like settings. The presence of an electric guitar and the association of the venue with a different performance practice than the classical one turned Sugimoto's performance to a different experience than the usually reported performances of 4'33". The latter were most of the time held in a classical setting, which is characterised by restrained interaction between members of the audience and the performer(s) and therefore lower noise levels and dynamics of communication.

Even though sound is an "irreducible given of music",[7] it can be concluded that there are numerous different examples where inaudible performances took place that were still perceived as musical events. The musical aspect of these performances can only be understood by taking account of the context they were placed in. The functions of music must thereby be seen as an aspect of the behaviour of man in society. In that sense, music identifies itself in its own terms in relation to society.[8] The musicologist Christopher Small even argues that asking what music is, means to pose the wrong question. He claims that music is not a thing but an activity that he refers to as 'musicking'.

> The apparent thing "music" is a figment, an abstraction of the action, whose reality vanishes as soon as we examine it all too closely. This habit of thinking in abstractions, of taking from an action what appears to be its essence and of giving

---

[6] Quoted from: Nyman, Michael: Experimental Music, Cambridge, UK: Cambridge University Press (1999, 2nd Ed.), 11.
[7] Nattiez, Jean-Jacques: Music and Discourse, Princeton, NJ: Princeton University Press (1990), 67.
[8] Blacking, John: "The Value of Music in Human Experience", in: Yearbook of the International Folk Music Council, Vol.1, Canberra: International Council for Traditional Music 1969, 33.

> that essence a name, is probably as old as language; it is useful in the conceptualising of our world but it has its dangers. It is very easy to come to think of the abstraction as more real than the reality it represents, to think, for example, of those abstractions which we call love, hate, good and evil as having an existence apart from the acts of loving, hating or performing good and evil deeds and even to think of them as being in some way more real than the acts themselves, a kind of universal or ideal lying behind and suffusing the actions.[9]

When music is understood in an extended context as a human activity, the postulate that it is defined by sonic events appears as an implausible limitation. That is to say that activities belonging to the production of music are more multifaceted. They mostly include some sort of participation of a performer,[10] an environment – social and architectural – and therefore elements that also have a visual existence.

5.1.2 The Silence inherent in the Harmonic Pythagoreanism

Harmonic Pythagoreanism was a complex body of knowledge based on harmonic ratios that offered an interpretation of the cosmos, as well as the human soul. Music was only one domain in which harmonic relationships could become evident, while harmony could just as well manifest itself without being audible at all (*musica aphanès*). Essential to Harmonical Pythagoreism is also the observation of the rotation of the planets (*harmonia mundana*), which adheres to the same proportions that also yield the diatonic scale in the musical realm.[11] Since music was assumed to obey the same principles of how our universe is put together, studying the laws of music would open the door to much larger knowledge.[12] For that reason, in the Middle Ages music was included in the *Artes Liberales* and was therefore considered to be a science.

What lies at the core of this worldview is that there is a fundamental consistency between rational and emotional understanding. A proportion can be expressed mathematically as a ratio, visually by observing planets over longer periods of time, or by building edifices according to harmonic proportions. But also it can be experienced instantly as a harmonic interval through the ears.

---

[9] Small, Christopher: Musicking, Middletown, CT: Wesleyan University Press (1998), 2.
[10] Stockburger, Axel: "Seeing Sound, The Short Films of May Ellen Bute", in: Audio.Visual – On Visual Music and Related Media, [ed: Cornelia and Holger Lund], Stuttgart: Arnoldsche Art Publishers (2009), 117.
[11] Haase, Rudolf: Geschichte des Harmonikalen Pythagoreismus, Vienna: Verlag Elisabethe Lafite (1969), 86.
[12] Godwin, Joscelyn: "The Revival of Speculative Music", in: The Musical Quarterly, Vol. 68, No. 3, Oxford: Oxford University Press (1982), 373f.

> It is impossible, … for a speculative musician [a musician who shares the views of Harmonic Pythagoreanism] to consider aesthetics as divorced from physics, or the history of music as something separate from the history of the human soul.[13]

The inaudible side of Harmonic Pythagoreanism can certainly not simply be reduced to being yet another type of silent music. It is remarkable, though, that Harmonic Pythagoreanism's understanding of aesthetics does not see any contradiction between expressing the same ideas acoustically or visually. Therefore, its understanding of music goes far beyond being concerned with the sonic phenomenon as an isolated event. Even though it might seem inappropriate to compare Harmonical Pythagoreism and its assertion of expressing universal truths, with artistic attempts that seek a correspondence between different artistic domains, it is interesting to notice that a line of thought lies in the cradle of Western music, which can in more modern terms be described as "cross-disciplinary".

5.2 Definitions of "Visual Music"

The term "visual music" also suggests a musical experience in the visual realm. Historically, the term first became a common expression in discussions of experimental film in the 1920s and 30s.[14] As it was already mentioned in Chapter 1.2.4 ("The time-aspect: Visual/Colour Music and Abstract Film") during that period, many artists who worked on abstract film, like Viking Eggling, Hans Richter, Walter Ruttmann and Leopold Survage – only to mention a few, searched for analogies between music and visual arts. This is also reflected in many of their titles, like Richter's <u>Rhythmus 21</u>, <u>23</u> and <u>25</u>, Ruttmann's <u>Opus I-IV</u> or Survage's <u>Farbrhythmus</u>.[15] Since experimental film was also an abstract but time based form of art, music seemed to be the most similar medium to compare it with.

However, in the past 90 years the meaning of "visual music" has undergone many changes and eventually came to be applied to all sorts of transformations between image and sound, either hand-made or computer generated.

> Visual Music today is a rapidly-expanding genre. Today we find artists in diverse fields creating what they all describe as "Visual Music" – from experimental

---

[13] Godwin, Joscelyn: "The Revival of Speculative Music", in: <u>The Musical Quarterly, Vol. 68, No. 3,</u> Oxford: Oxford University Press (1982), 384.
[14] Lund, Cornelia and Holger: "Editorial" in: <u>Audio.Visual – On Visual Music and Related Media</u>, [ed: Cornelia and Holger Lund], Stuttgart: Arnoldsche Art Publishers (2009), 11.
[15] Selwood, Sarah: "Color Musik and Abstract Film" in: <u>Light Art from Artificial Light</u>, [ed: Peter Weibel and Gregor Jansen], Ostfildern: Hatje Crantz (2006), 417.

> filmmakers to video artists, animators, CG [computer graphic] artists, VJs, installation artists, painters and musicians. It's suddenly become popular across so many disciplines, and today a worldwide contemporary scene thrives. Perhaps all of this work being created today isn't what has been historically defined as Visual Music, but it all serves to help shape, define and further progress the genre.[16]

At the occasion of curating a competition for visual music, jury members Cindy Keefer and Jack Ox (1948-) came up with the following differentiated definitions of visual music, that keep account with the many different manifestations it has taken in recent history:

> Visual music is:
>
> 1. A visualization of music which is the translation of a specific musical composition (or sound) into a visual language, with the original syntax being emulated in the new visual rendition. This can be done with or without a computer. This can also be defined as intermedia.
>
> 2. A time based narrative visual structure that is similar to the structure of a kind or style of music. It is a new composition created visually but as if it were an aural piece. This can have sound, or exist silent. Theorist/inventor Adrian Klein wrote in 1930: "…somehow or other, we have got to treat light, form and movement, as *sound* has already been treated. A satisfactory unity will never be found between these expressive media until they are reduced to the same terms."
>
> 3. A direct translation of image to sound or music, as images photographed, drawn or scratched onto a film's soundtrack are directly converted to sound when the film is projected. Often these images are simultaneously shown visually. Literally, what you see is also what you hear. (An early example is filmmaker Oskar Fischinger's Ornament Sound experiments c. 1932). There are many examples in Visual Music film of this process, e.g. McLaren, Spinello, Damonte and other contemporary filmmakers, including sections of Pengilly's work in this show. This method has been called a "pure" type of Visual Music.
>
> 4. A visual composition that is not done in a linear, time-based manner, but rather something more static like a 7' x 8' canvas. However, as in Klee, the

[16] Keefer, Cindy: in an interview with Silvia Bianchi, http://www.digicult.it/digimag/article.asp?id=817 [accessed on March 20, 2010].

movement of the painted elements can and have achieved a kind of Visual Music, serving as an artist's visual interpretation of specific music.[17]

The last category is not of interest as part of this dissertation as it does not result into a time-based work of art but in a static image. The third category best describes many computer generated examples of visual music, which are built on various algorithms that are directly translating characteristics of sound into visuals or vice versa. The first and second categories best apply to my experiments with sound and light. Here, both media are organised according to similar and corresponding principles without being an exact rendition of one another.

In general terms the goal of all sorts of visual music was probably best described in Walter Murch's (1943-) preface to Michel Chion's (1947-) book Audio-Vision:

> The most successful sounds seem not only to alter what the audience sees but to go further and trigger a kind of *conceptual resonance* between image and sound: the sound makes us see the image differently, and then this new image makes us hear the sound differently, which in turn makes us see something else in the image, which makes us hear different things in the sound, and so on.[18]

The most fruitful combination of sound and image therefore creates a sort of "feedback" between the two media, an interdependence that might work subconsciously, but which alters the perception and yields a new sensation – a surplus value – that no single medium could provide on its own. In semantic terms, this surplus value is the result of a dynamic process. The interaction that takes place between the aural and visual perception happens by amplifying certain aspects of either one, and by numbing other ones. As a result it yields a new perceptual quality.[19] This can also be compared to the often-used analogy of counterpoint to the combination of sounds and visuals. As described in Chapter 3.4.2 ("Time: Rhythm/Form") counterpoint describes an interactive relationship between at least two melodic lines. The note of one melody defines the harmonic reference of the note occurring at the same time in the other melody. The perception of the single melody is thereby strongly affected by the harmonic frame it is placed in. One melody changes the appearance of the other one and vice versa. The combination of the two entails a "surplus value" that none

---

[17] Keefer, Cindy and Ox, Jack: On Curating Recent Digital Abstract Visual Music, 2008, http://www.centerforvisualmusic.org/Ox_Keefer_VM.htm [accessed on January 11, 2010].
[18] Murch, Walter: "Foreword", in: Chion, Michel: Audio-Vision, New York: Columbia University Press (1990), xxii
[19] Flückiger, Barbara: Sound Design, Marburg: Schüren Verlag (2001), 143.

could provide on its own. The analogy of counterpoint therefore adequately describes the audiovisual processes that Murch refers to as *conceptual resonance*.

Even though this is a very generic description of the surplus-value that can emerge from the audiovisual context, it expresses the potential that the fusion of auditory and visual domains have to offer and which is likely to have been the driving force behind the old fascination for visual music.

5.3 Light and Sound, and live events

As mentioned above, the term "visual music" goes back to the early days of absolute film, when musical concepts of organisational principles were transferred onto the moving image.[20] However, a strong impetus for the development of "visual music", and specifically light shows, came from the contexts of live events and performances. While "visual music" was primarily the domain of film studios, the fifties and sixties of the past century brought forth a multimedia and party culture that propelled the development of "visual music" and light shows in the context of immersive environments.

5.3.1 A brief History of Light Shows

The following overview is by far not comprehensive. It mentions the most relevant artistic contributions to the development of light shows until World War II and then focuses on the development of Light Shows in popular music in the USA, which is especially interesting as a development that primarily took place in the context of concert or performance situation, rather than in the studio.

The Danses lumineuses by Loïe Fuller (1862-1928) are probably the earliest example of a form of performance art that integrated changing light as a primary means of expression. A pioneer of modern dance and theatrical lighting techniques, Fuller started to perform circulating dances with dresses of long veils in interaction with changes of electric lights as early as 1892. In her performances the body along with the dress became the projection surface for light.[21] She had special projectors with rotating colour discs designed, along with particular gels, in order to enable her to "sculpt the light". She managed to elevate lighting from being a subordinated medium for the support of narrative actions on a stage, to become

---

[20] Naumann, Sandra: "Seeing Sound, The Short Films of Mary Ellen Bute", in: Audio.Visual – On Visual Music and Related Media, [ed: Cornelia and Holger Lund], Stuttgart: Arnoldsche Art Publishers (2009), 41.
[21] Klementz, Constanze: Tanz als Audiovision, http://beta.see-this-sound.at/kompendium/text/45/5 [accessed on May 25, 2010].

one of the main actors in her unique performances. Even though her work was revolutionary from an artistic as well as technological perspective, she was never recognised as an innovator of theatre, in the way for example Adolphe Appia or Max Reinhard (1873-1943) were. This is probably due to the fact that as a dancer she was associated with the varieté theatres and entertainment industry rather than the institutions of higher culture, like ballet or drama.[22] In addition, in the early 20th century, being a woman in male-dominated fields made it especially hard to gain recognition beyond being a celebrity as a performer.

One of the most famous early attempts to compose with sound and light is Alexander Scriabin's (1872-1915) Prometheus (The poem of fire) op.60 for orchestra with piano, choir and *tastiera per luce* (light keyboard) completed in 1910. This is the first work with a written out part for lighting. Scriabin envisaged that the lighting would intensify the experience of the music. However, he did not give any clear indications how the projections of the lighting would be realised technically. During his lifetime, several performances of Prometheus took place without the lighting part being realised. The first performance with light took place in 1915 in New York, shortly before his death. Because of World War I he was not able to attend the concert. Since then many technical setups have been attempted in order to realise the light part but it has remained unclear which would come closest to the form that Scriabin imagined.[23]

Roughly at the same time also other composers included lighting directions in their compositions, like Bela Bartòk in his opera Herzog Blaubarts Burg (1911)[24], Arnold Schönberg in his one-act opera Die glückliche Hand (1913)[25] or Granville Bantock in his choral symphony Atlanta in Claydon (1911)[26]. However, with all of these composers the interest in light was limited to the mentioned works and was not further pursued in their individual oeuvres.

From 1922 the Hungarian pianist and composer Alexander László (1895-1970)[27] started to develop colour organs and compose music for them. Throughout the 1920 he designed different *Farblichtklaviere* (colour light pianos). He collaborated with the painter Matthias Holl and developed audiovisual programs that he toured with successfully throughout Europe. In 1926 he was part of the fair *Gesolei* in Hannover where he performed his program eight to

[22] Bahr, Petra: Loie Fuller, http://www.theomag.de/02/pb1.htm [accessed on May 24, 2010].
[23] Jewanski, Jörg and Siedler, Nathalie: Farbe – Licht – Musik, Bern: Peter Lang (2006), 176ff.
[24] Jewanski, Jörg and Siedler, Nathalie: Farbe – Licht – Musik, Bern: Peter Lang (2006), 175.
[25] Jewanski, Jörg and Siedler, Nathalie: Farbe – Licht – Musik, Bern: Peter Lang (2006), 182.
[26] Jewanski, Jörg and Siedler, Nathalie: Farbe – Licht – Musik, Bern: Peter Lang (2006), 181.
[27] The paragraphs on László are based on the chapter "Eine neue Kunstform – Die Farblichtmusik Alexander Lászlós" from Jewanski, Jörg and Siedler, Nathalie: Farbe – Licht – Musik, Bern: Peter Lang (2006), 211-265.

ten times a day, during 149 days, reaching an audience of roughly 41.500 people – a much larger number than any light or film artist may have reached before him. At the same time he published a book titled Farblichtmusik (colour light music) where he laid out the theory and notation of his audiovisual compositions. Even though his work was controversial, he was much discussed in the media and also in the field of synaesthesia, which was at its height during the 1920s and 30s. Hence, he was also featured as an artist during the first synaesthesia conference in Hamburg in 1927.

Being half Jewish, László fled to the United States of America in 1938 with the help of László Moholy-Nagy. In New York he met the composer John W. Haussermann Jr.. Coming from a wealthy family, Haussermann united with László to set up an association for colour light music. He also invested large amounts of money into the development of a new colour organ that László designed. Even though the colour organ was completed and László was supposed to write a new Concerto Grosso for it, neither of the two was ever presented to the public. Apparently it was due to a lack of public interest, that the expensive and time consuming project was eventually abandoned in the fall of 1940. In 1943 László relocated to Los Angeles where he became a successful composer in the film industry. He was still active in a field where visuals and music were brought together, but het never again attempted to construct a colour organ again or compose for sound and lighting.

From 1957 to 1960 Henry Jacobs (1924-) and Jordan Belson (1926-) realised more than 100 events at the Morrison Planetarium in San Francisco, which became known as the Vortex Concerts. They were an experiment in audiovision for which the planetarium provided a perfect setting. It offered close to 50 different sound sources that could be controlled by a special keyboard and also allowed sounds to rotate in space. Hundreds of projection devices were present and extended by specially designed projectors with interference patterns. The music ranged from partly specially commissioned avant-garde electronic compositions to ethnic music and was accompanied by coloured lights, films, slides, star projectors and rotational sky projectors. It was the first realization of an immersive audiovisual environment of its kind. The concerts were so successful that they were invited to the Brussels World Fair in 1958.[28]

At around the same time, San Francisco became the centre of the development of Light Shows that largely depended on much simpler equipment than was available to Henry Jacobs and Jordan Belson at the Morrison Planetarium.

---

[28] Youngblood, Gene: Expanded Cinema, New York: P. Dutton & Co., Inc. (1970), 389.

Seymour Locks (1919-1964) was an art professor at the San Francisco State College and is often referred to as the inventor of psychadelic light shows. Already in 1952 he tried to replicate some techniques used by the European Futurists in the 1920s and 30s and thereby discovered that paints could be stirred, mixed and manipulated on conventional overhead projectors. However, it was one of his students, Elias Romero, who went out and placed the light shows in the context of music events. Together with Bill Ham (1932-), who in 1964 started to develop a sort of "live projection painting", he gained popularity as part of the original San Francisco rock dance light show events.[29]

In the late 60s light shows began to pop up everywhere in the San Francisco rock concert and dance scene. Other artists across the country that significantly contributed to the development of this style of light shows were Tony Martin at the San Francisco Tape Music Center and artist collectives like the SF Lightworks, The Brotherhood of Light, Fly By Light, Headlights, the Single Wing Turqoise Bird and the Joshua Light Show. The equipment primarily used at these events comprised slides, films, strobe and especially overhead projectors manipulated with liquids and stencils.

At the same time, on the East Coast a very different approach developed in the music and art scene. In 1966, Andy Warhol combined many trends of the time in the multimedia shows "Exploding Plastic Inevitable", which featured music performances with the Velvet Underground, multiple slide and film projections, light shows and dance.[30] The West Coast Light Shows and the Exploding Plastic Inevitable formed two very contrasting approaches to immersive multimedia events:

> This hard edge, Eastern approach to art was the reason San Francisco hated the Velvets and Andy Warhol. Some felt however that the hard edge east coast best reflected the social/political climate of the day and that the San Francisco hip scene was on some kind of fantasy trip and more geared to Folk than Rock.[31]
>
> There was a big dichotomy: they [the West Coast Light Artists] took acid and were going towards enlightenment; we [artists from the Exploding Plastic Inevitable] took amphetamines and were going towards death. They wore colors, we wore black; they

[29] Oppenheimer , Robin: "An International Picture Language: The History and Aesthetics of West Coast Light Shows", in: <u>Bulletin of the Computer Arts Society</u>, Page 58, Autumn 2004, 1.
[30] Lund, Holger: "Visual Music in the context of Multimedia Parties", in<u>: Audio.Visual – On Visual Music and Related Media</u>, [ed: Cornelia and Holger Lund], Stuttgart: Arnoldsche Art Publishers (2009), 181.
[31] Don Paulson, quoted in: Oppenheimer , Robin: "An International Picture Language: The History and Aesthetics of West Coast Light Shows", in: <u>Bulletin of the Computer Arts Society</u>, Page 58, Autumn 2004, 4.

> were barefoot, we wore boots. All they ever said was "wow" and we talked too much. It was the old NY is smart and LA is stupid routine.[32] [33]

5.3.2 The emergence of sound and light out of live events

It is important to notice that in the 1960s light shows developed in a "hands on" situation, as part of live events and the direct interaction of artists from various fields. The common interest in the creation of immersive environments led them to combine their ideas in a trial and error fashion. The tight connection between "visual music" and live events is continued in the combination of DJ and VJ culture, which started to flourish in the nineties of the 20th century.[34]

> The live setting is where the art evolves and recreates itself into fresh forms and techniques. New relationships between works that were created independently emerge during live mixing, many of which would have never materialized in a production studio alone. For many VJs, presenting their work in front of a live audience is half, if not most of the exhilaration for creating their art. The spontaneity of the art is most evident in the live setting: the music, audience and surroundings are unknown and the VJ makes on-the-fly interpretations of all the external elements.[35]

The origins of VJing go back to the 70s when discoballs and liquid projections – similar to those used in the psychedelic rock shows in the sixties and seventies – were introduced in dance clubs in order to add a visual component to the music. In 1981 the TV channel MTV started to broadcast music video clips. What was at first a marketing strategy for pop artists eventually led to a new form of video that specifically explored the connections between image and sound. This coincided with new technological developments that made processings of videos possible at much lower costs than before. As some dance clubs started to project video clips during dance nights, they often combined it with works by local video artists. At the end of the 80s the electronic dance music called "House" became popular.

---

[32] Woronov, Mary in: O'Brian, Glenn: Tune in, Turn on, Light up (2005), http://www.tate.org.uk/tateetc/issue4/summeroflove.htm [accessed on January 16, 2010].

[33] The contrast between East Coast and West Coast aesthetics can also be found in the work of US light artists in the 60s and 70s. On the West Coast a group of artists – also referred to as the "Light & Space" group and most prominently represented by James Turrell (1943-) – created works that were strongly influenced by the topography and the light conditions of Southern California. At the same time a number of minimalist artist from New York , like Dan Flavin (1933-1996), started to create works that reflected the light conditions of the metropolitan city. See: Gehring, Ulrike: Bilder aus Licht, Heidelberg: Kehrer Verlag (2006), 231-240.

[34] Watz, Marius, in: "More Points to the Chicken: Visual Instruments and New Directions in Improvised Visual Performance", in: 'vE-"jA, [ed: Eskandar, Xárene], San Francisco: h4 (2006), 6.

[35] Xárene, Eskandar, in: "Introduction", in: 'vE-"jA, [ed: Eskandar, Xárene], San Francisco: h4 (2006), 3.

> The House Parties were large gatherings of people who came to enjoy the music, there was no band or anything to watch, just a pile of electronics with a DJ mixing other people's music. To give the parties a more profound look, a face or even an icon, the VJ came into play and complemented the music with visuals.[36]

While still today VJ culture struggles with the stigma of being a shallow visual form of entertainment that merely decorates dance clubs, it can not be ignored that many leading video artists nowadays feel equally at home in the museum as in the club.[37]

It is noteworthy that the coupling of sound and visuals has a strong foundation in the realisation of live events. Neither light-shows nor VJing have evolved in studios but in direct interaction with a social event and an environment. When music is seen in a social function, as a live event and as an activity, performance elements, staging and lighting conjoin in a seamless manner. Therefore also lighting can be considered an inherent extension of the act that Christopher Small refers to as “musicking”.

5.4 Summary – Music in the Expanded Context

Until the invention of electronic (re-)productions of sound, the creation of music was connected to players that are performing on the instrument and physically moving in some way. As such, sound and the performer’s body shared more or less the same location, something which is even more valid for singers, where the body is the instrument as well.[38] The creation of music was therefore inseparable from some sort of visually perceptible motion; the visual and the sound formed a coherent entity. Definitions of music that only concentrate on music’s sonic aspect are therefore based on a sense-depriving understanding that isolates the perception of a single sense from a multisensory experience.[39] To ignore the

---

[36] Dekker, Annet: Synaesthetic Performance in the Club Scene, (2003), http://www.montevideo.nl/en/nieuws/detail.php?id=44&archief=ja&showjaar=2003&beginjaar=2006 [accessed on May 29, 2010].
[37] see the DVD: Video Out, by Vlachos, Paul and Finkelstein, Meredith, New York City: 13bit productions (2005).
[38] The only older instrument, which does not adhere to this is the organ, which often had its pipes in a location remote from the keyboard and the performer. The organ carries a number of aspects that became typical of electronic instruments. It is the first instrument which volume does not stand in direct relation to the performer’s physical efforts (the key action is the same for soft and loud sounds). Also the performer is partly located in a different place than the sound sources, a fact that is even intensified by the acoustics of churches, which often make the sound resonate form many different directions so that the actual origin of sound becomes harder to locate.
[39] The Western tradition of classical music shows a tendency to reduce the physical aspects in the act of performance. It is generally considered to be inappropriate if a performer moves much beyond what is necessary in order to perform a musical part. This might be the result of an understanding that situated music in the realm of the mental and spiritual. Bodily and kinaesthetic aspects were therefore rejected as relicts of a lower culture. Again it is telling, that in church-music the performers were most of the time invisible. Choirs were often placed on balconies invisible to the audience and organ players were usually hidden behind the bulky construction of the

visual aspect while listening to music is not necessarily wrong. For many works of music this is the most appropriate way to experience them. However, describing music as an art form that is exclusively preoccupied with sonic phenomena is artificial in the sense that it can only assert this by ignoring the performative process how music comes to sound and how it acts socially.

In the preceding chapters of this section I looked at music from different perspectives. I discussed how expanded silences or entirely silent pieces can still very well function as musical works because of the way they are presented, which entails a certain expectation and awareness on the part of the audience. Also I laid out that the process of performance inevitably combines physical and gestural – and therefore visual aspects – with aural ones, which has found a visual extension in Light Shows and VJ culture. Furthermore I discussed that the millennia old Pythagorean tradition was rooted in the idea that the same harmonic principles can be manifested in a multitude of different ways across all disciplines, including sonic and visual proportions. This concept came to form an academic tradition for centuries to follow and shape much of philosophical thinking of Western Culture.

From this perspective, it can be concluded that the search for a homological combination between sound and light forms the continuation of an old and well established way of presenting and perceiving music, rather than a fashionable trend that forces together two incompatible senses.

---

instrument. Classical music has therefore not only assimilated and secularised elements of religious music, it has at the same time also been imbued by the idea of a sublimated music. This is a complex field of research that would deserve further investigation but which is beyond the scope of this dissertation.

6. Conclusion

The various compositions that are part of this dissertation are the results of different approaches to the combination of sound and light. My fascination with this particular combination of media started out with an intuitive feeling that both sound and light have much in common and are therefore highly compatible.

This first impression was supported by looking at the history of analogies between sound and colour, which showed that – although there was never any consensus – a compatibility between the two was hardly ever fundamentally questioned. A closer comparison of the perception of vision and sound revealed some essential differences in how our senses operate, especially concerning the speed with which changing impressions can be processed. Furthermore, colour perception that is based on only three different areas of colour sensitivity functions in a very different way than the perception of sound, which has a more continuous band of nerve cells across the frequency spectrum to its disposal. Even though these differences entail a number of consequences that have to be kept in mind when combining sound and light (for example differing aptitudes of the senses concerning spatial or temporal issues), there were still apparently no areas where the two senses would conflict with each other in a fundamental way.

Only when I started to compare specific sonic characteristics with general attributes of light, did I realise that a fundamental conflict arises when noisy or impure qualities are searched for. While noisy sounds are easily associated with dirtiness, light – because of its immateriality – seems at first inseparable from purity. Hence the fact that light has cross-culturally been a metonym for divine power. The integration of noise, however, has been an important aspect of Western music, especially since the beginning of the 20th century. If it would prove to be impossible to apply light in any way that corresponds to noise in music, I thought that this would form a substantial handicap when approaching the two as compatible media. Therefore the investigation of noise and dirt has become pivotal in my research. Soon I realised that the cultural implications of purity and dirtiness are much too complex to be ignored and that a purely aesthetic investigation of noise and dirtiness would not suffice. Therefore I investigated this field from an anthropological, socio-historical and semiological perspective and soon came to realise that dirt and noise are not stable qualities, but dynamic classifications that are inseparable from established systems. My conclusion was that if the notion of dirt and noise is not necessarily connected to a medium-specific property, then it must be possible to express these qualities even with a pure medium as light. I came to differentiate three aspects of dirt – *contextual*, *liminal* and *extrinsic* –, which helped me to derive applications of light that could also convey "noisy" qualities. I explored several of these aspects in some of my compositions, most notably in Rational Cantilenae in Nine Triads, Corrosion and to a lesser extent in Alias.

Another aspect that I found interesting in my research concerning the artistic compatibility of sound and light was the general controversy that arose around the use of different media in arts. As mentioned above, from Antiquity at least until the Renaissance, analogies between different fields of knowledge and arts were something that was taken for granted. In the 19th century the ideal of the *Gesamtkunstwerk* even seemed to offer the redemption from a status quo in the arts that was perceived as artificial, and alienated from its true roots, which were thought to be found in Greek tragedy. Also in the early 20th century multi-disciplinary art forms have vividly been explored. However, after World War II the art discourse has been dominated by a modernist idea of art that focussed on medium-specificity and an artwork's autonomy as the prerequisites for artistic quality. Medium-specificity thereby excluded the possibility of multi-media from the outset, since everything that formed the aesthetic experience of an object of art had to be situated and integrated in the medium itself. Interestingly, this idea of art also idealised a sense of purity, which was remarkable in the context of my search for "dirty light". Eventually, it was the rejection of this idea of medium-specificity, which became one of the most evident aspects of Minimalist Sculpture and Postmodernism, while the latter explicitly placed referentiality and the shifting meanings of an artwork's mimetics in the foreground – something that Modernism used to discard as insignificant. Conjoined by new technological possibilities, multi-media artworks thrived since the sixties. In music discourse, however, the combination of music with other art forms always remained something that was regarded with scepticism by certain camps.

In my opinion it is neither possible nor desirable to conclude which party is right, the one that wishes to concentrate on a single medium with its inherent qualities and specificities, or the one that attempts to blur the borders between art genres in order to find an immersive multi-sensory experience. For me it was important to understand the motivation of both points of view. Furthermore, I found it interesting to discover that concert light shows and DJ/VJ culture largely emerged from practical situations. Rather than being developed in a studio environment, they emerged from situations where a group of people conjoined their forces to put together live events. In a hands-on situation the combination of different media seems to happen more naturally.

In the last part of my research I attempted to question the common definitions of music that postulate that music is preoccupied with sonic events. I looked at examples of almost or completely inaudible compositions or performances, and also discussed the Pythagorean idea that harmony can be experienced in many different ways, while the sonic manifestation is only one possibility. The goal was to show that the presence of sonic events is not necessarily a prerequisite to experience an event as musical. Based on this understanding, it became possible to re-evaluate the concept of "visual music".

Altogether, this thesis is the attempt to provide a differentiated understanding of the qualities of sound and light and the problems that might arise in works that combine the two. I have come to a better theoretical and practical understanding of the ways in which they complement each other better than in others. In this way, my research around the noise and dirt issue has been crucial in order to understand that the meanings and functions that sound and light can take, each on its own and in the combination with each other, are never fixed. Hence, the potential relationships between the two form a boundless field of possibilities.

In all my compositions where I combine sound and light I have been very careful about establishing tight relationships between the two so that a structural connection is always present. This has been a strategy that I pursued for artistic reasons, but also in order to justify to myself this cross-disciplinary approach. After having collected and reflected a certain amount of experience, I have come to the point where I could see myself working with both media in a way in which the relationship between them is less tight and evident. Often, I have specially enjoyed moments in a composition where the music and the light design went their own ways after having been tightly related to each other at first. Therefore I have become curious to explore relationships between sound and light where the design of each medium is not directly derived from the same structural ideas, or where the relationships are less obvious. I have to say that this came to me as a surprise, since I have always been very critical about forms of visual music where the relationship between sound and vision seemed too vague. However, maybe – and hopefully – this is the result of coming to a point where I feel more confident about working with these media and where I do not feel the necessity anymore to justify the fact that I am leaving the realm of music as an exclusively sonic experience.

List of Scores:

1. My Ultradeep I for six performers, live-electronics and lighting 2006-07;

2. Alias for electric violin, live electronics, lighting and laser 2007;

3. Rational Cantilenae in Nine Triads for a roaring pianist and lighting 2008;

4. Jeanne of the Dark for five musicians, lighting and video 2008;

5. Corrosion for analogue electronics and laser reflections 2008/09;

6. Dromomania for two pianos, electronics and lighting 2009;

7. Planetary Runway audiovisual installation 2009.

List of DVDs

1. My Ultradeep I for six performers, live-electronics and lighting (2006-07)
   performed by **Bakin Zub:**
   Barbara Lüneburg: violin, viola
   Ulrich Krieger: sopranino saxophone, didjeridu
   Michael Blank: electric guitar
   Patricio Wang: electric bass
   Arnold Marinissen: percussion, musical saw, voice
   Marko Ciciliani: electronics, no-input mixer
   April 6, 2007, Theater Kikker in Utrecht/The Netherlands.
   Duration: ±65 minutes.

2. Alias for electric violin, live electronics, lighting and laser (2007)
   (lighting version from 2007)
   performed by Barbara Lüneburg: electric violin
   Festival *Wien Modern*, November 6, 2007, Sammlung Essl, Klosterneuburg/Austria.
   Duration: ±20 minutes.

3. Alias for electric violin, live electronics, lighting and laser (2007)
   (lighting version from 2009)
   performed by Barbara Lüneburg: electric violin
   DVD production, shot on January 22, 2010 at ZKM in Karlsruhe/Germany.
   Duration: ±20 minutes.

4. Rational Cantilenae in Nine Triads for a roaring pianist and lighting (2008)
   performed by Ashley Hribar: piano and vocals
   February 12, 2009, Muziekcentrum Den Bosch, 's Hertogenbosch/The Netherlands.
   Duration: ±18 minutes.

5. Jeanne of the Dark for four performers, lighting and video (2008)
   performed by **Bakin Zub:**
   Barbara Lüneburg: electric violin
   Michael Blank: electric guitar, electric bass
   Fedor Teunisse: percussion
   Marko Ciciliani: keyboards, electronics, table-top bass
   Huddersfield Contemporary Music Festival, November 27, 2008,

Huddersfield/Great Britain.
Duration: ±56 minutes

6. Corrosion for analogue electronics and laser reflections (2008/09)
performed by Marko Ciciliani: analogue synthesizer
May 7, 2009, Goethe Institute Los Angeles, Los Angeles/USA.
Duration: ±13 minutes.

7. Dromomania for two pianos, electronics and lighting (2009)
performed by Sonsoles Alonso: piano
Moritz Eggert: piano
Marko Ciciliani: electronics
February 14, 2010, Museum De Pont, Tilburg/The Netherlands.
Duration: ±40 minutes.

Bibliography

A

[Anonymus]: An explanation of the Ocular Harpsichord, upon shew to the Public, London, Printed for S.Hooper and A.Morley, London, British Library (1757)

Adorno, Theodor W.: Über einige Relationen zwischen Musik und Malerei, Berlin: Akademie der Künste (1967)

Albers, Josef: Interaction of Color, New Haven: Yale University Press (1963)

Apel, August: "Ton und Farbe", in: Allg. musikalische Zeitung (Leipzig) 2 (44), 30.7. (1800)

Auhagen, Wolfgang: Studien zur Tonartencharakteristik in theoretischen Schriften und Kompositionen vom späten 17. Bis zum Beginnn des 20. Jahrhunderts, Frankfurt a.M.: P.Lang (1983)

B

Bach, Johann Sebastian: Das Wohltemperierte Klavier Band I, München: G.Henle Verlag

Bahr, Petra: Loie Fuller, http://www.theomag.de/02/pb1.htm [accessed on May 24, 2010]

Bartòk, Bela: Herzog Blaubarts Burg, CD, München: Oehms Classics (2003)

Bartòk, Bela: Herzog Blaubarts Burg, Score, Vienna: Universal Edition

Blacking, John: "The Value of Music in Human Experience", in: Yearbook of the International Folk Music Council, Vol.1, Canberra: International Council for Traditional Music (1969)

Bruce, Vicki/Green, Patrick R./Georgeson, Mark A.: Visual Perception, Hove: Psychology Press (2003)

C

Cacciari, Cristina: "Why Do We Speak Metaphorically? Reflections on the Functions of Metaphor in Discourse and Reasoning", in: Katz, Albert N., Cacciari, Cristina; Gibbs, Raymond W. Jr.; Turner, Mark.: Figurative Language and Thought. New York & Oxford: Oxford University Press (1998)

Cage, John: 4'33", New York: Edition Peters (1960)

Cage, John: Silence, Middletown, CT: Wesleyan University Press (1961)

Campen, Cretien van: The Hidden Sense, Cambridge, MA: MIT Press (2008)

Castel, Louis-Bertrand: "Lettre du P.Castel, Jesuite, à M. de la Roque, écrité à P. le 9. Juin 1725", in: Mercure de France (probably 1726)

Castel, Louis-Bertrand: "Nouvelles expériences d'optique et d'acoustic", in: Mémoires (de Trévoux) pour l'histoire des sciences et des beaux arts 35 (1735)

Castel, Louis-Bertrand: "Lettre d. P.C.I.A.M.L.P.D.M. (sur un feu d'artifice où les couleurs bien diversifiées feraient un clavecin oculaire", in: Mémoires (de Trévoux) pour l'histoire des sciences et des beaux arts 35 (1739)

Castel, Louis-Bertrand: Optique des couleurs, Fondée sur les simples observations, & tournée sur-tout à la pratique de la peinture, de la teinture & des autresbarts coloristes, Paris (1740)

Chepesiuk, Ron: “Decibel Hell”, in: Environmental Health Perspectives, Vol. 113, No. 1, Cary, NC (2005)

Chion, Michel, Audio-Vision, New York: Columbia University Press (1994)

Chopin, Frédéric: Etudes op.10, München: G.Henle Verlag

Collins, Nicolas: Hacking the CD Player (2009),. PDF downloaded at http://www.nicolascollins.com/texts/cdhacking.pdf [May 30, 2010]

Collins, Nicolas: “Broken Light”, in: It was a Dark and Stormy Night, CD, New York: Trace Element Records (1992)

Crombie, Alistair Cameron: Augustine to Galileo, München: DTV (1959/77)

Cytowic, Richard E.: “Touching Tastes, Seeing Smells – and shaking up Brain Science”, in: Cerebrum, volume 4.3, Summer: 7-26 (2002)

D

Dekker, Annet: Synaesthetic Performance in the Club Scene, (2003), http://www.montevideo.nl/en/nieuws/detail.php?id=44&archief=ja&showjaar=2003&beginjaar=2006 [accessed on May 29, 2010]

Douglas, Mary: Purity and Danger (1966), London: Rutledge Classics (2002)

E

Eisenstein, Sergei M./Pudovkin, Vsevolod/Alexandrov, Grigori, “Statement on Sound”, in: The Eisenstein Reader, (ed.) Richard Taylor, BFI (1978)

F

Fierz, Markus: Girolamo Cardano (1501-1576), Basel: Schriftenreihe der Eidgenössischen Technischen Hochschule Zürich, Vol.4 (1977)

Flückiger, Barbara: Sound Design, Marburg: Schüren Verlag (2001)

Foucault, Michel: Sexualität und Wahrheit 1, Der Wille zum Wissen, Frankfurt a.M: Suhrkamp (1977)

G

Gaffurius, Franchinus: De harmonia musicorum instrumentorum opus, Book 4, Chapter 5, (1500)

Gage, John: Colour and Meaning, London: Thames and Hudson (1999)

Galton, Francis: “Visualised Numerals”, in: Nature Vol.22 (1880)

Gehring, Ulrike: Bilder aus Licht, Heidelberg: Kehrer Verlag (2006)

Gericke, Lothar and Schöne, Klaus: Das Phänomen der Farbe. Zur Geschichte und Theorie ihrere Anwendung, Berlin: Henschel Verlag (1970/73)

Godwin, Joscelyn: “The Revival of Speculative Music”, in: The Musical Quarterly, Vol. 68, No. 3, Oxford: Oxford University Press (1982)

Godwin, Joscelyn: The Harmony of the Spheres, Rochester, Vermont: Inner Traditions International (1993)

Goethe, Johann Wolfgang: Farbenlehre (1810), Weimar: Deutsche Akademie der Naturforscher

Leopoldia, Schriften zur Naturwissenschaft (1988)
Groot, Jan Willem de: “Gnosis en raszuiverheid”, in: v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998)

H

Haase, Rudolf: Geschichte des Harmonikalen Pythagoreismus, Vienna: Verlag Elisabethe Lafite (1969)
Haase, Rudolf: Harmonikale Grundlagenforschung, in: Acta Musicologica, Vol. 58, Fasc. 2, International Musicological Society (1986)
Hegarty, Paul: Noise/Music, a history, New York: Continuum (2007)
Hilmar Hoffmann & Walter Schobert (ed.): Perspektiven. Zur Geschichte der filmischen Wahrnehmung. Dauerausstellung 1: Vom Guckkasten zur Cinematographe Lumière, Frankfurt: Deutsches Fimmuseum (1986)

J

Jewanski, Jörg: Ist C = Rot?, Berlin: Berliner Musik Studien Band 17 (1996)
Jewanski, Jörg and Siedler, Nathalie: Farbe – Licht – Musik, Bern: Peter Lang (2006)

K

Kahn, Douglas: Noise Water Meat, Cambridge, MA: MIT Press (1999)
Keefer, Cindy: interview with Silvia Bianchi, http://www.digicult.it/digimag/article.asp?id=817 [accessed on March 20, 2010]
Keefer, Cindy and Ox, Jack: On Curating Recent Digital Abstract Visual Music, 2008, http://www.centerforvisualmusic.org/Ox_Keefer_VM.htm [accessed on January 11, 2010]
Kelly, Caleb: Cracked Media, Cambridge, MA: MIT Press (2009)
Klementz, Constanze: Tanz als Audiovision, http://beta.see-this-sound.at/kompendium/text/45/5 [accessed on May 25, 2010]
Krauss, Rosalind E.: “Sculpture in the Expanded Field” (1978), in: The Originality of the Avant-Garde and Other Modernist Myths, Cambridge, MA: MIT Press (1986)
Krüger, Johann Gottlob: Naturlehre, volume 1, Halle (1740)

L

Labrie, Arnold: “Het verlangen naar Zuiverheid”, in: v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998)
Lachenmann, Helmut: “Accanto”, in: Helmut Lachenmann, Musik-Konzepte, Vol.61/62, München: Edition Text & Kritik GmbH (1988)
Lachenmann, Helmut: “Accanto”, in Helmut Lachenmann Musique Concrète, CD, Stockholm: x5musicgroup (2009)
Leibovivi, Solange: “Zuiverheid als Utopie”, in: v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998)
Linde, Almut: “Radical Beauty”, interview with Oliver Zybok, in: Kunstforum Vol.199,

Ruppichteroth: Kunstforum International (2009)

Lund, Cornelia and Holger: “Editorial”, in: Audio.Visual – On Visual Music and Related Media, [ed: Cornelia and Holger Lund], Stuttgart: Arnoldsche Art Publishers (2009)

Lund, Holger: “Visual Music in the context of Multimedia Parties”, in: Audio.Visual – On Visual Music and Related Media, [ed: Cornelia and Holger Lund], Stuttgart: Arnoldsche Art Publishers (2009)

M

Mozart, Wolfgang Amadeus: “Klarinettenkonzert K.622”, in: Neue Mozart Ausgabe Vol.14, Kassel: Bärenreiter Verlag, (2006)

Murch, Walter: “Foreword”, in: Chion, Michel: Audio-Vision, New York: Columbia University Press (1990)

N

Naumann, Sandra: “Seeing Sound, The Short Films of May Ellen Bute”, in: Audio.Visual – On Visual Music and Related Media, [ed: Cornelia and Holger Lund], Stuttgart: Arnoldsche Art Publishers (2009)

Nattiez, Jean-Jacques: Music and Discourse, Princeton: Princeton University Press (1990)

Neisser, Ulic: Cognition and Reality, New York: W.H.Freeman & Co Ltd (1976)

Newton, Isaac: Optics, Book 1, Part 2, Prop.3, Prob. 1, Exper. 7 (1704)

Nivelle, Armand (1971): Les théories estétiques en Allemagne de Baumgarten à Kant, Paris (1971)

Nyman, Michael: Experimental Music, Cambridge, UK: Cambridge University Press (1999, 2nd Ed.)

O

Oosterhuis, Harry: “Sexuele grensconflicten in fin-de-siècle Wenen”, in: v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998)

Oppenheimer , Robin: “An International Picture Language: The History and Aesthetics of West Coast Light Shows”, in: Bulletin of the Computer Arts Society, Page 58, Autumn 2004.

Owens, Craig: “The Allegorical Impulse: Toward a Theory of Postmodernism”, in October, Vol.12 (1980)

P

Pierce, John R.: Klang, Heidelberg: Spektrum der Wissenschaft (1985)

Poidevin, Robin de, The Experience and Perception of Time, Stanford Encyclopedia of Philosophy, plato.stanford.edu/entries/time-experience/ [accessed on October 25, 2009]

R

Rainer, Cosima: See this Sound, Cologne: Walther König (2009)

Raitt, Jill: “The *Vagina Dentata* and the *Immacultaus Uterus Divini Fontis*”, in: The Journal of the American Academy of Religion, Vol.48, Nr.3 (1980)

Ramachandran, V.S. and Hubbard, E.M.: “Synaesthesia – A Window Into Perception, Thought and

Language", in: Journal of Consciousness Studies, 8, No.12, (2001)

Rebentisch, Juliane: Ästhetik der Installation, Frankfurt a.M.: Edition Suhrkamp (2003)

Riley II, Charles A.: Color Codes, Hanover, NH: University Press of New England (1995)

Roth, Franz: Untersuchungen der Beziehung von Einzeltönen zu Gefühlen und Farben, Vienna (1951)

Ruttmann, Walter: "Wochenende", in: Anthology of Noise and Electronic Music Vol.1, CD, Brussels: Sub Rosa (2009)

S

Sandler, Irving: Art of the Postmodern Era, New York City: Icon Editions/HarperCollins Books (1996)

Schäfke, Rudolf: Geschichte der Musikästhetik in Umrissen, Berlin (1934)

Schafer, Murray: Ear Cleaning, Vienna: Universal Edition, (1969)

Schafer, Murray: The Soundscape, Rochester, Vermont: Destiny Books (1977)

Schneider, Marius: Singende Steine. Rhythmus Studien an drei katalanischen Kreuzgängen romanischen Stils, Kassel: Bärenreiter Verlag (1955)

Schönberg, Arnold: Die glückliche Hand, Vienna: Universal Edition

Schürmann, Eva: Erscheinen und Wahrnehmen, München: Wilhelm Fink Verlag (2000)

Scriabin, Alexander: Prometheus op.60, Mainz: Edition Eulenburg

Segal, Joes: "Gestolde Identiteiten", in: v.d. Laarse, Labrie, Melching ed., De Hang naar Zuiverheid, Amsterdam: Het Spinhuis (1998)

Selwood, Sara: "Color Music and Abstract Film", in: Light Art from artificial Light, ZKM/Hatje Cantz (2005)

Shipley, T, "Auditory Flutter-Driving of Visual Flicker", in: Science New Series, Vol. 145, No. 3638 (Sep. 18, 1964)

Sirker, Udo: "Joseph Saveurs musikakustische Untersuchungen. Ein Beitrag zur experimentellen Forschung um 1700", in: Ars musica, musica scientia, Cologne (1980)

Small, Christopher: Musicking, Middletown, CT: Wesleyan University Press (1998)

Stegmüller, Wolfgang: Probleme und Resultate der Wissenschaftstheorie und Analytischen Philosophie, Vol. 1, Berlin: Springer (1969/74)

Stockburger, Axel: "Seeing Sound, The Short Films of May Ellen Bute", in: Audio.Visual – On Visual Music and Related Media, [ed: Cornelia and Holger Lund], Stuttgart: Arnoldsche Art Publishers (2009)

Szulakowska, Ursula (2000): The Alchemy of Light, Leiden: Brill (2000)

T

Tart, C.T.: On being stoned: A psychological study of Marijuana intoxication, Palo Alto: Science and Behavior Books (1971)

Taylor, F. Scott: "Synaesthesia and "The Name of Silence" in the work of Steven Heimbecker", in: Heimbecker, Steve: Songs of Place, Montreal: Oboro (2005)

Thürlemann, Felix: "Grün – Die verstossene Vierte. Zur Genealogie des modernen Farbpurismus", in: Rot Gelb Blau: Die Primärfarben in der Kunst des 20. Jahrhunderts, Stuttgart/Teufen (1988)

V

van der Velden, J.A.: Israël en het antisemitisme, Kampen: De Groot Goudriaan (1990)

Vlachos, Paul and Finkelstein: Video Out, DVD, Meredith, New York City: 13bit productions (2005)

W

Warburton, Dan: "THE SOUND OF SILENCE: the music and aesthetics of the Wandelweiser Group", in: Signal to Noise (2001)

Warren, Richard M. and Roslyn P., "Auditory Illusions and Confusions" in: Scientific American, Vol. 223, New York: Scientific American Inc. (1970)

Watz, Marius: "More Points to the Chicken: Visual Instruments and New Directions in Improvised Visual Performance", in: 'vE-"jA, [ed: Eskandar, Xárene], San Francisco: h4 (2006)

Weibel, Peter: "The Development of Light Art", in Light Art from artificial Light, ZKM/Hatje Cantz (2005)

Wellek, Albert: Doppelempfinden und Programmusik, Vienna (1928)

Winkler, Gerhard E.: Heptameron, CD, Salzburg: Col Legno (2004)

Woronov, Mary in: O'Brian, Glenn: Tune in, Turn on, Light up (2005), http://www.tate.org.uk/tateetc/issue4/summeroflove.htm [accessed on January 16, 2010]

X

Xárene, Eskandar: "Introduction", in:'vE-"jA, [ed: Eskandar, Xárene], San Francisco: h4 (2006)

Y

Young, Thomas: On the Theory of Light and Colours, in: Philosophical Transactions, of the Royal Society of London (1802)

Youngblood, Gene: Expanded Cinema, New York: P. Dutton & Co., Inc. (1970)

Z

Zarlino, Gioseffe: Le institutioni harmoniche, parte III, cap.8, Venice (1558)

Zoller, Maxa, in "Sound in Expanded Cinema: Malcolm Le Grice's *Berlin Horse*", in: Audio.Visual – On Visual Music and Related Media, (ed.) Cornelia and Holger Lund, Stuttgart: ARNOLDSCHE Art Publisher (2009)

Acknowledgements:

I wish to thank my supervisors **Dr. Bob Gilmore** and **Prof. Dr. Johannes Birringer** for their insight, invaluable advice, support and encouragement throughout my time at Brunel University.

My Ultradeep I

for violin/viola, sopranino sax/didjeridu, electric guitar, electric 6-string bass, percussion/musical saw/voice, live-electronics, no input mixer and lighting

marko ciciliani 2006/2007

My Ultradeep I

for violin/viola, sopranino sax/didjeridu, electric guitar, electric 6-string bass, percussion/musical saw/voice, live-electronics, no input mixer and lighting

composed by
Marko Ciciliani

for Bakin Zub
with a commission by the Fonds voor de scheppende Toonkunst
June 2006 - February 2007

In “My Ultradeep I” the idea of individuality as the “in-divisible” entity in society is artistically investigated. Individuality lies at the core of Western culture where it holds the status of one of the most basic human rights. This project poses the question to what degree the uniqueness of an individuality is truly authentic and in how far is it a product of non-reflected influences and manipulations coming from the outside.

Descartes' renowned sentence “I think, therefore I am” expresses that the identity of the “self” is allocated in the spiritual realm, detached from the body. This is a notion that was characteristic of the Enlightenment period. However, it is the physical human senses that are forming the interface between the individual and the outside world and enable us to relate to our environment. It is through the differentiation to the 'other' that a sense of the 'self' is born.

Based on this idea, the piece is divided into sections according to the human senses. It starts out with a large block consisting of five sections, each dedicated to one of the five senses: Skin, Smell, Taste, Hearing and Sight. The second block is based on the more nebulous 6th sense, which is here understood as the metaphysical sense of the "I", the sense where the feeling for identity - the “I” - takes shape. The order and durations of the individual sections are:

1. Skin 14'
2. Smell 5'
3. Taste 3'
4. Hearing 11'
5. Sight 7'

-----

6. I 25'

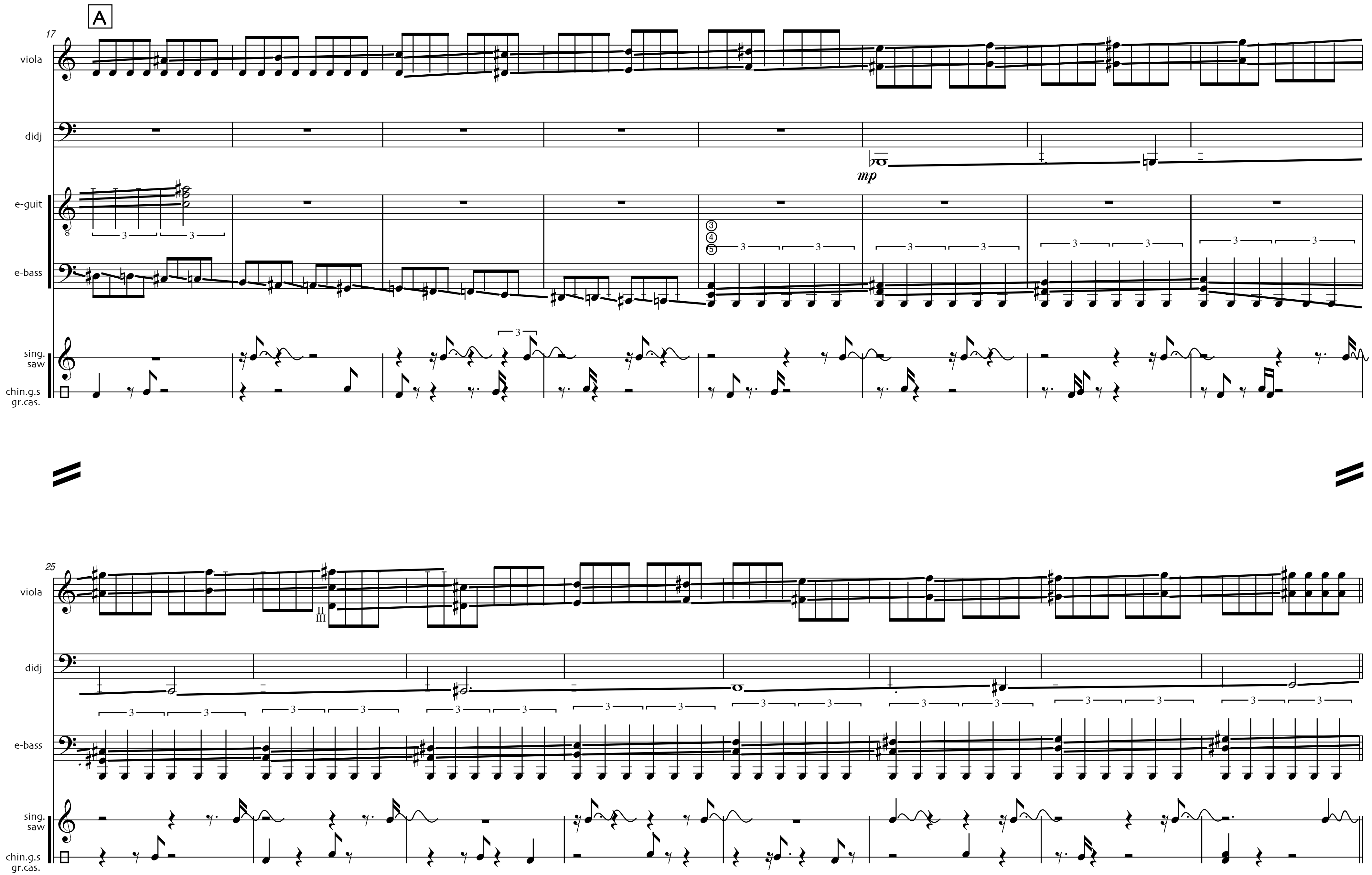
For the live-electronics a program has been written in SuperCollider that contains all the required processings and samples that have to be applied during the piece. It can be provided by the compose (contact: marko@ciciliani.com) along with all instructions concerning its operation.

"My Ultradeep I" also makes use of a rather refined light design which is controlled by a dedicated laptop with a specifically written software – again written in SuperCollider and also obtainable by the composer. The light setup of “My Ultradeep I” consists of three screens that are positioned in the back of the stage and left and right of it. Each of the screens can be colourised monochromatically, using red, green and blue mixtures. In addition, three balloon-shaped objects are positioned in front of the musicians that were specially designed for this project by artists Kyoko Inatome. Inside these balloons are three LED lamps that can also mix colours using red, green and blue LEDs. Hence, a total of six independently controllable light units are used in this piece.

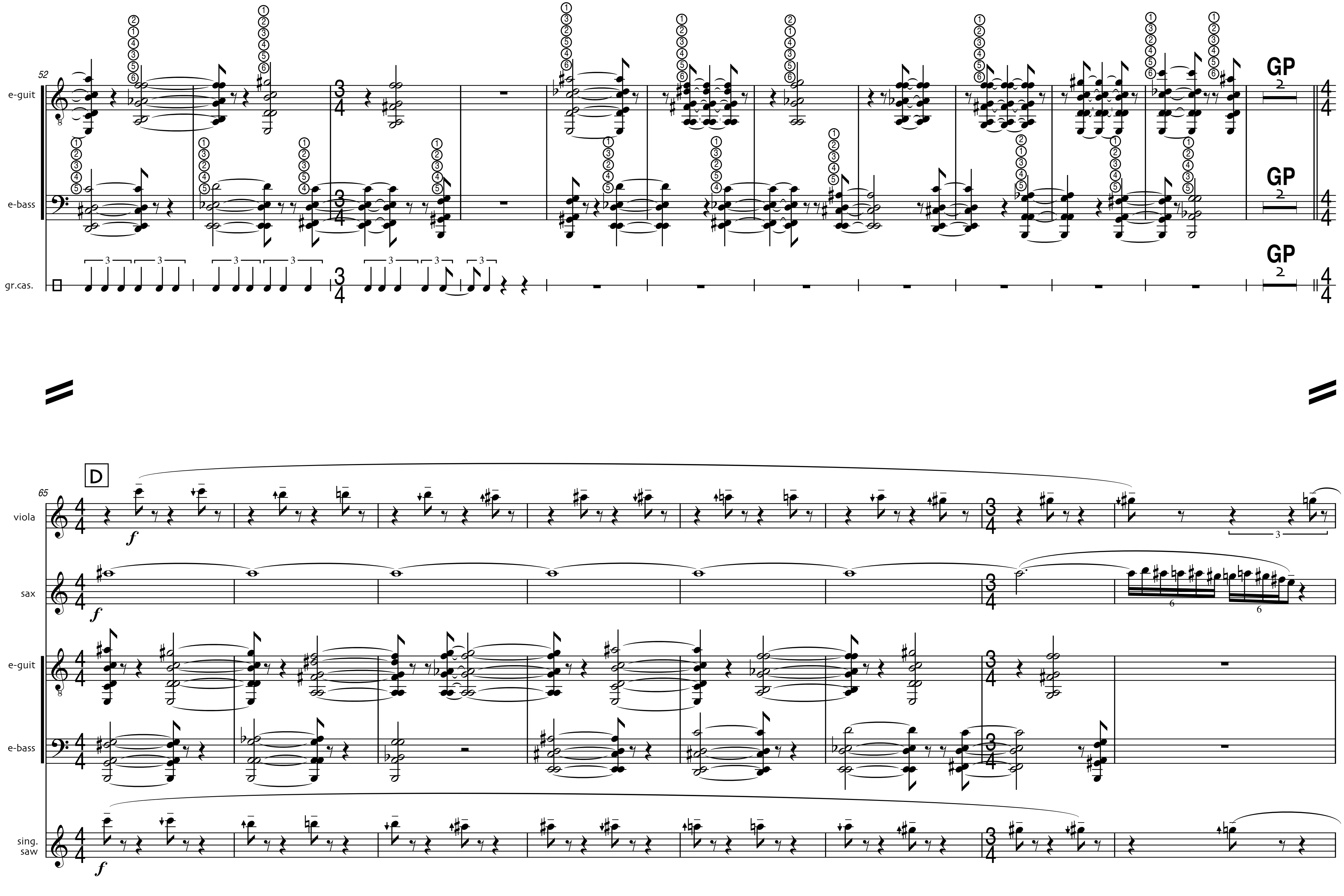
The image on the right shows the setup of the lighting equipment. A detailed description of the setup and the used fixtures is provided with the softeware.

Nr.1

♩ = 90 - 92
etc. keep speeding up and slowing down ad lib. with gentle changes
viola
didjeridu
electric guitar
bottleneck
electric bass
5-string fretless bass
singing saw
with mallet: vary pitches ad lib.
chinese gongs
gran cassa
mp
mf
8
viola
didj
e-guit
e-bass
sing. saw
chin.g.s gr.cas.

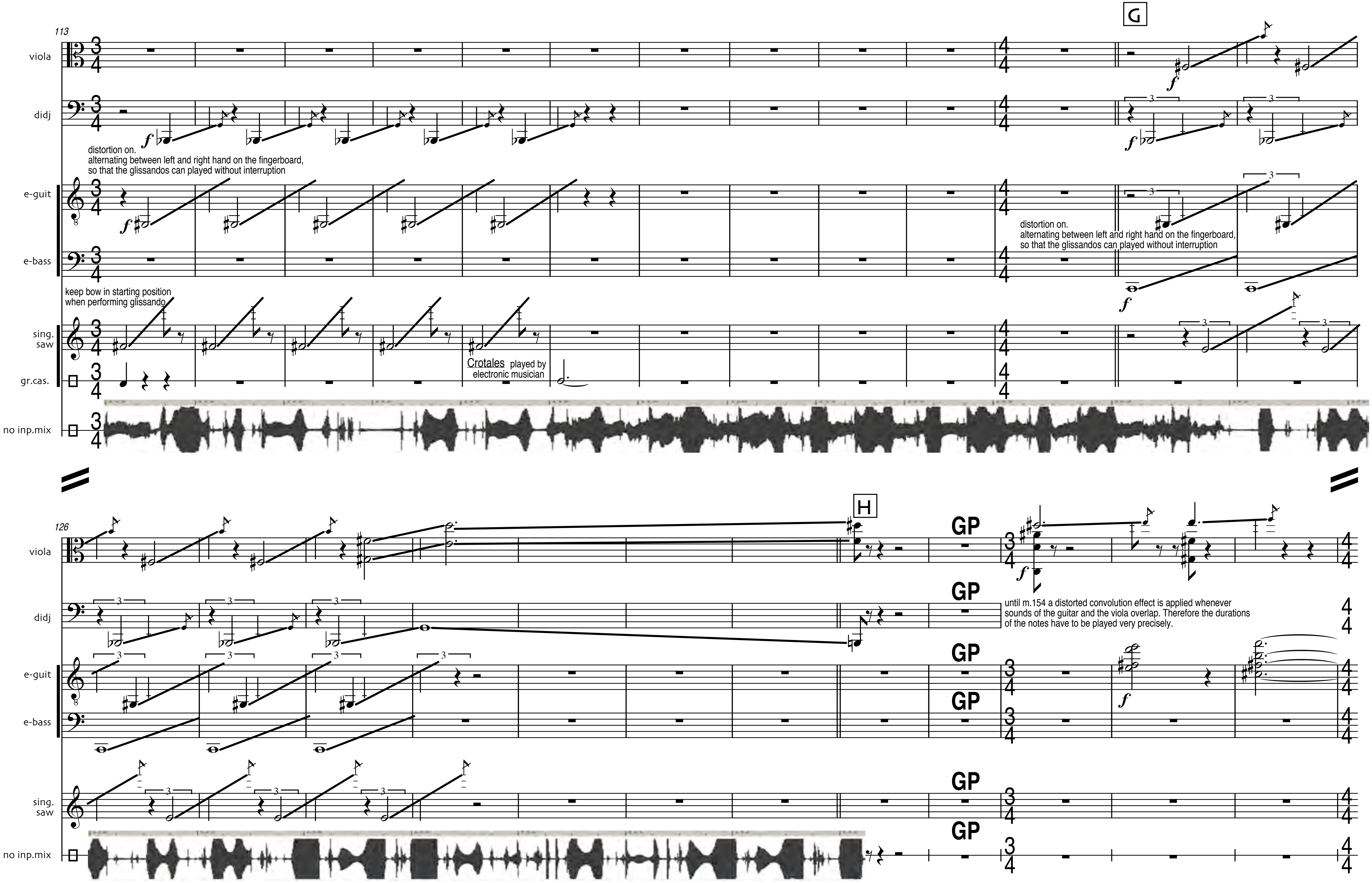

A
17
viola
didj
mp
e-guit
e-bass
sing. saw
chin.g.s gr.cas.
25
viola
didj
e-bass
sing. saw
chin.g.s gr.cas.


B
33
pizz.
create with the singing saw a continuously decending line
arco
viola
mf
f
S-Sax
muta in sopranino-sax
didj
mf
grinding effect
on guitar
8va
e-guit
mf
until m.100 a distorted convolution effect is applied whenever sounds of the guitar and the bass overlap. Therefore the durations of the notes have to be played very precisely.
e-bass
mf
lasciare vibrare
form with viola a continuously descenting line
can be omitted if more
time is required to take the bow
arco
sing.
saw
f
chin.g.s
gr.cas.
mf
C
42
viola
sax
(8va)
e-guit
f
e-bass
f
sing.
saw
gr.cas.
mf

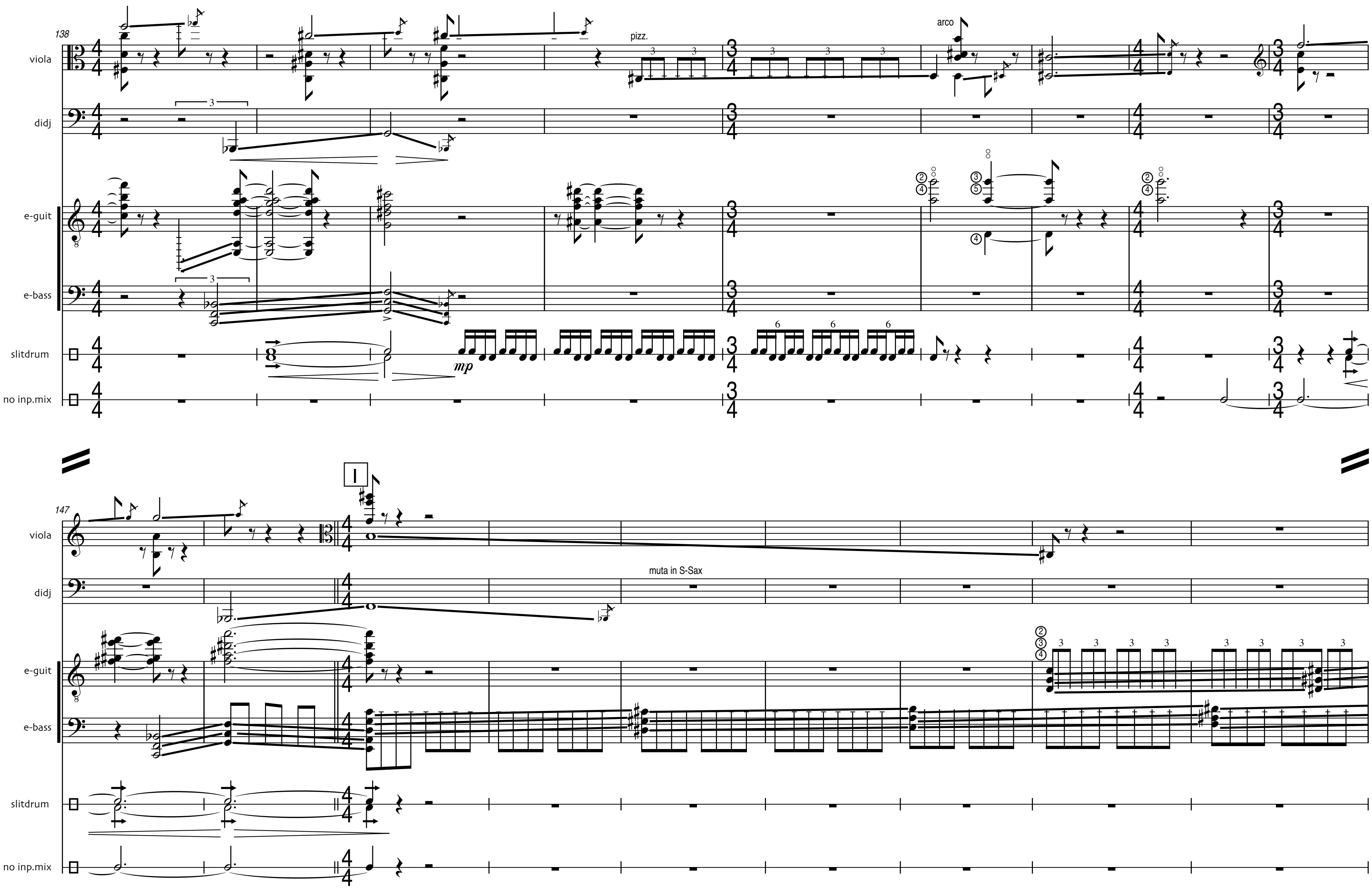

52
e-guit
e-bass
gr.cas.
GP
D
65
viola
sax
e-guit
e-bass
sing. saw


73
E
viola
sax
e-guit
e-bass
sing. saw
gr.cas.
grinding effect on guitar
(distorted convolution between guit. and bass is also remains active)
82
mp
8va


91
viola
sax
pp
(8va)
e-guit
e-bass
sing. saw
gr.cas.
F
100
sax
muta in didjeridu
gr.cas.
f
no inp.mix



G
113
viola
didj
distortion on.
alternating between left and right hand on the fingerboard,
so that the glissandos can played without interruption
e-guit
e-bass
distortion on.
alternating between left and right hand on the fingerboard,
so that the glissandos can played without interruption
keep bow in starting position
when performing glissando
sing. saw
Crotales played by
electronic musician
gr.cas.
no inp.mix
H
126
GP
until m.154 a distorted convolution effect is applied whenever
sounds of the guitar and the viola overlap. Therefore the durations
of the notes have to be played very precisely.


138
viola
didj
e-guit
e-bass
slitdrum
no inp.mix
pizz.
arco
mp
147
I
muta in S-Sax

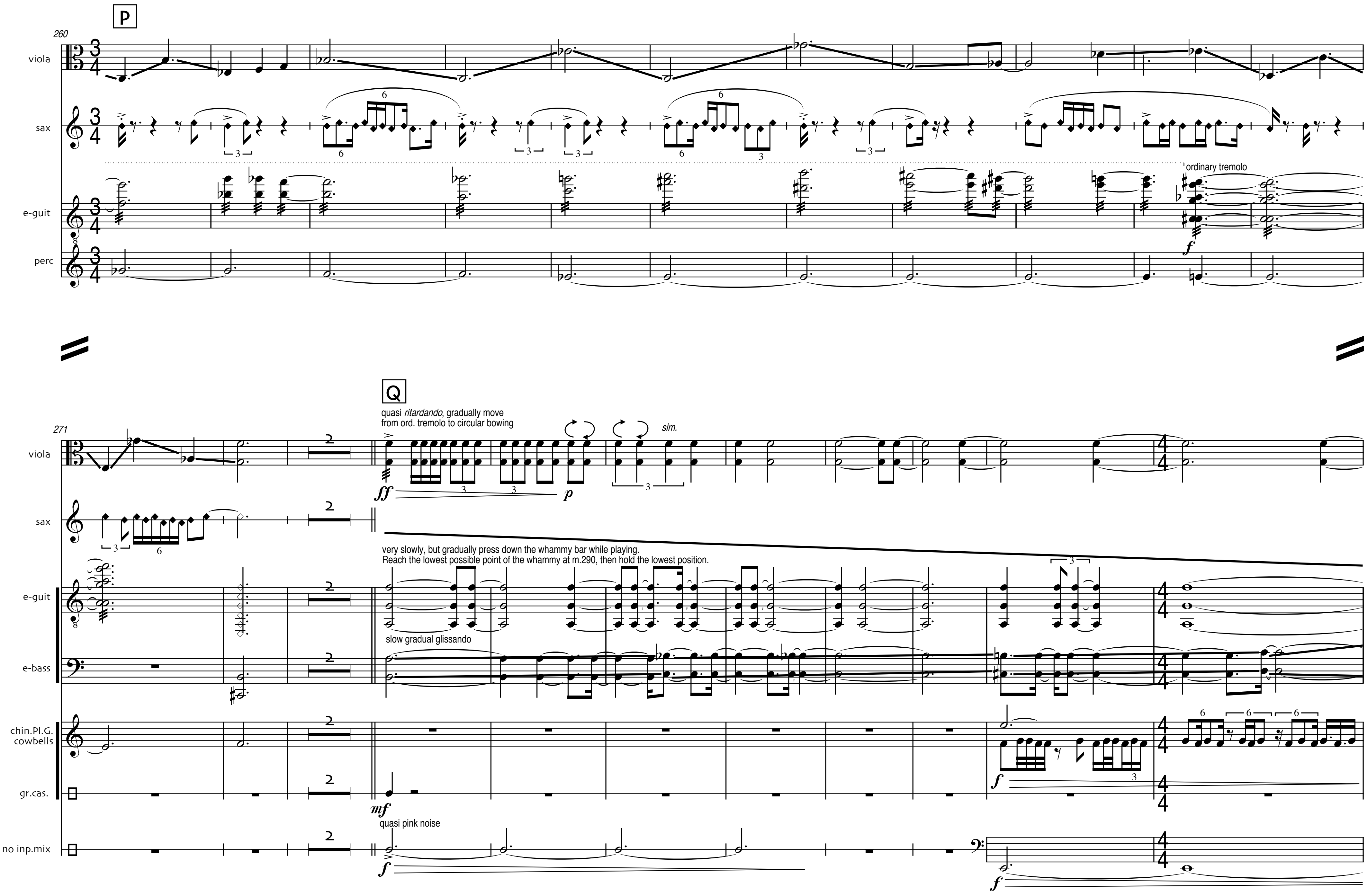

J
156
viola
sax
e-guit
e-bass
sing. saw
164
Dist.I
Dist._I
gr.cas.
electr
Pitch shift with saw-wave form with an interval of a perfectly tuned minor seventh (4/7).
The pitch shift is applied independantly on two instrumental groups:
guitar and bass guitar (above line) and viola, sax and saw (below line)


172
viola
sax
e-guit
Dist.l
e-bass
Dist._l
sing. saw
electr
K
179
Distortion on ->
with mallet: pitch ad lib.
chin.g.s
gr.cas.
crotales


187
e-guit
e-bass
sing. saw
chin.g.s gr.cas.
electr
GP
199
L tempo libero
N = strong noise component
sax
f
mp
211
M
Bullroarer
slowly, but continuously change speed & pitch
bullr.


222
sax
e-guit
bullr.
no inp.mix
N
tempo primo
ff
mp
f
232
viola
sul ponticello
create (natural) harmonics ad lib, creating a sonic
texture which matches the character of the bullroarer.
sim.
ppp
fret-tremolo
ordinary tremolo
p

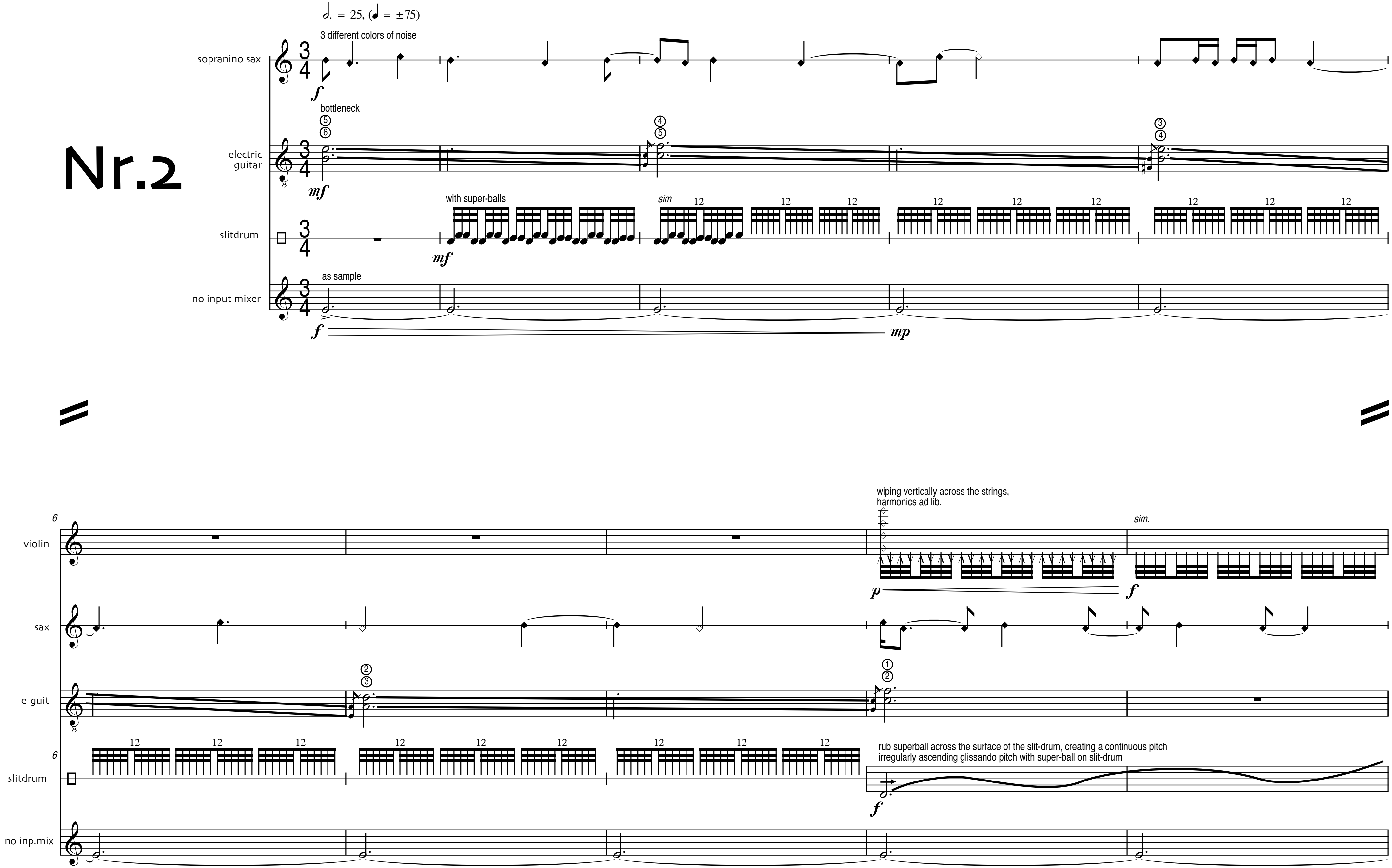

244
O
subtle glissandi up and down (total range ±1/2-tone) irregular in tempo
viola
sax
subtle glissandi up and down (total range ±1/2-tone) performed with tremolo
e-guit
bullr.
252
viola
sax
e-guit
Cow Bell
don't strike, circulate with pebble stone
cowbells


P
260
viola
sax
e-guit
perc
ordinary tremolo
Q
271
quasi ritardando, gradually move
from ord. tremolo to circular bowing
sim.
very slowly, but gradually press down the whammy bar while playing.
Reach the lowest possible point of the whammy at m.290, then hold the lowest position.
e-bass
slow gradual glissando
chin.Pl.G.
cowbells
gr.cas.
no inp.mix
quasi pink noise

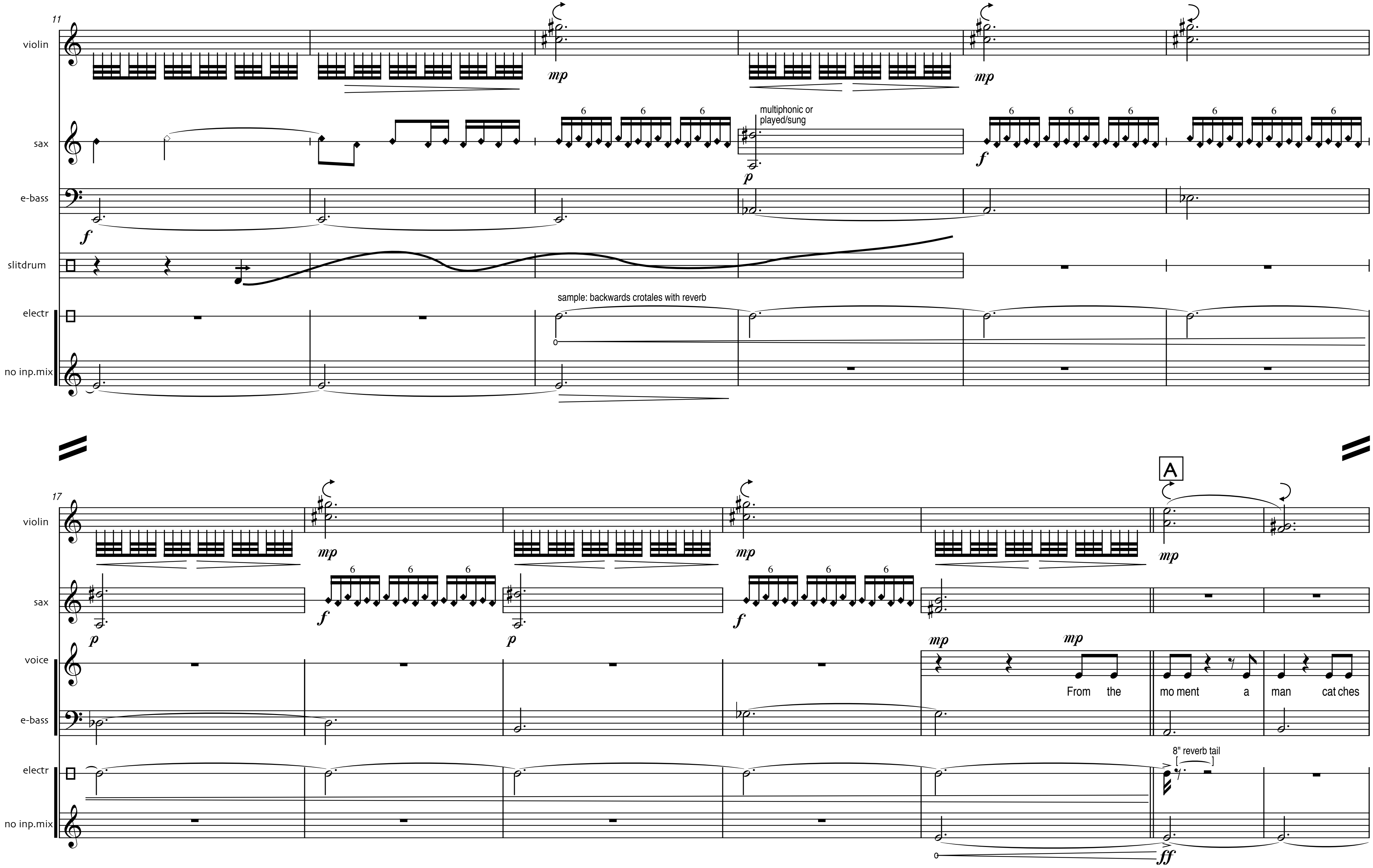

283
viola
quasi ritardando, gradually move
from ord. tremolo to circular bowing
sim.
whammy:
e-guit
take bottle-neck
e-bass
chin.Pl.G.
cowbells
gr.cas.
no inp.mix
quasi pink noise
290
pizz.
didj
press bottleneck between the leftmost two
pickups so that a sustained chord results;
R
sempre lasciare vibrare


298
viola
didj
e-bass
cowbells
electr
pizz.
arco
306
e-guit
slitdrum
no inp.mix
muta in sopranino sax
whammy:
"sine-tone generator emulation":
play accellerating pulses that transform into an ascending pitch and the same
again backwards, like a large arch-shaped glissando.
sim.
high no-input mixer sample

Nr.2



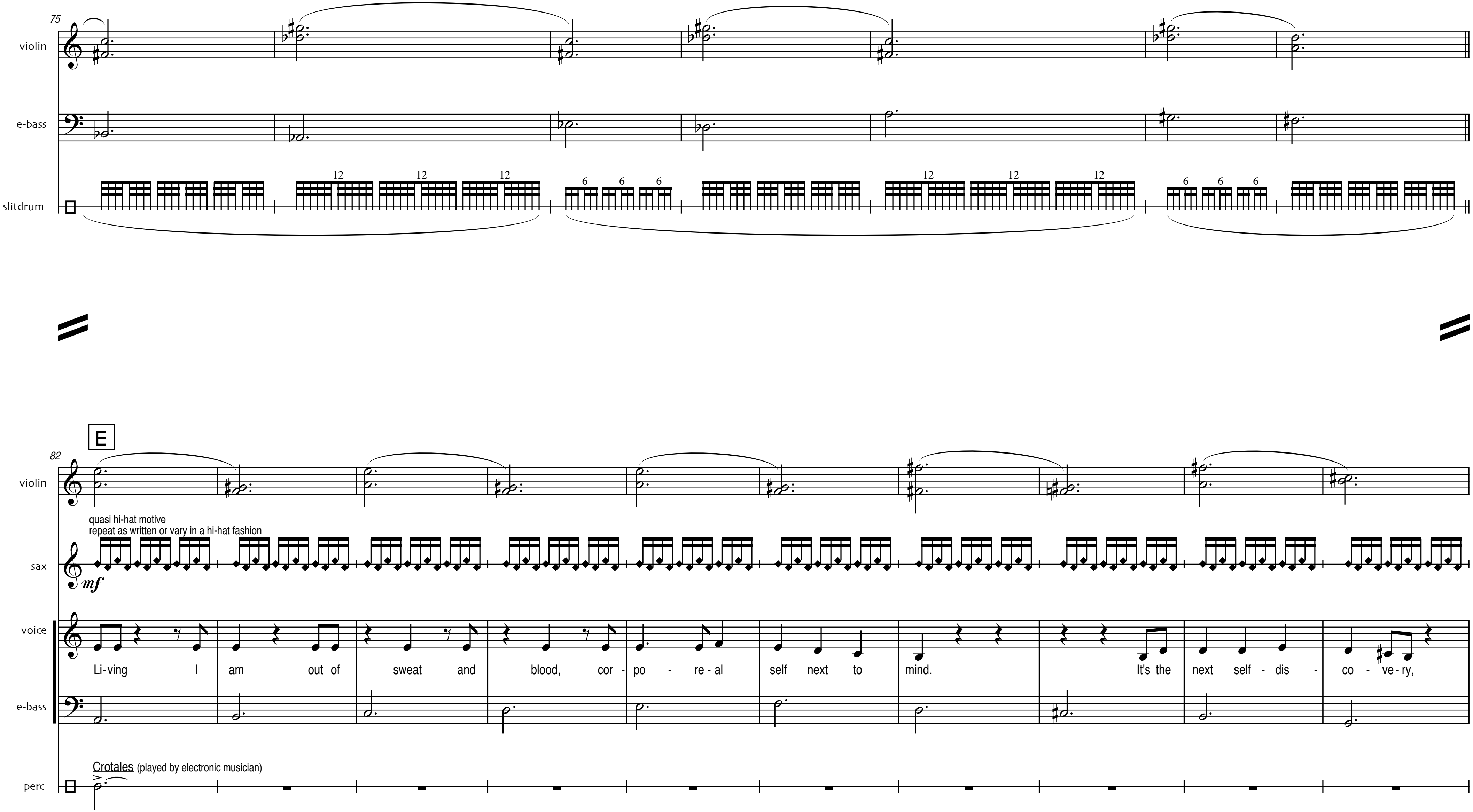
𝅗𝅥. = 25, (♩ = ±75)
3 different colors of noise
soprano sax
bottleneck
electric guitar
with super-balls
sim
12
slitdrum
as sample
no input mixer
mf
f
mp
6
violin
wiping vertically across the strings,
harmonics ad lib.
sim.
p
sax
e-guit
rub superball across the surface of the slit-drum, creating a continuous pitch
irregularly ascending glissando pitch with super-ball on slit-drum
no inp.mix



11
violin
sax
e-bass
slitdrum
electr
no inp.mix
multiphonic or
played/sung
sample: backwards crotales with reverb
17
A
voice
From the
mo ment a
man cat ches
8" reverb tail

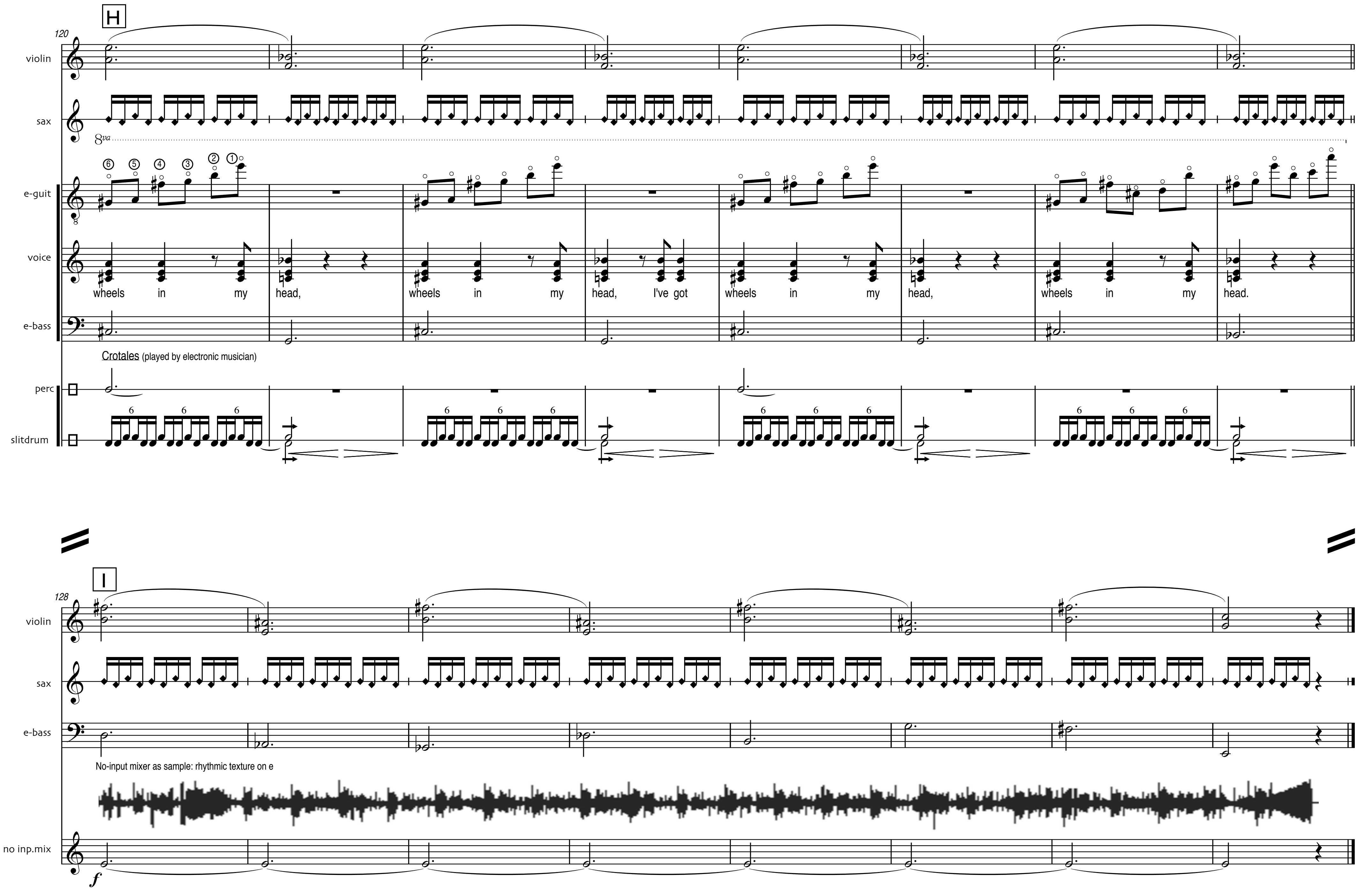

24
violin
sim.
voice
sight of the light, takes a breath of the air of the world, a man seeks to find out him self, and get hold of him self out of con - fu - sion, in which he and
e-bass
no inp.mix
37
B
every thing else is tossed a - bout in mot - ley mix - ture.
Mind is the name of the first self - dis - co - ve - ry, the first turn down of the di - vine.
No-input mixer
irregular pulse ad lib.
-> sim.
mf


51
violin
voice
For the first time we come to see, since we've be - come to be, what's all a - round us we have not been loo-king at but in-stead: we've on - ly been sta - ring
e-bass
no inp.mix
64
C
D
violin
8va
processed with grinding
e-guit
mp
voice
at it. I've got wheels in my head, wheels in my head, I've got wheels in my head, wheels in my head.
e-bass
slitdrum
sim.
quasi acc. over 3 measures
mf
no inp.mix


75
violin
e-bass
slitdrum
12
6
E
82
violin
quasi hi-hat motive
repeat as written or vary in a hi-hat fashion
sax
mf
voice
Li-ving I am out of sweat and blood, cor-po - re-al self next to mind. It's the next self - dis - co - ve-ry,
e-bass
Crotales (played by electronic musician)
perc

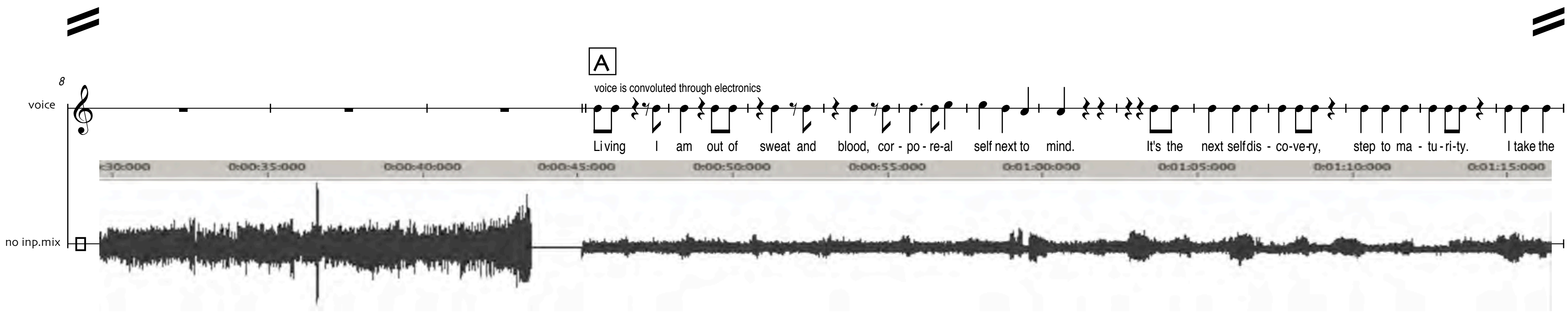
92
violin
sax
voice
e-bass
no inp.mix
step to ma - - tu - ri - ty. I take the world as mine, light in my soul let shine, gra - vi - ty:
100
F
8va
e-guit
2nd and 3rd voice sung by
percussionist and electronic musician
fine em - bo - - died spi - rit. I've got wheels in my head, wheels in my
slitdrum
mf

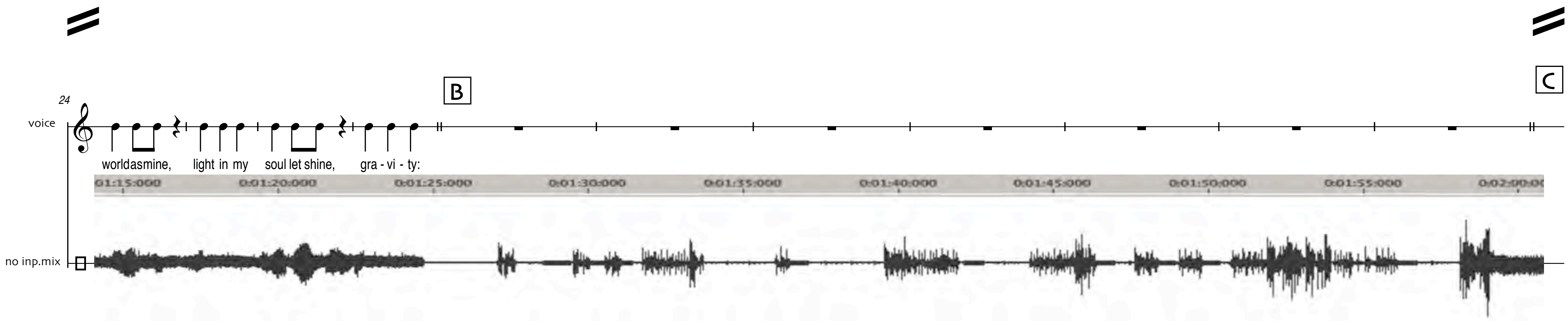

G
107
violin
sax
(8va)
8va
e-guit
voice
head, I've got
wheels in my
head,
wheels in my
head.
e-bass
sim. quasi acc. over 3 measures
slitdrum
no inp.mix
114
violin
sax
voice
I've got
e-bass
sim.
quasi acc. over 3 measures
slitdrum
no inp.mix


H
120
violin
sax
e-guit
voice
wheels in my head,
wheels in my head, I've got
wheels in my head,
wheels in my head.
e-bass
Crotales (played by electronic musician)
perc
slitdrum
I
128
violin
sax
e-bass
No-input mixer as sample: rhythmic texture on e
no inp.mix


0:00:05:000
0:00:10:000
0:00:15:000
0:00:20:000
0:00:25:000
0:00:30:000
no inp.mix

Nr.3


8
voice
A
voice is convoluted through electronics
Living I am out of sweat and blood, cor - po - re-al self next to mind. It's the next self dis - co-ve-ry, step to ma - tu-ri-ty. I take the
0:00:35:000
0:00:40:000
0:00:45:000
0:00:50:000
0:00:55:000
0:01:00:000
0:01:05:000
0:01:10:000
0:01:15:000
no inp.mix


24
voice
B
C
worldasmine, light in my soul let shine, gra - vi - ty:
01:15:000
0:01:20:000
0:01:25:000
0:01:30:000
0:01:35:000
0:01:40:000
0:01:45:000
0:01:50:000
0:01:55:000
no inp.mix

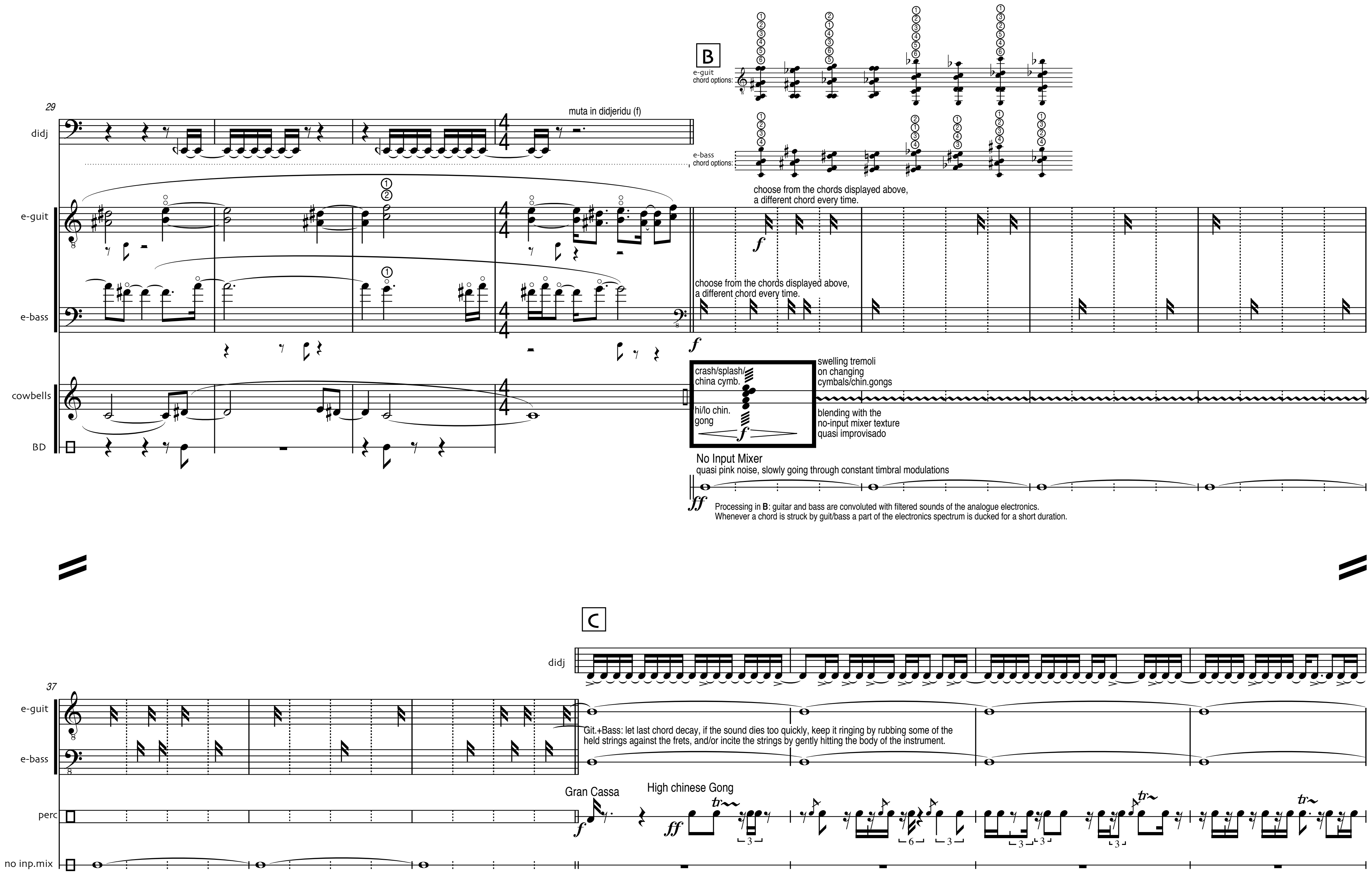

0:02:00:000
0:02:05:000
0:02:10:000
0:02:15:000
0:02:20:000
0:02:25:000
0:02:30:000
0:02:35:000
0:02:40:000
36
no inp.mix

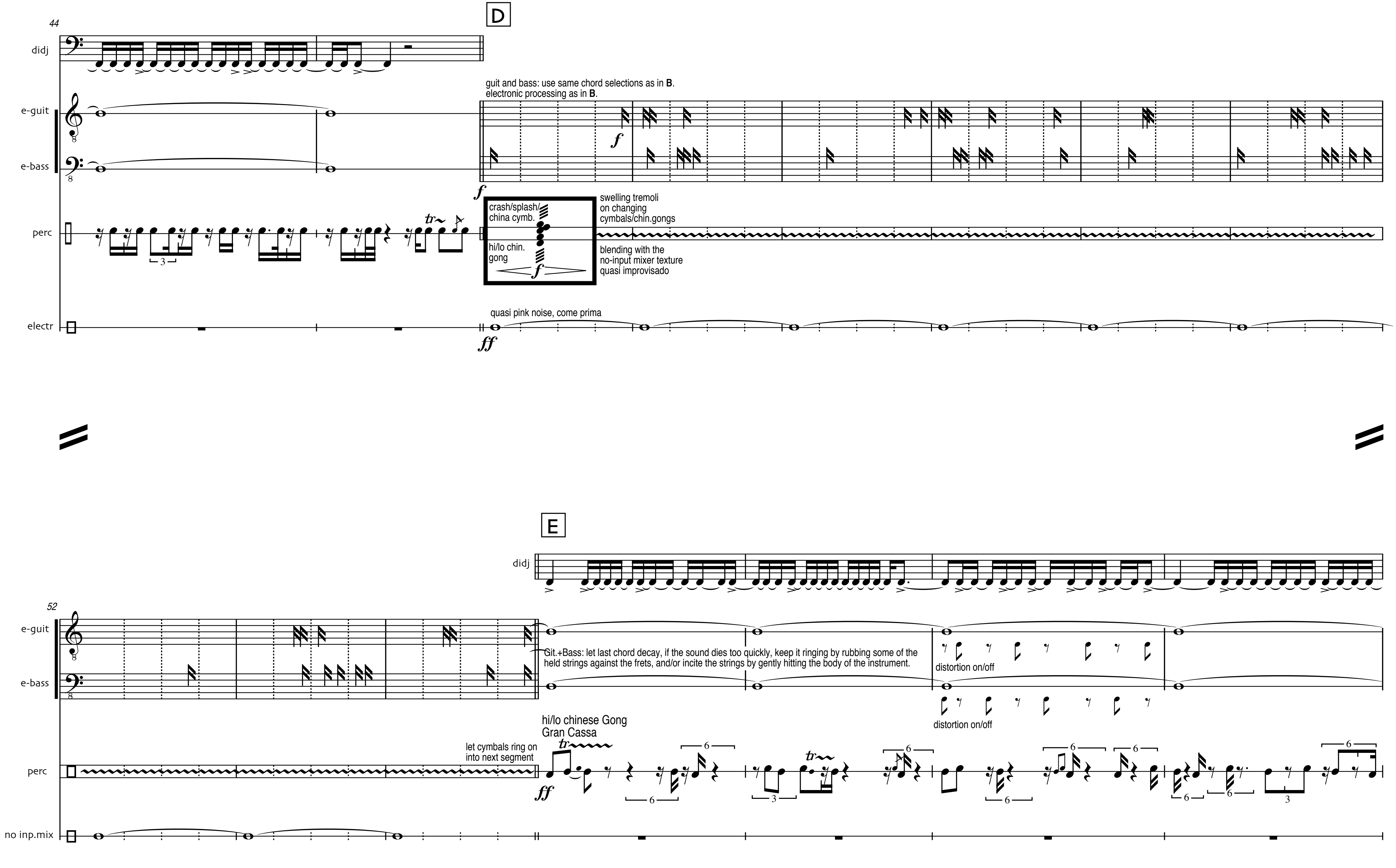

0:02:45:000
0:02:50:000
0:02:55:000
0:03:00:000
0:03:05:000
46
no inp.mix

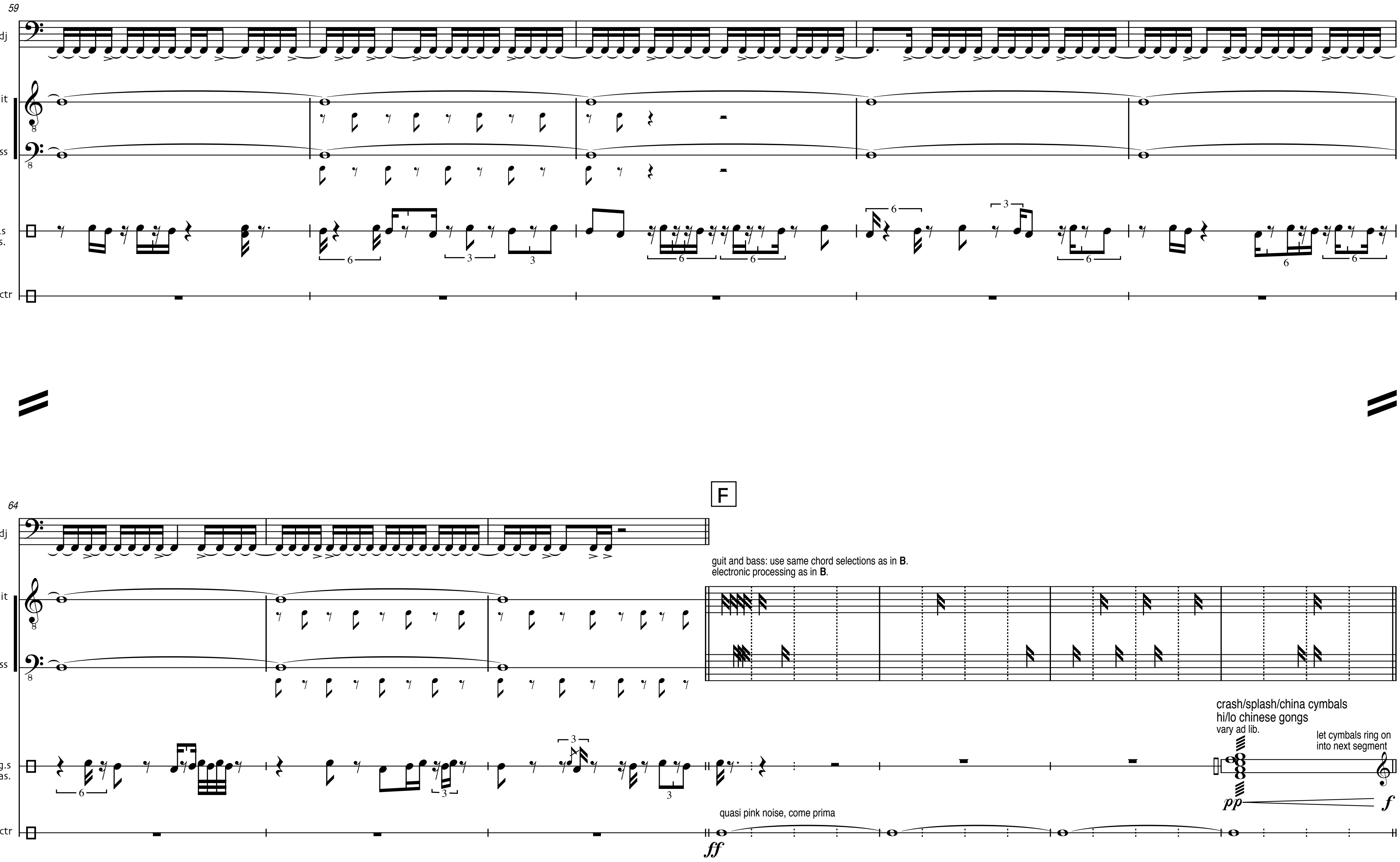
Nr.4

♩ = ±82
Didjeridu
spiccato
sax/ didjeridu
electric guitar
distortion on/off
bottleneck
electric bass
loco
8vb
Bass Drum
Gran Cassa (with pedal)
no input mixer
7
sax/didj
muta in didjeridu (c)
A
e-guit
e-bass
distortion on/off
Cow Bells
(sustained with circulating pebble stone)
perc
BD
electr


14
muta in didjeridu (b-flat)
didj
lasciare vibrare
e-guit
e-bass
cowbells
BD
22
didj
lasciare vibrare
e-guit
e-bass
cowbells
BD


29
didj
muta in didjeridu (f)
e-guit
e-bass
cowbells
BD
B
e-guit
chord options:
e-bass
chord options:
choose from the chords displayed above,
a different chord every time.
choose from the chords displayed above,
a different chord every time.
crash/splash/
china cymb.
hi/lo chin.
gong
swelling tremoli
on changing
cymbals/chin.gongs
blending with the
no-input mixer texture
quasi improvisado
No Input Mixer
quasi pink noise, slowly going through constant timbral modulations
Processing in B: guitar and bass are convoluted with filtered sounds of the analogue electronics.
Whenever a chord is struck by guit/bass a part of the electronics spectrum is ducked for a short duration.
37
C
didj
e-guit
e-bass
Git.+Bass: let last chord decay, if the sound dies too quickly, keep it ringing by rubbing some of the
held strings against the frets, and/or incite the strings by gently hitting the body of the instrument.
Gran Cassa
High chinese Gong
perc
no inp.mix


44
D
didj
guit and bass: use same chord selections as in B.
electronic processing as in B.
e-guit
e-bass
f
perc
crash/splash/china cymb.
hi/lo chin. gong
f
swelling tremoli on changing cymbals/chin.gongs
blending with the no-input mixer texture quasi improvisado
tr
3
electr
quasi pink noise, come prima
ff
E
didj
52
e-guit
e-bass
Git.+Bass: let last chord decay, if the sound dies too quickly, keep it ringing by rubbing some of the held strings against the frets, and/or incite the strings by gently hitting the body of the instrument.
distortion on/off
distortion on/off
perc
let cymbals ring on into next segment
hi/lo chinese Gong
Gran Cassa
tr
ff
6
3
no inp.mix


59
didj
e-guit
e-bass
chin.g.s
gr.cas.
electr
64
F
guit and bass: use same chord selections as in B.
electronic processing as in B.
crash/splash/china cymbals
hi/lo chinese gongs
vary ad lib.
let cymbals ring on
into next segment
pp
f
quasi pink noise, come prima
ff


G
71
didj
Git.+Bass: let last chord decay, if the sound dies too quickly, keep it ringing by rubbing some of the held strings against the frets, and/or incite the strings by gently hitting the body of the instrument.
e-guit
e-bass
Cow Bells
(sustained with circulating pebble stone)
cowbells
chin.g.s
gr.cas.
H
76
muta in sopranino sax
bottleneck
loco

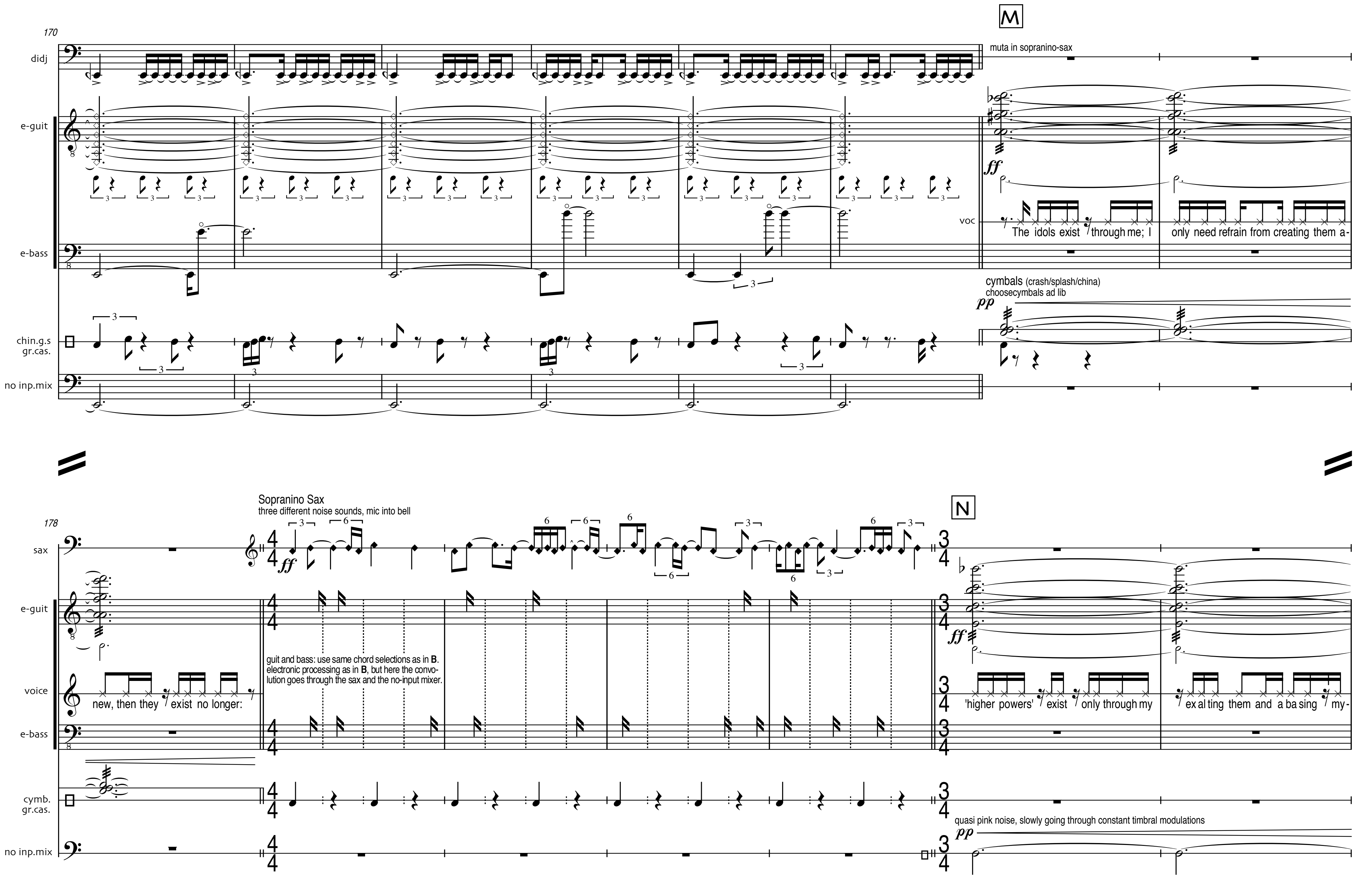

82
e-guit
lasciare vibrare
e-bass
cowbells
93
sopranino sax
strong, slowly varying air component in sound;
slow irregular glissandi with a radius of a quartertone
sax
pp
I
lasciare vibrare
distortion on/off
put off bottleneck
if chord decays too fast, keep it
ringing by rubbing the strings
against the frets with the left hand
if chord decays too fast, keep it
ringing by rubbing the strings
against the frets with the left hand
distortion on/off
Gran Cassa
BD
f
No Input Mixer (ch.6-7-8)
continously modulate sound (ch.15-16/sg.3-4)
no inp.mix
mp


J
104
sax
e-guit
irregular, casual, intimate non-verbal vocal sounds:
breathing into mic, grunting, smacking, loud swallowing, subtle laughing etc.
perform in a natural manner, as if non-verbally communicating with yourself
voice
(leave dist. turned on)
Git + Bass: fret-tremolo, keep the string ringing by rubbing it against its fret with the left hand
let open E-string ring sympathetically
e-bass
(leave dist. turned on)
Cow Bell
don't strike, circulate with pebble stone
BD
pulsating sound
slowly modulated in timbre
no inp.mix
115
gradually go to noise
(wind-sound only)
let open C and F-string ring sympathetically
sim
cowbells
the sound of guit, bass and perc is routed through electronics.
Pitchshifting is applied as the rythm indicates.
The interval ratios 8/9, 7/8, 4/5 and 21/16 are used at random.
electr

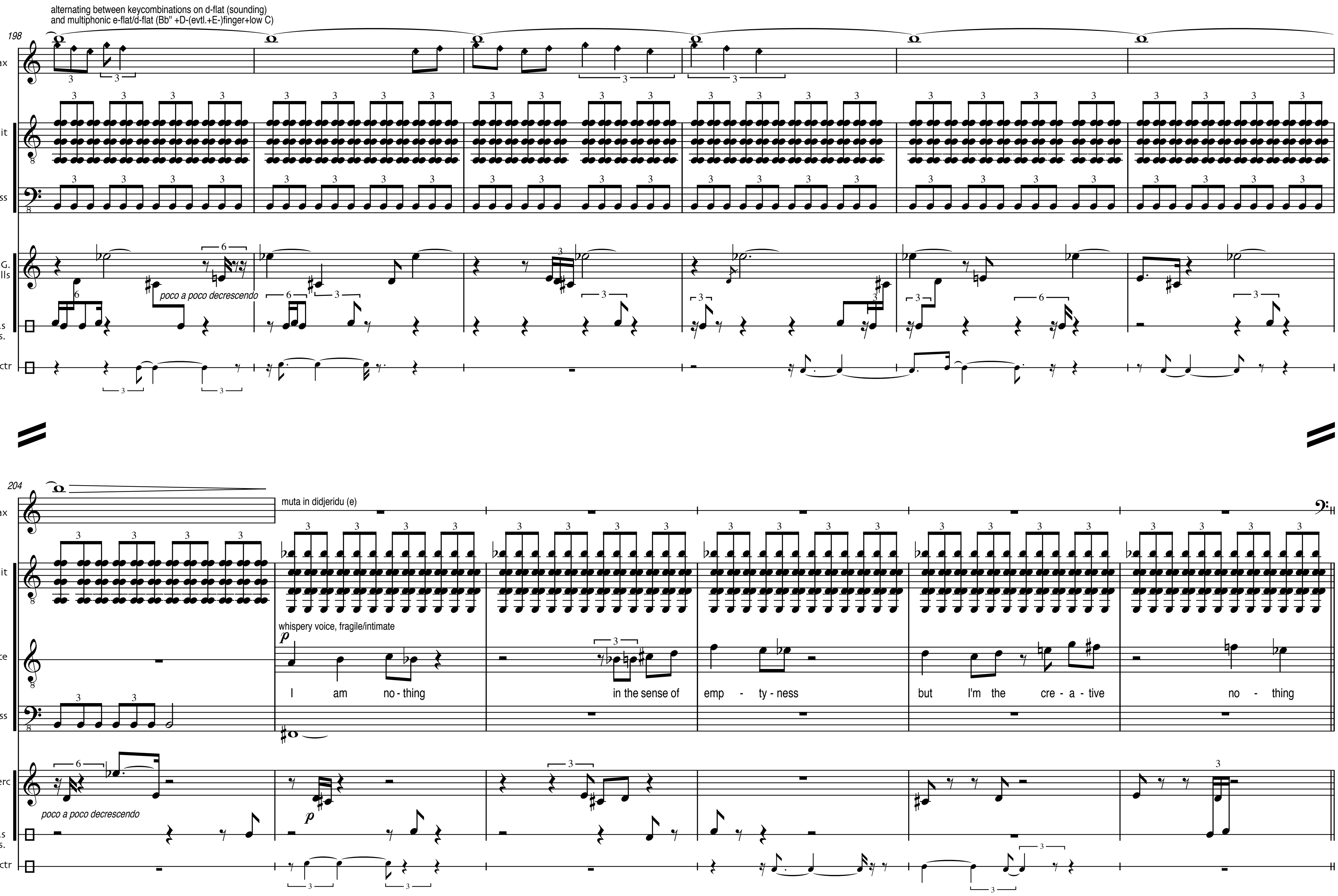

125
e-guit
sung, choose pitch ad lib.
whispery voice, fragile/intimate
pp
voice
I am nothing in the sense of emp - ty - ness but I'm the cre - a - tive no - thing out of which I my - self as cre - a - tor create ev - ry - thing.
e-bass
cowbells
electr
no inp.mix
K
Sopranino Sax
three different noise sounds, mic into bell
135
sax
ppp f
spoken (in a natural fashion, use rythm only approximately)
voice is heavily processed: convolution with noise
from sax and chopped envelope (grinding)
mp
I am owner of my might when I know myself as unique. In the unique one the owner himself returns in - to his cre - a - tive nothing, out of which he is born. Every higher essence a -
perc
very gradually mix noise component into pulse. Always remain in the background.


141
sax
e-guit
voice
e-bass
cowbells
electr
no inp.mix
bove me, weakens the feeling of my u-nique-ness, and pales on-ly be fore the sun of this con-scious-ness. If I con cern my self for my self, the u nique one, then my con - cern rests on its tran si-to-ry, mor tal cre -
146
L
muta in didjeridu (e)
ord. trem.
(dist. still on)
Didjeridu
a-tor, who con-sumes him self, and I may say: All things are no-thing to me.
dist.:
Git: don't strike the open strings but let them ring after releasing the chord.
Occasionally gently hit the body of the instruments to keep the strings ring.
hi/lo chinese Gong
Gran Cassa
No Input Mixer
quasi pink noise, slowly going through constant timbral modulations


154
didj
e-guit
e-bass
chin.g.s
gr.cas.
no inp.mix
162
didj
e-guit
e-bass
chin.g.s
gr.cas.
no inp.mix


170
M
didj
muta in sopranino-sax
e-guit
ff
voc
The idols exist through me; I
only need refrain from creating them a-
e-bass
cymbals (crash/splash/china)
choosecymbals ad lib
pp
chin.g.s
gr.cas.
no inp.mix
178
Sopranino Sax
three different noise sounds, mic into bell
N
sax
ff
e-guit
guit and bass: use same chord selections as in B. electronic processing as in B, but here the convolution goes through the sax and the no-input mixer.
voice
new, then they exist no longer:
'higher powers' exist only through my
ex al ting them and a ba sing my-
e-bass
cymb.
gr.cas.
quasi pink noise, slowly going through constant timbral modulations
pp
no inp.mix

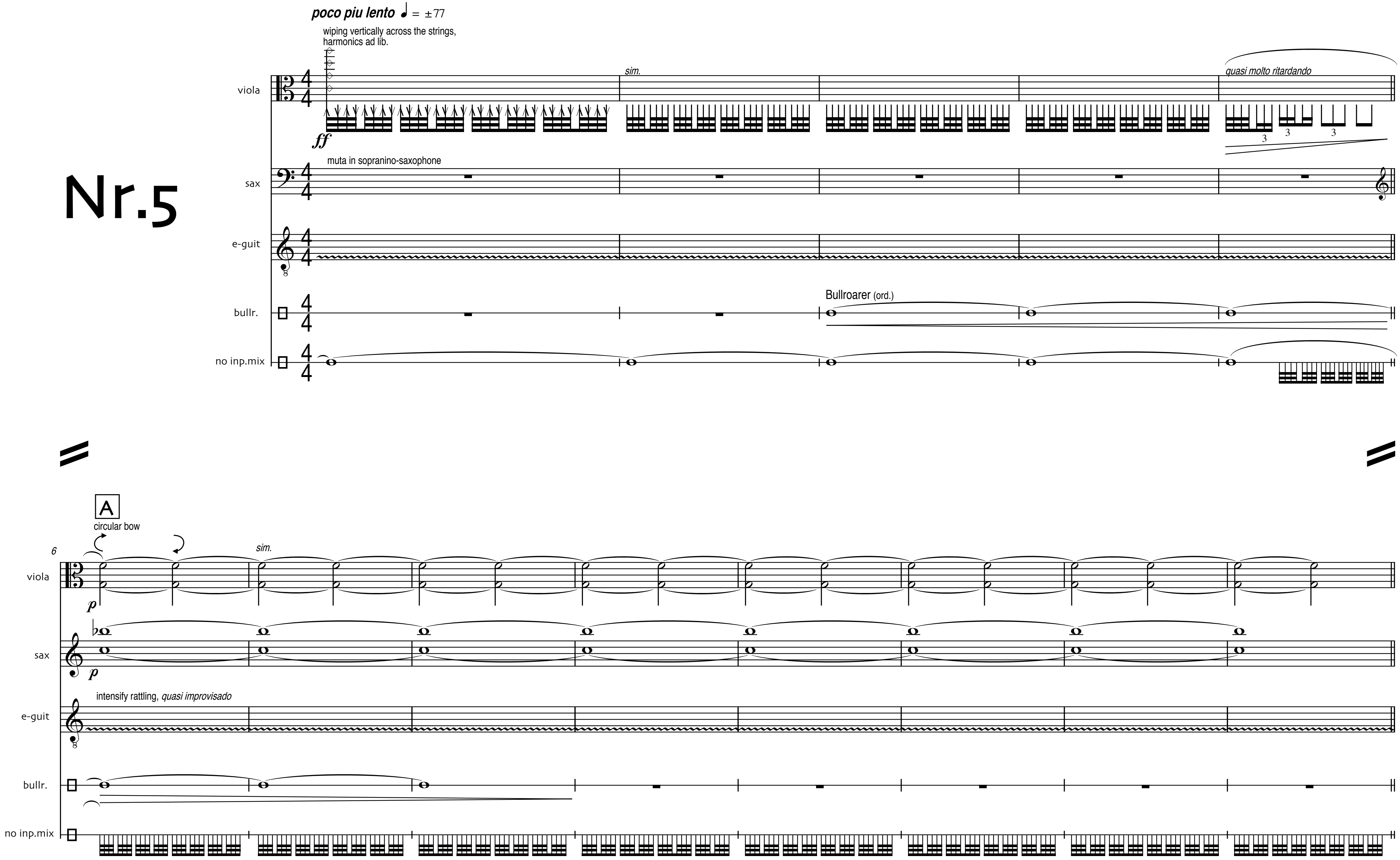

185
sax
e-guit
voice
self. My intercourse with the world con - sists in my enjoying it, and so con - suming it for my self enjoyment
e-bass
chin.g.s
gr.cas.
ff
no inp.mix
[p <-> mf]
gradually move from pure noise-sounds to a
b-flat (notation) in three different key-combinations
192
O
Git + Bass:
very subtely start to tremolate parts of the chosen chords. The chord
changes are accentuated while the trem. layer gradually gets louder.
Chinese Plate Gong
Cowbell
Plate Gong
poco a poco decrescendo
hi/lo chinese Gong
Electronics
the sound of guit, bass and sax is routed through electronics.
Pitchshifting is applied as the rythm indicates.
The interval ratios 8/9, 7/8, 4/5 and 21/16 are used at random.


alternating between keycombinations on d-flat (sounding)
and multiphonic e-flat/d-flat (Bb'' +D-(evtl.+E-)finger+low C)
198
sax
e-guit
e-bass
chin.Pl.G.
cowbells
chin.g.s
gr.cas.
electr
poco a poco decrescendo
204
muta in didjeridu (e)
whispery voice, fragile/intimate
p
voice
I am no - thing in the sense of emp - ty - ness but I'm the cre - a - tive no - thing
perc
poco a poco decrescendo
p

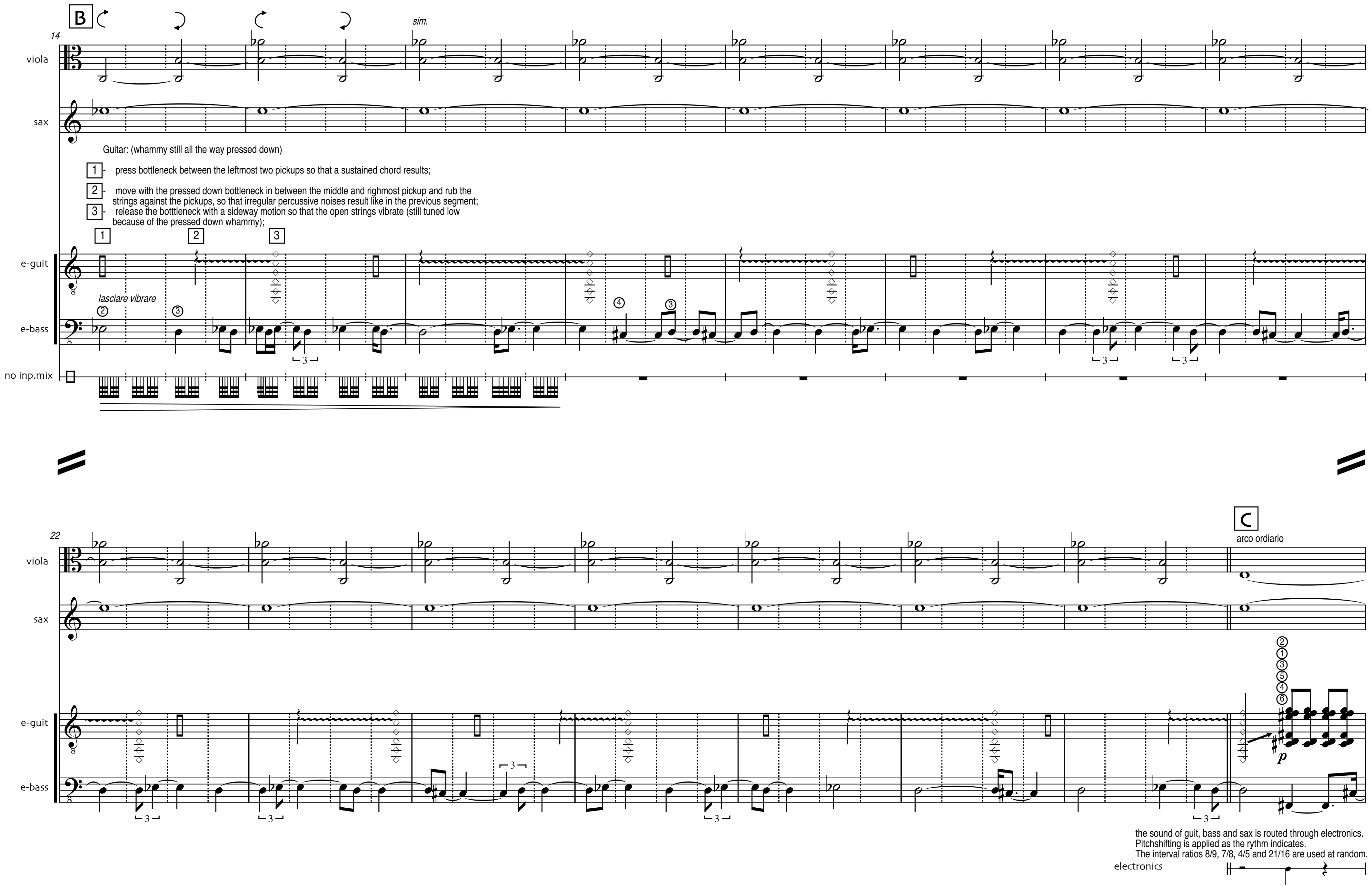

P
Didjeridu
spiccato
210
didj
ff
e-guit
whammy
p
e-bass
Chinese Plate Gong (e-flat)
Cow-Bells
(long notes suspended with circling pebble-stones)
chin.Pl.G.
cowbells
mf
No Input mixer
quasi Pink Noise
no inp.mix
f
220

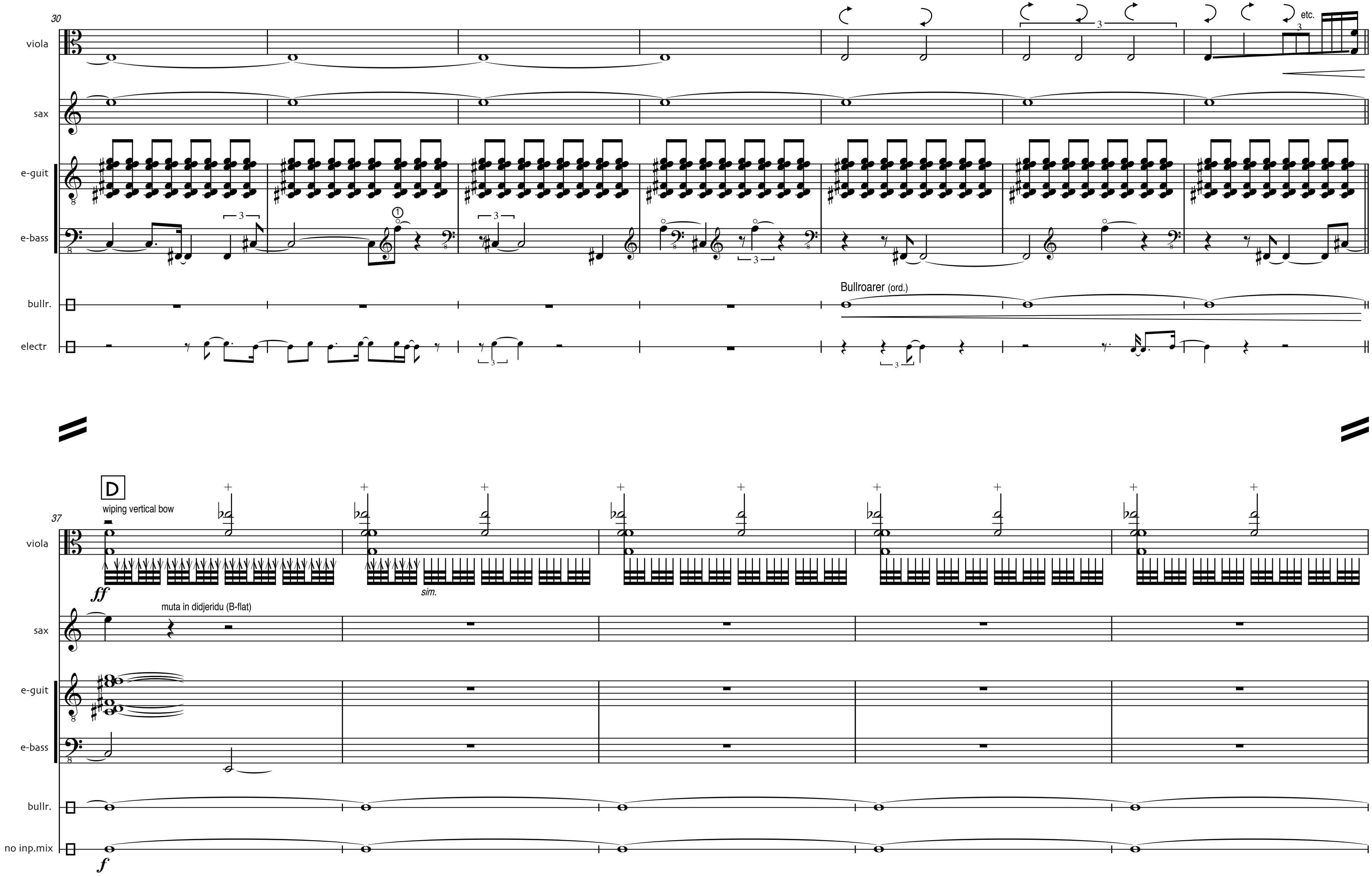

Q
227
didj
e-guit
make subtle rattling sounds by letting the loose strings
(whammy is all the way pressed down) move across the pickups)
e-bass
chin.g.s
gr.cas.
no inp.mix
236
didj
e-guit
e-bass
cowbells
no inp.mix

Nr.5



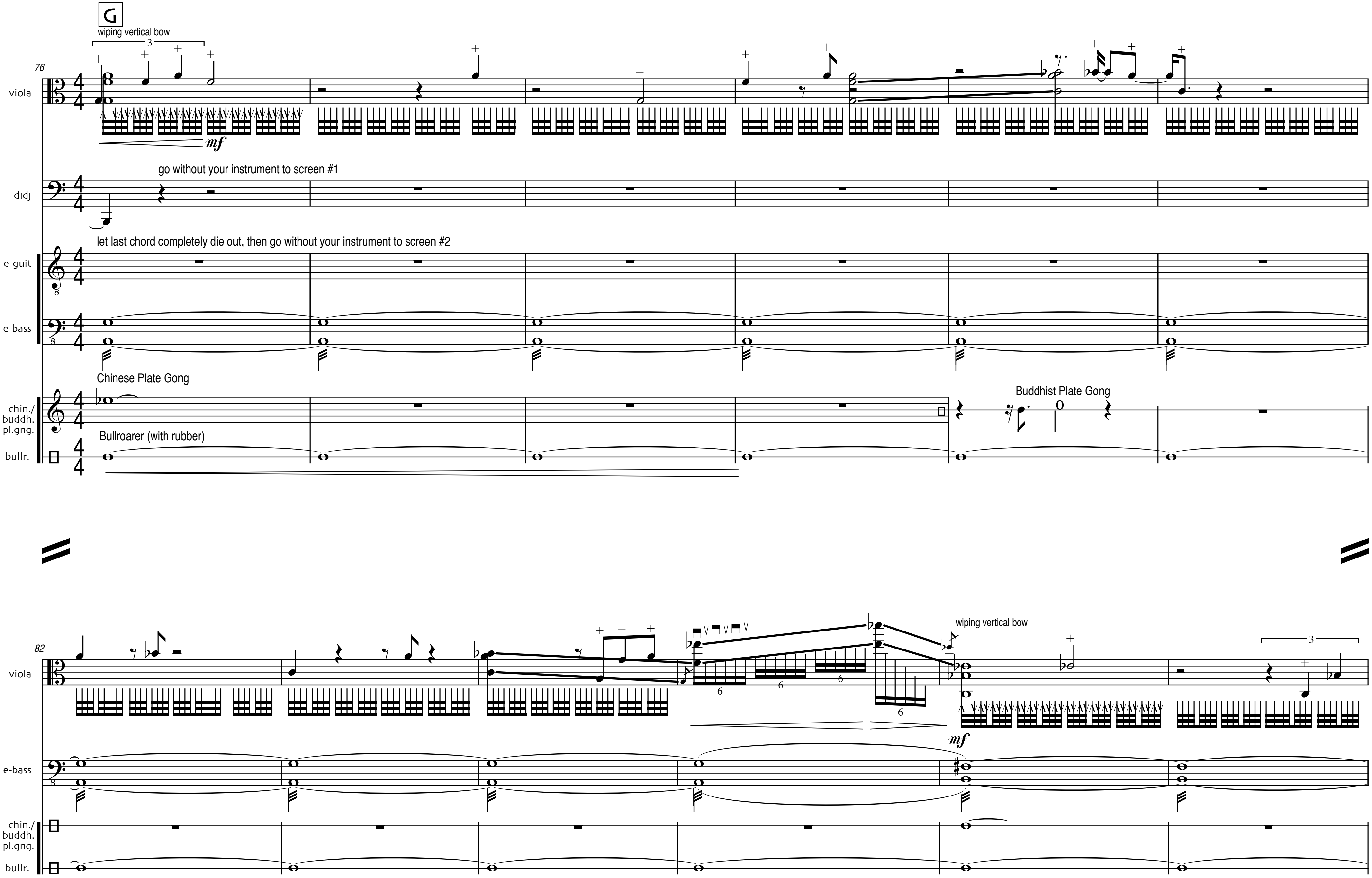
poco piu lento ♩ = ±77
wiping vertically across the strings, harmonics ad lib.
sim.
quasi molto ritardando
3
3
3
viola
ff
sax
muta in sopranino-saxophone
e-guit
bullr.
Bullroarer (ord.)
no inp.mix
A
circular bow
6
sim.
p
p
intensify rattling, quasi improvisado

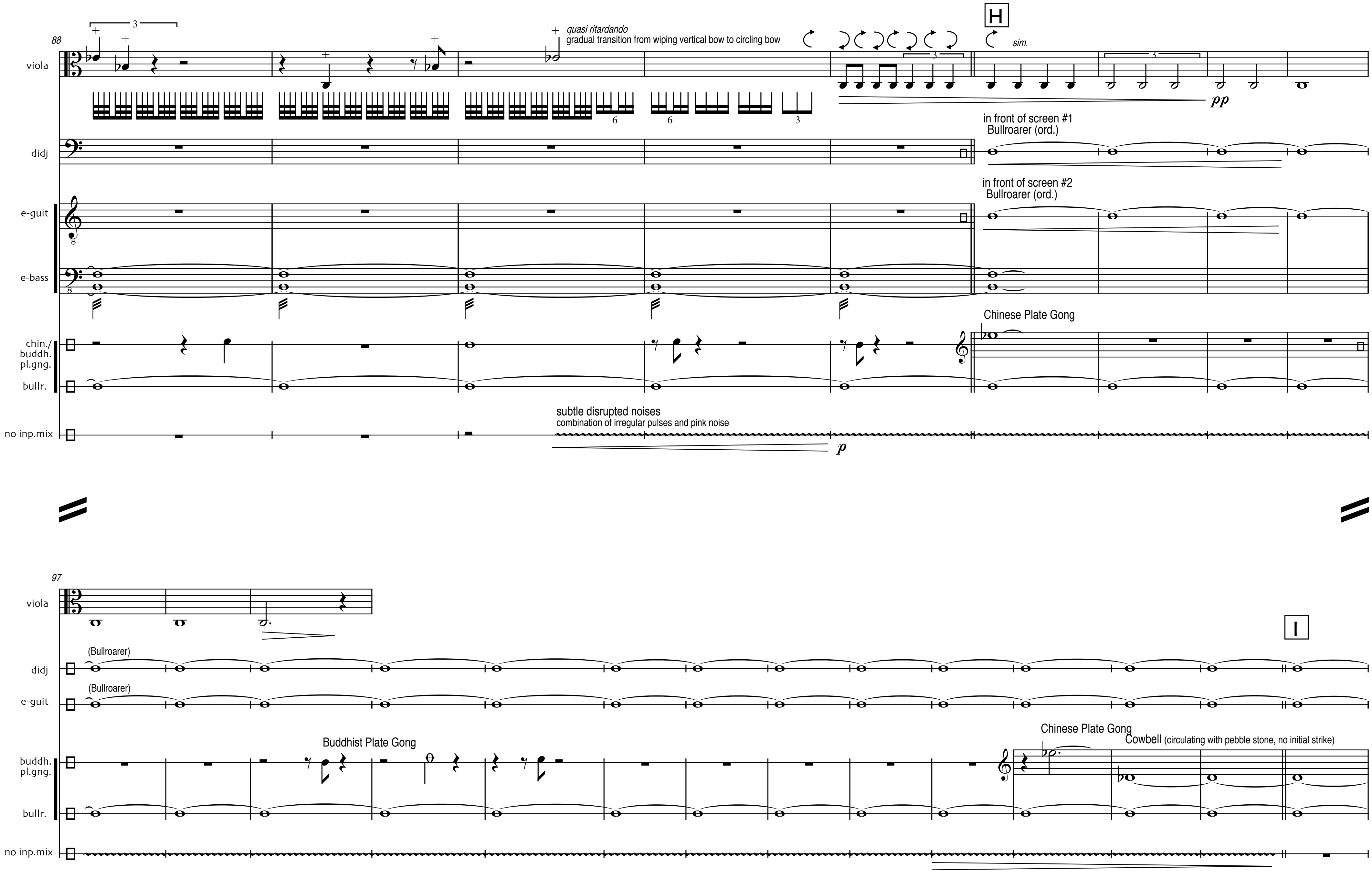

B
sim.
14
viola
sax
Guitar: (whammy still all the way pressed down)
1 - press bottleneck between the leftmost two pickups so that a sustained chord results;
2 - move with the pressed down bottleneck in between the middle and righmost pickup and rub the strings against the pickups, so that irregular percussive noises result like in the previous segment;
3 - release the botttleneck with a sideway motion so that the open strings vibrate (still tuned low because of the pressed down whammy);
1
2
3
e-guit
lasciare vibrare
e-bass
no inp.mix
22
C
arco ordiario
the sound of guit, bass and sax is routed through electronics.
Pitchshifting is applied as the rythm indicates.
The interval ratios 8/9, 7/8, 4/5 and 21/16 are used at random.
electronics


30
viola
sax
e-guit
e-bass
bullr.
electr
etc.
Bullroarer (ord.)
D
37
wiping vertical bow
ff
sim.
muta in didjeridu (B-flat)
no inp.mix
f

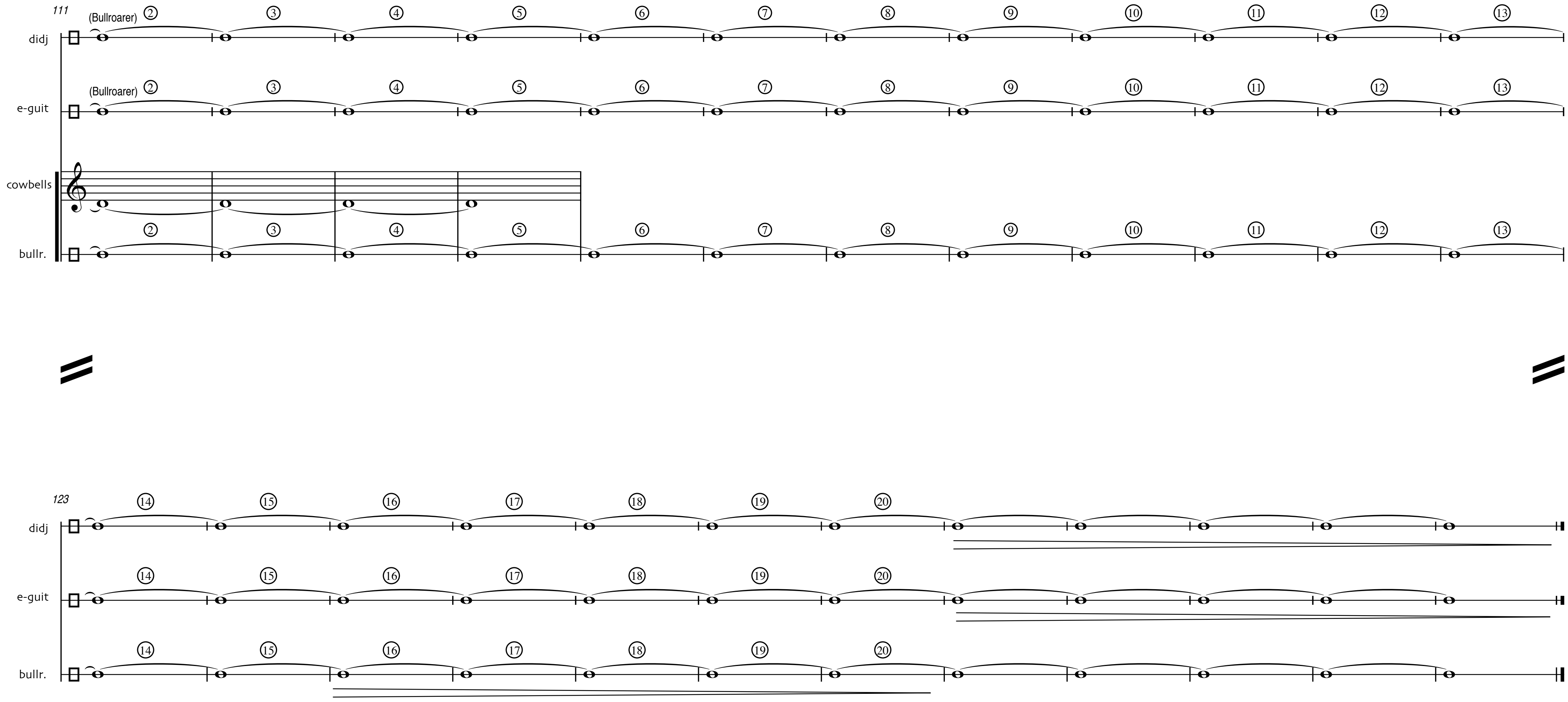

42
E
quasi molto rit.
sempre lasciare vibrare
viola
Didjeridu (B-flat)
pale sound
rhythm ad.lib but unobtrusive
didj
guitar is processed by graining
effect and FFT-gating
sempre lasciare vibrare
sim.
e-guit
Chinese Plate Gong
Buddhist Plate Gong (low)
(different pitches indicate different strike points on the gong)
perc
bullr.
no inp.mix
49
viola
didj
sim.
sim.
e-guit
buddh.
pl.gng.


F
55
viola
didj
(8va)
e-guit
e-bass
Bass: fret-tremolo, keep the string ringing by rubbing it against its fret with the left hand. Distortion on.
Chin.Plate Gong (e-flat)
Cowbell (d-flat) (circulating with pebble stone, no initial strike)
chin.Pl.G. cowbells
buddh. pl.gng.
65
viola
didj
(8va)
e-guit
e-bass
cowbells
buddh. pl.gng.

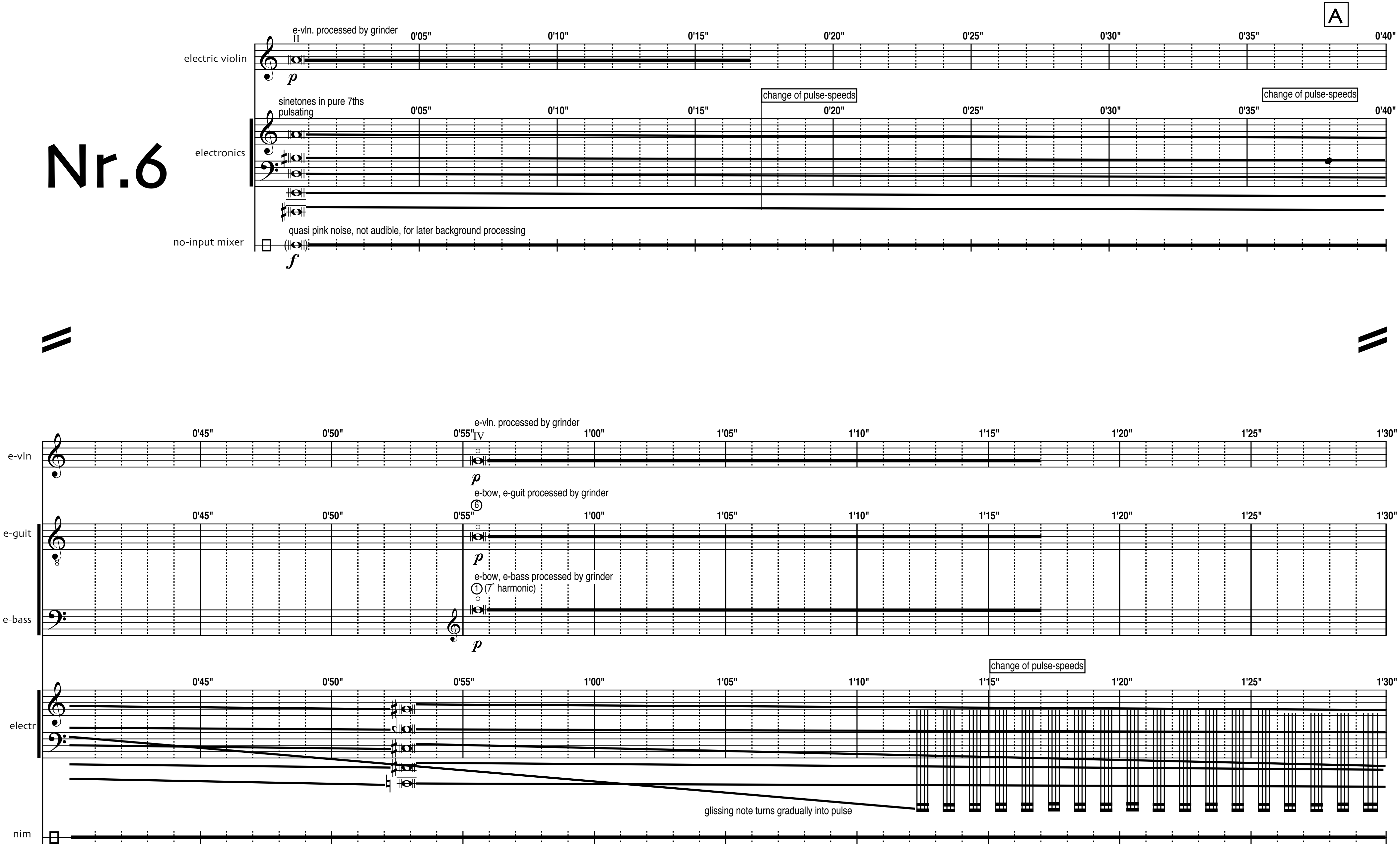

G
wiping vertical bow
76
viola
didj
go without your instrument to screen #1
let last chord completely die out, then go without your instrument to screen #2
e-guit
e-bass
Chinese Plate Gong
chin./
buddh.
pl.gng.
Bullroarer (with rubber)
bullr.
Buddhist Plate Gong
82
wiping vertical bow

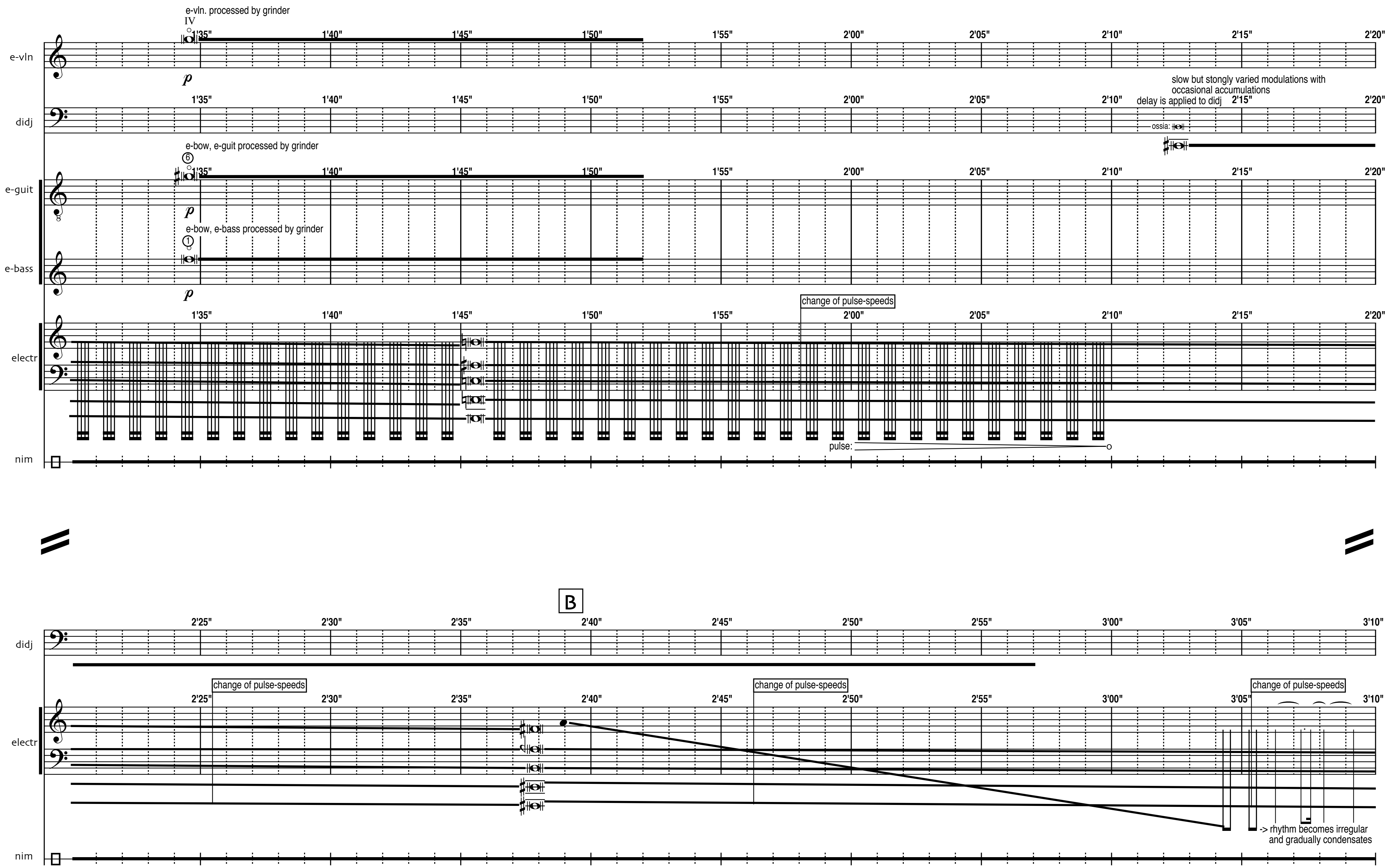


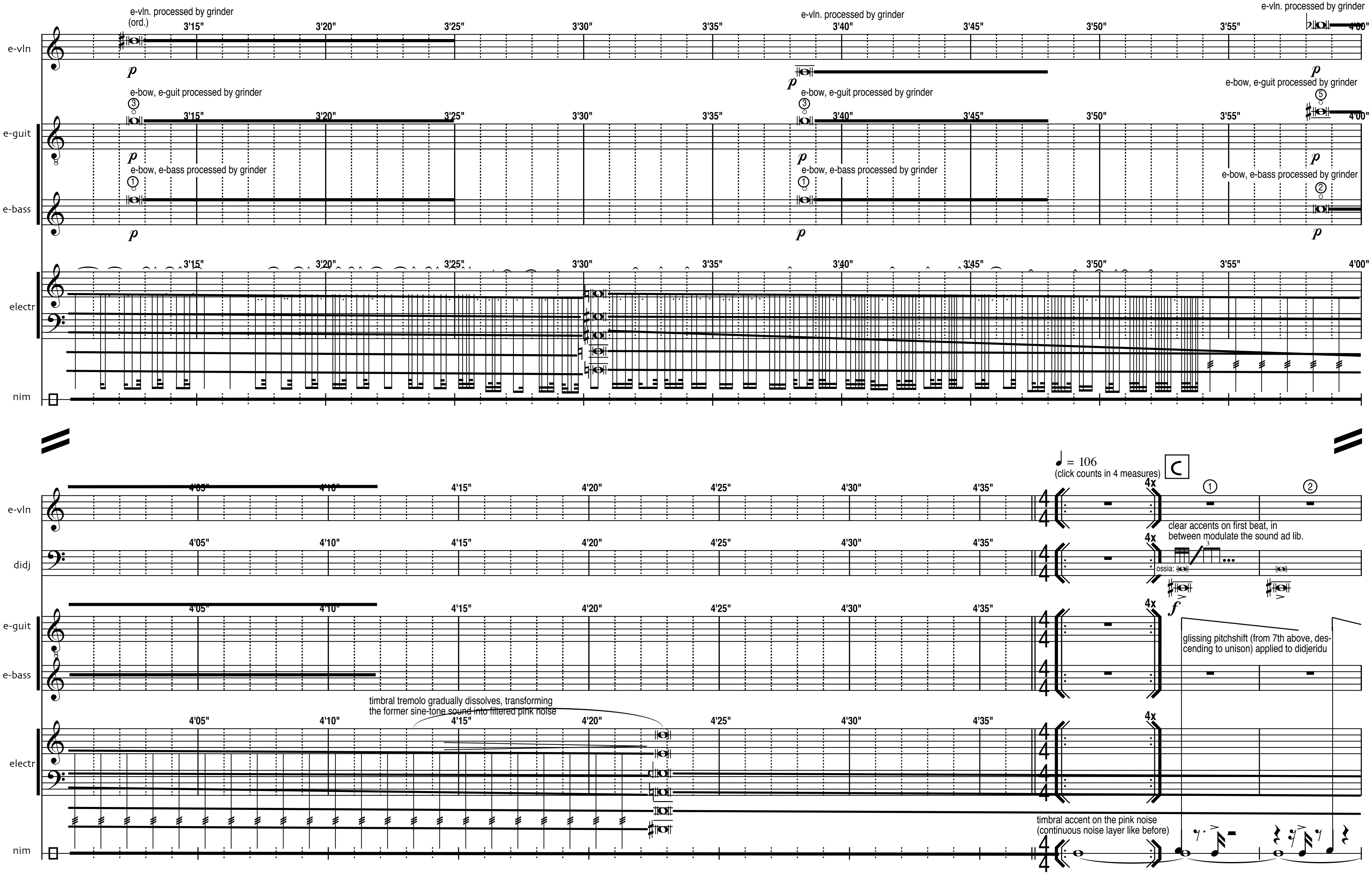
88
viola
didj
e-guit
e-bass
chin./ buddh. pl.gng.
bullr.
no inp.mix
quasi ritardando
gradual transition from wiping vertical bow to circling bow
H
sim.
in front of screen #1
Bullroarer (ord.)
in front of screen #2
Bullroarer (ord.)
Chinese Plate Gong
subtle disrupted noises
combination of irregular pulses and pink noise
97
(Bullroarer)
(Bullroarer)
Buddhist Plate Gong
Chinese Plate Gong
Cowbell (circulating with pebble stone, no initial strike)
I
buddh. pl.gng.


111
(Bullroarer)
didj
e-guit
cowbells
bullr.
123
didj
e-guit
bullr.

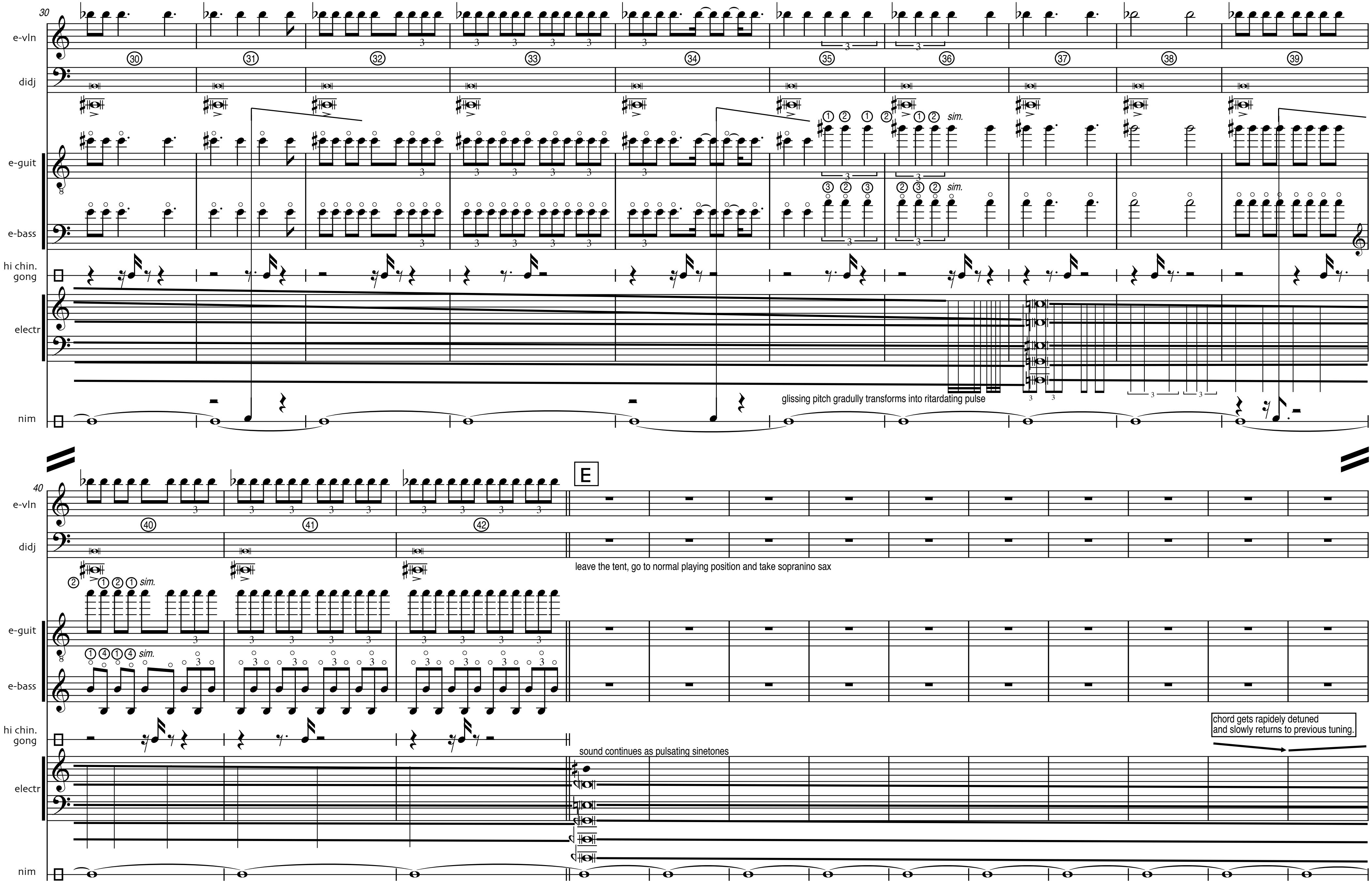
Nr.6

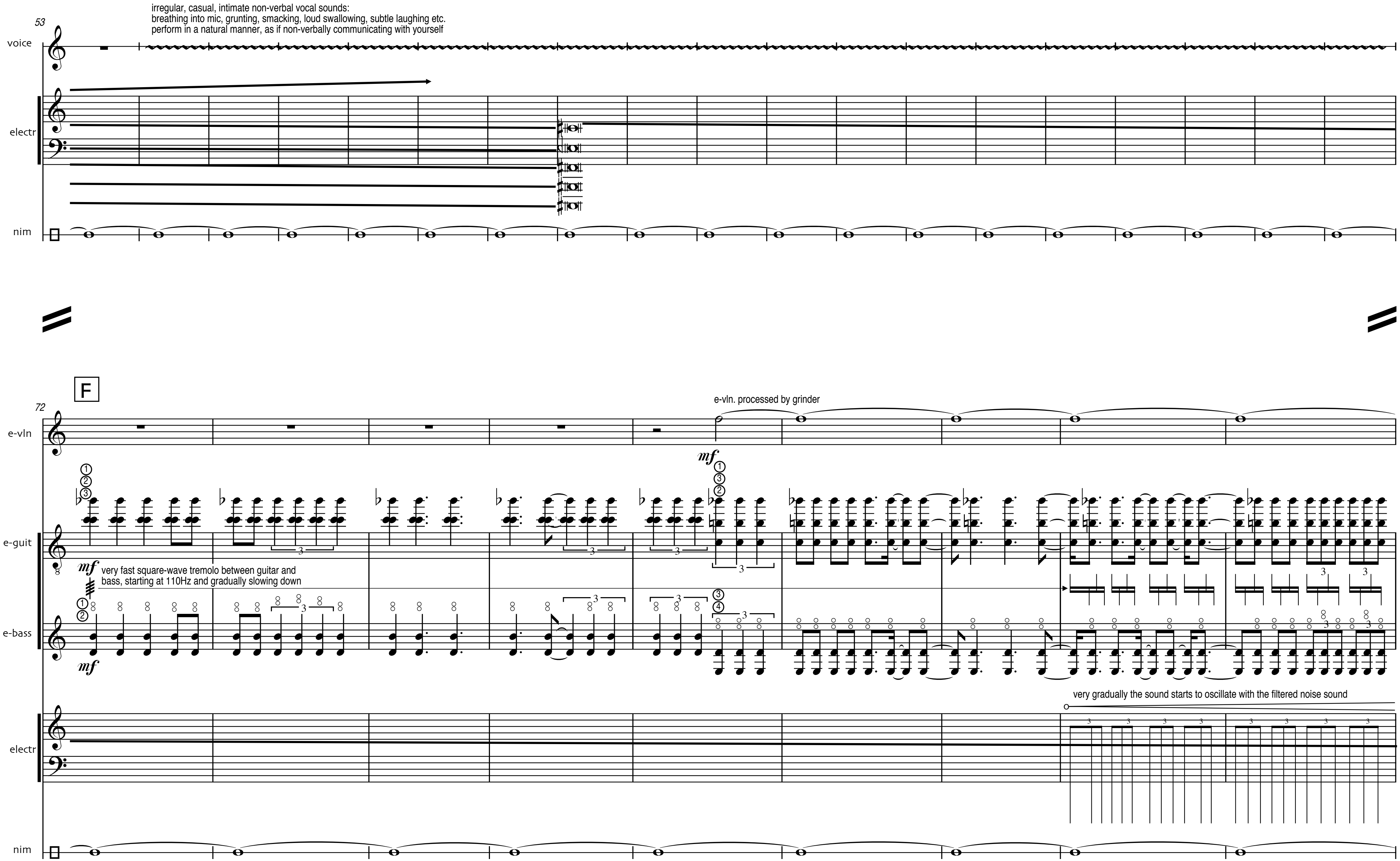

A
electric violin
e-vln. processed by grinder
II
0'05"
0'10"
0'15"
0'20"
0'25"
0'30"
0'35"
0'40"
electronics
sinetones in pure 7ths
pulsating
change of pulse-speeds
change of pulse-speeds
no-input mixer
quasi pink noise, not audible, for later background processing
e-vln
e-vln. processed by grinder
IV
0'45"
0'50"
0'55"
1'00"
1'05"
1'10"
1'15"
1'20"
1'25"
1'30"
e-guit
e-bow, e-guit processed by grinder
6
e-bass
e-bow, e-bass processed by grinder
1 (7° harmonic)
electr
change of pulse-speeds
glissing note turns gradually into pulse
nim

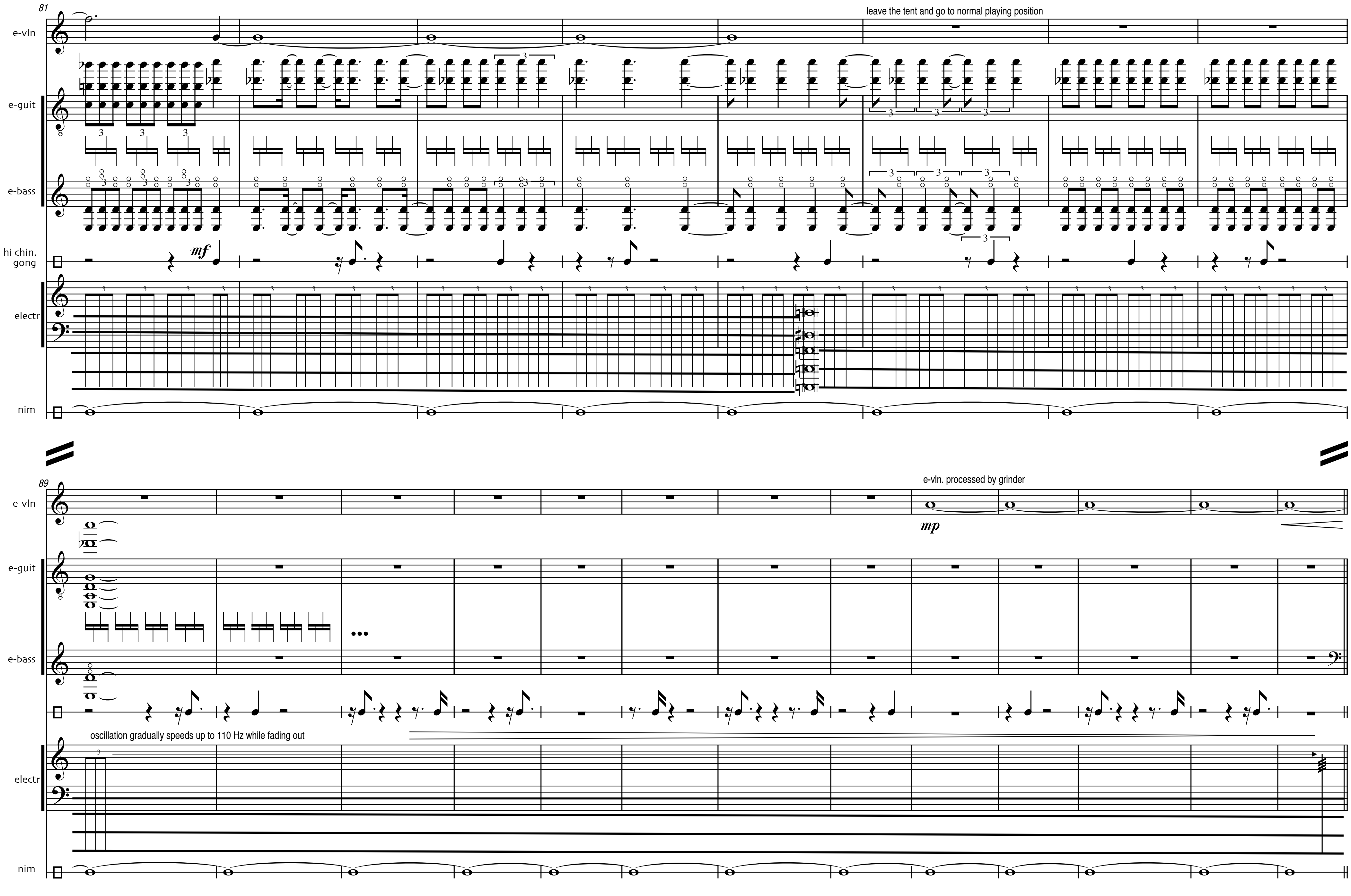

e-vln. processed by grinder
IV
1'35" 1'40" 1'45" 1'50" 1'55" 2'00" 2'05" 2'10" 2'15" 2'20"
e-vln
p
slow but stongly varied modulations with
occasional accumulations
delay is applied to didj
didj
ossia:
e-bow, e-guit processed by grinder
6
e-guit
p
e-bow, e-bass processed by grinder
1
e-bass
p
change of pulse-speeds
electr
pulse:
nim
B
2'25" 2'30" 2'35" 2'40" 2'45" 2'50" 2'55" 3'00" 3'05" 3'10"
didj
change of pulse-speeds
change of pulse-speeds
change of pulse-speeds
electr
-> rhythm becomes irregular
and gradually condensates
nim

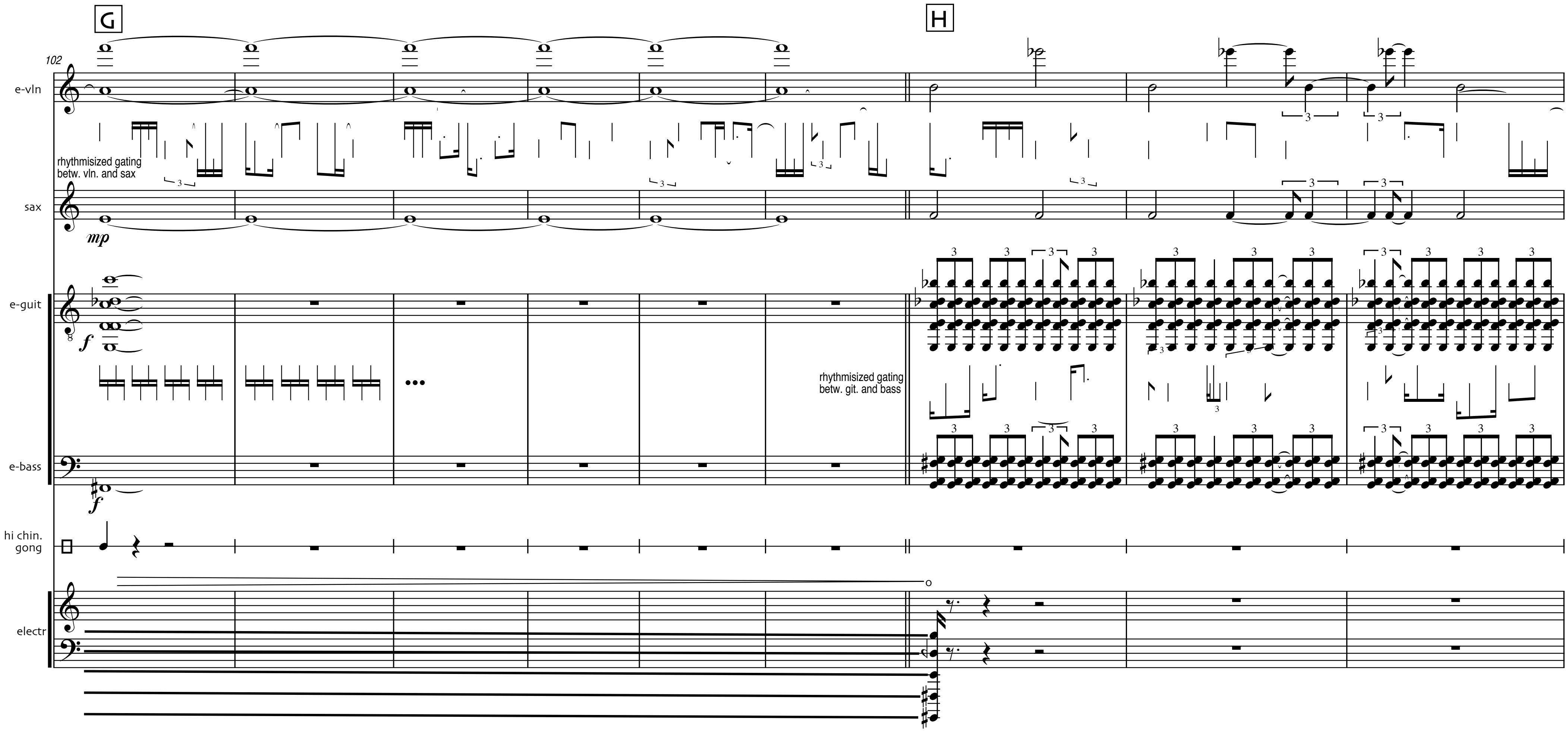

e-vln
e-guit
e-bass
electr
nim
didj
e-vln. processed by grinder
(ord.)
e-bow, e-guit processed by grinder
e-bow, e-bass processed by grinder
3'15"
3'20"
3'25"
3'30"
3'35"
3'40"
3'45"
3'50"
3'55"
4'00"
4'05"
4'10"
4'15"
4'20"
4'25"
4'30"
4'35"
♩ = 106
(click counts in 4 measures)
C
4x
clear accents on first beat, in between modulate the sound ad lib.
ossia:
glissing pitchshift (from 7th above, descending to unison) applied to didjeridu
timbral tremolo gradually dissolves, transforming the former sine-tone sound into filtered pink noise
timbral accent on the pink noise (continuous noise layer like before)


didj
electr
nim
D
e-vln
e-guit
e-bass
hi chin. gong
ord., processed through dense grinder
sim.
ord., processed through dense grinder
mp
mf

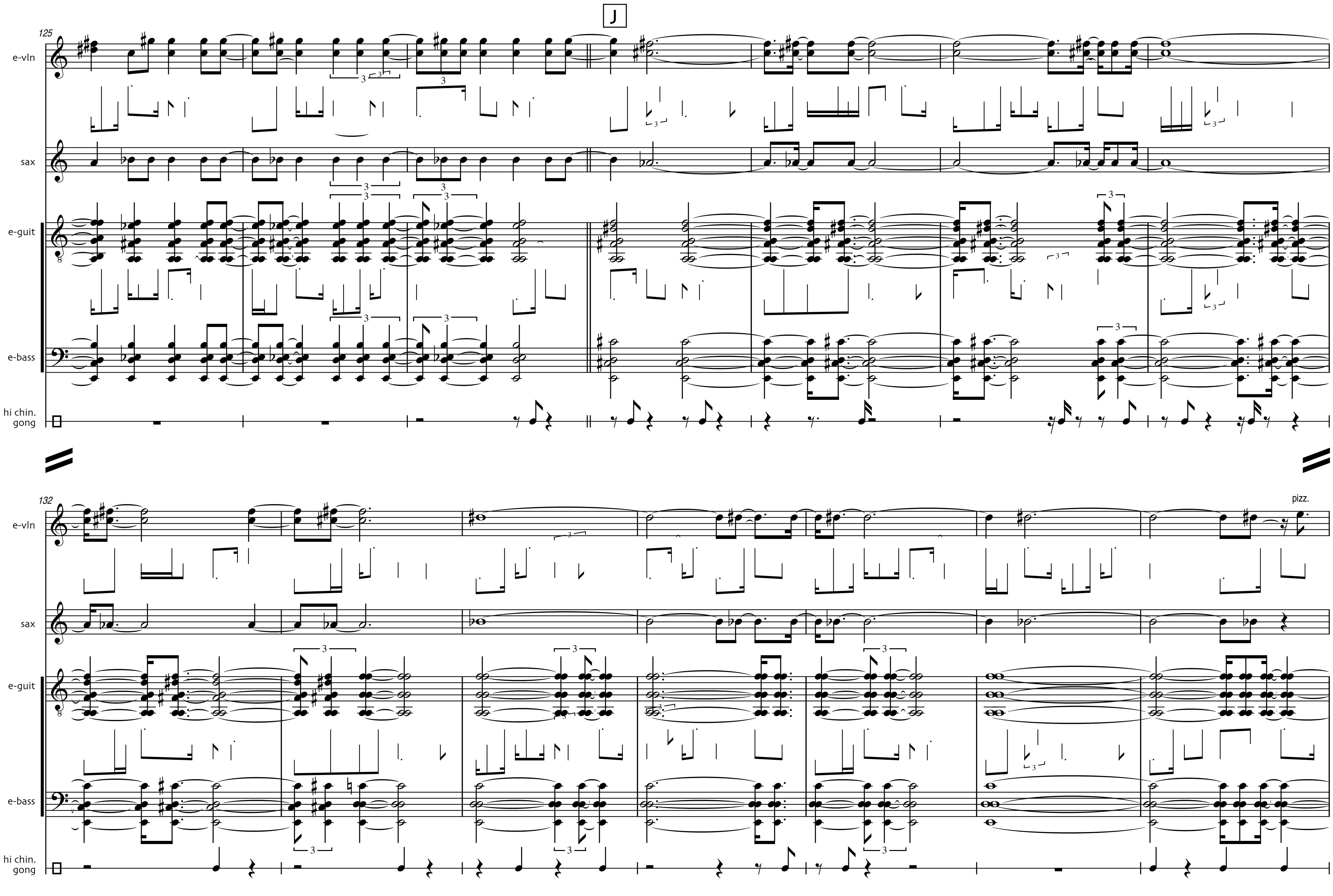

30
e-vln
didj
e-guit
e-bass
hi chin. gong
electr
nim
sim.
glissing pitch gradually transforms into ritardating pulse
40
E
leave the tent, go to normal playing position and take sopranino sax
sound continues as pulsating sinetones
chord gets rapidely detuned
and slowly returns to previous tuning.

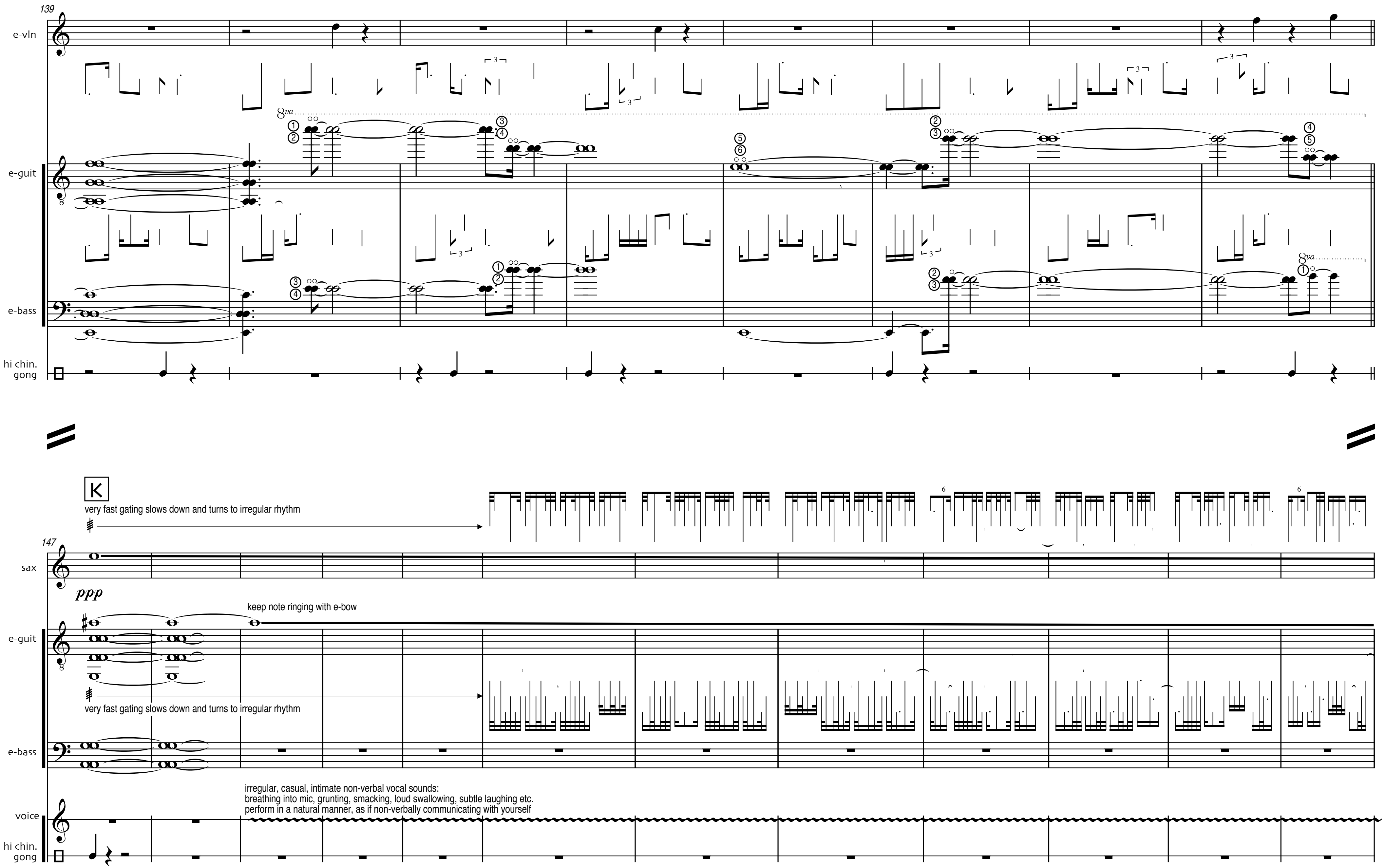

53
voice
irregular, casual, intimate non-verbal vocal sounds:
breathing into mic, grunting, smacking, loud swallowing, subtle laughing etc.
perform in a natural manner, as if non-verbally communicating with yourself
electr
nim
F
72
e-vln
e-vln. processed by grinder
mf
e-guit
mf
very fast square-wave tremolo between guitar and bass, starting at 110Hz and gradually slowing down
e-bass
mf
electr
very gradually the sound starts to oscillate with the filtered noise sound
nim


81
e-vln
leave the tent and go to normal playing position
e-guit
e-bass
hi chin. gong
mf
electr
nim
89
e-vln. processed by grinder
mp
oscillation gradually speeds up to 110 Hz while fading out


G
H
102
e-vln
rhythmisized gating
betw. vln. and sax
sax
mp
e-guit
f
rhythmisized gating
betw. git. and bass
e-bass
f
hi chin.
gong
electr


111
e-vln
sax
e-guit
e-bass
118
I
e-vln
sax
e-guit
e-bass


J
125
e-vln
sax
e-guit
e-bass
hi chin.
gong
132
pizz.


139
e-vln
8va
e-guit
e-bass
hi chin. gong
K
very fast gating slows down and turns to irregular rhythm
147
sax
ppp
keep note ringing with e-bow
e-guit
very fast gating slows down and turns to irregular rhythm
e-bass
irregular, casual, intimate non-verbal vocal sounds:
breathing into mic, grunting, smacking, loud swallowing, subtle laughing etc.
perform in a natural manner, as if non-verbally communicating with yourself
voice
hi chin. gong


159
L
e-vln
sax
e-guit
e-bass
voice
grinder
III
pizz.
mf
IV
arco
III
pizz.
IV
grinder
ord.
8va
ossia:
leave tent and go to normal playing position
170
arco
pizz.
ord.
III
didj
muta in didj
didjeridu
start with very smooth and subtle modulations
and become increasingly rhythmic and dense
f


M
182
e-vln
didj
glissing pitchshift (from 7th above, descending to unison) applied to didjeridu
e-guit
e-bass
cowbells
chin. G. Cymbal BD
nim
193
voice
voice is going through vocoder, synthesized with pink noise by the no-input mixer
wrap per
garment
veil
chan nel
Sinetones
electr
noise keeps going but inaudible (for vocoder processing)
N
glissing pitchshift (from 7th above, descending to unison) applied to didjeridu
Resonance filter on NIM (slowly glissing downwards, like the sinetone sound before)


204
didj
muta in s.sax
Tap-Delay with oscillating times on e-guit, e-bass, and e-vln.
e-guit
voice
liq - uid
pres - sure
e-bass
voice is going through vocoder, synthesized with pink noise by the no-input mixer
chin.Pl.G. cowbells
chin. G. Cymbal BD
electr
tremolo between sine-tones and filtered NIM
nim
noise keeps going but inaudible (for vocoder processing)
214
O
Tap-Delay also on percussion
e-vln
III pizz.
IVarco
pas - sage
birth
rup-ture
ord.
ossia:

224
e-vln
e-guit
e-bass
chin.Pl.G.
cowbells
buddh.
pl.gng.
III
pizz.
IV
arco
pizz.
ord.
8va
ord.
235
III
muta in singing saw
p
mp

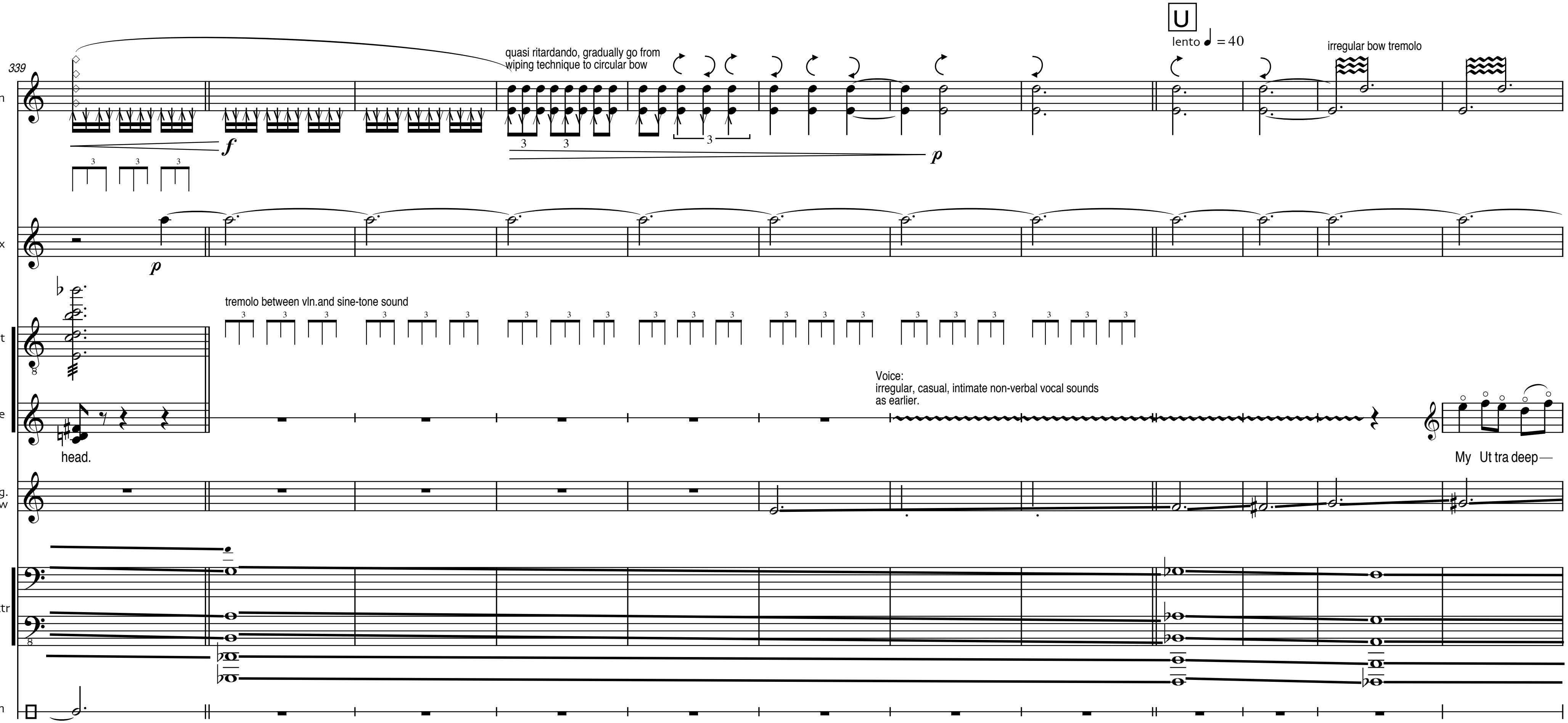

P
e-violin is going through vocoder with NIM
(intonate alle minor 7ths as natural 7:4 intervals)
248
e-vln
sax
e-guit
e-bass
sing. saw
nim
with strong air component
8va
let delays die out
s.p.
ord.
261


270
e-vln
sax
sing.
saw
nim
s.p. ord.
s.p.
Q
279
e-vln
sax
perc
nim
II I
I 0 III

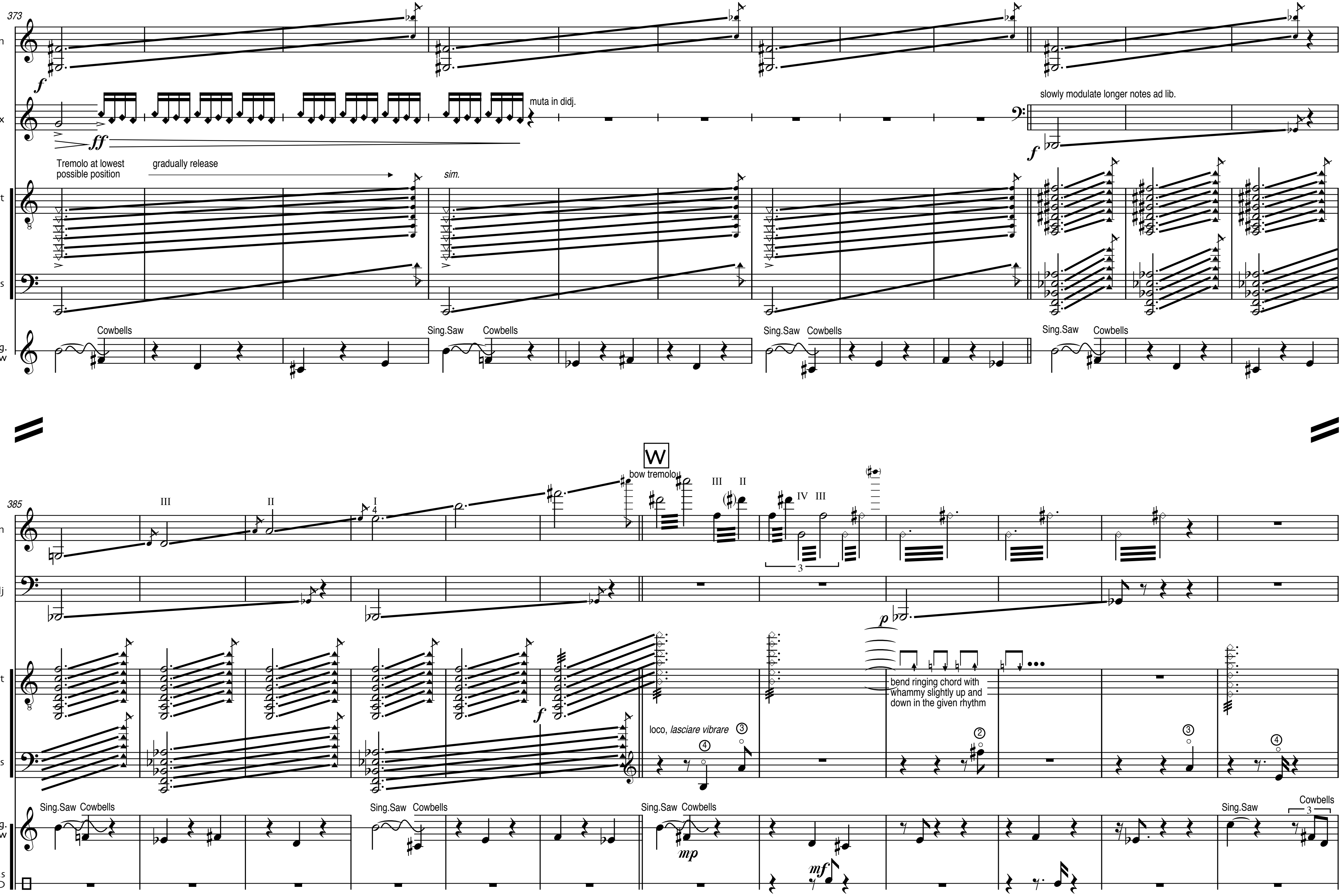

288
e-vln
tr
ord.
II
wiping vertically across the strings,
harmonics ad lib. (like in Nr.5)
sax
e-guit
e-bass
sing.
saw
nim
297
R
go gradually from bow tremolo to vertical wiping technique
let air component gradually become stronger so that you have pure air sound in m.309
chin.g.s
BD


305
e-vln
sax
e-guit
e-bass
chin.g.s
BD
nim
three different noise colorations
gating between sax and nim̂
modulate nim noise
313
S
rhythmisized alternating gating between violin and guitar
voices
wheels


322
e-vln
sax
e-guit
voice
e-bass
electr
nim
in
my
head,
very fast square-wave tremolo between sax and filtered nim,
starting at 32nd tempo and gradually slowing down to triads
331
T
tremolo between guit. and filtered nim
voices
wheels
in
my


U
lento ♩ = 40
339
e-vln
quasi ritardando, gradually go from
wiping technique to circular bow
irregular bow tremolo
sax
e-guit
tremolo between vln.and sine-tone sound
voice
Voice:
irregular, casual, intimate non-verbal vocal sounds
as earlier.
head.
My Ut tra deep—
sing.
saw
electr
nim

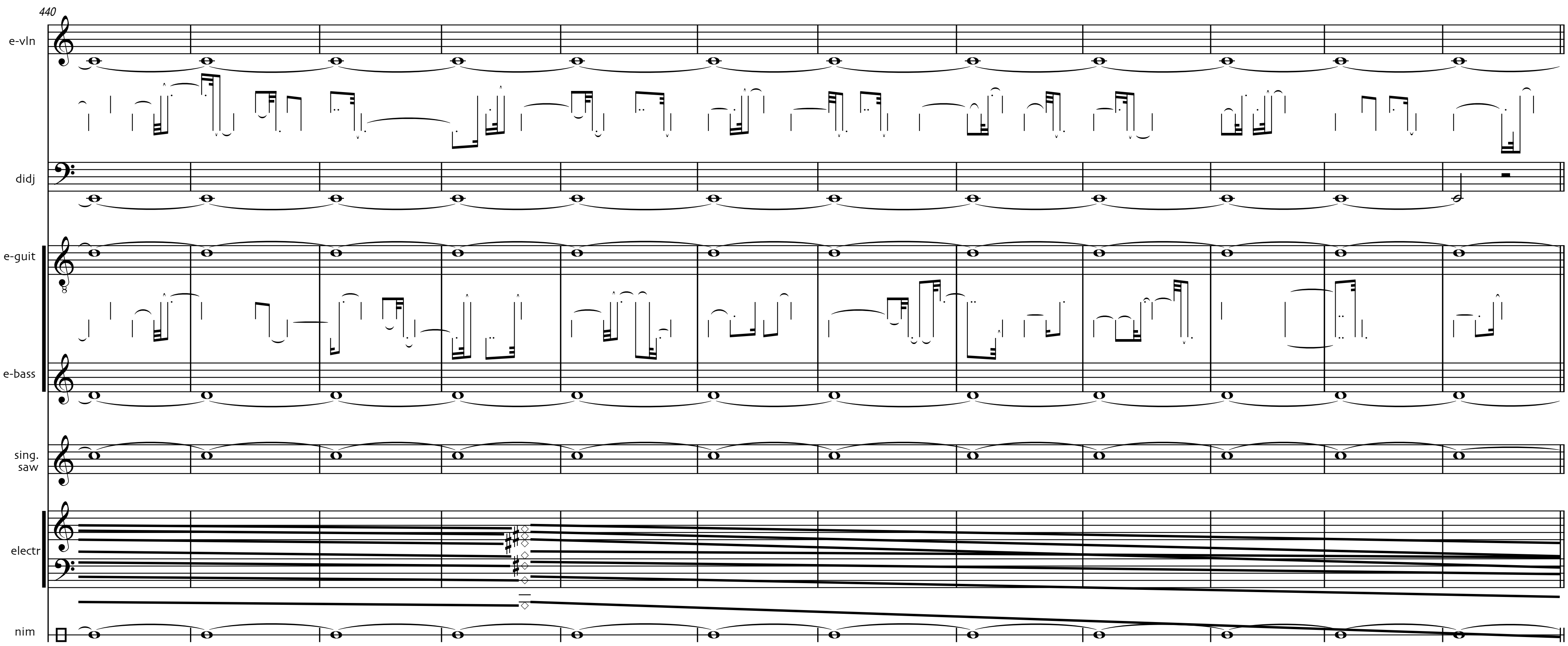

tempo primo ♩ = 106
351
e-vln
sax
e-guit
voice
e-bass
sing. saw
electr
come prima
I
My Ul-tra deep
I
My——
Ul - tra - deep
My—— Ul-tra deep
distortion
distortion
come prima
Ul - tra - deep——
V
364
flt.
I
My I, is it my lie, I de - fy thy mir-ror
My I, is it my lie, I de - fy thy mir-ror
My I, is it my lie, I de - fy thy mir-ror
distortion off
chinese plate gong
singing saw (hit with mallet)
chinese plate gong
singing saw (hit with mallet)
chinese plate gong
sing. saw
buddh. pl.gng.


373
e-vln
sax
muta in didj.
slowly modulate longer notes ad lib.
Tremolo at lowest possible position
gradually release
sim.
e-guit
e-bass
sing. saw
Cowbells
Sing.Saw
385
W
bow tremolo
III
II
I
IV
didj
bend ringing chord with whammy slightly up and down in the given rhythm
loco, lasciare vibrare
chin.g.s BD


397
s.p.
IV
III
e-vln
p
quasi portamento (as opposed to glissando)
didj
e-guit
e-bass
Sing.Saw
Cowbells
Sing.Saw
Chin.Plate Gng.
Cowbells
Sing.Saw
Cowbells
Chin.Plate Gng.
cowbells
chin.g.s
BD
408
e-vln
portamento
didj
e-guit
e-bass
Sing.Saw
Cowbells
Sing.Saw
Cowbells
Sing.Saw
Cowbells
Chin.Plate Gng.
sing.
saw
chin.g.s
BD


416
pizz.
e-vln
didj
slap
e-guit
e-bass
Sing.Saw
Cowbells
sing. saw
chin.g.s BD
arco
423
Y
Chin.Plate Gng.
perc
electr
nim
E-bow
resonance filter on NIM
quasi pink noise


Z1
431
e-vln
didj
e-guit
e-bass
sing. saw
chin.g.s BD
electr
nim
slap
E-bow
rhythmisized gating between vln. and guit.
slowly modulate ad lib.
Sing.Saw
Cowbells
Chin.Plate Gng.
arco
rhythmisized gating between saw and didj

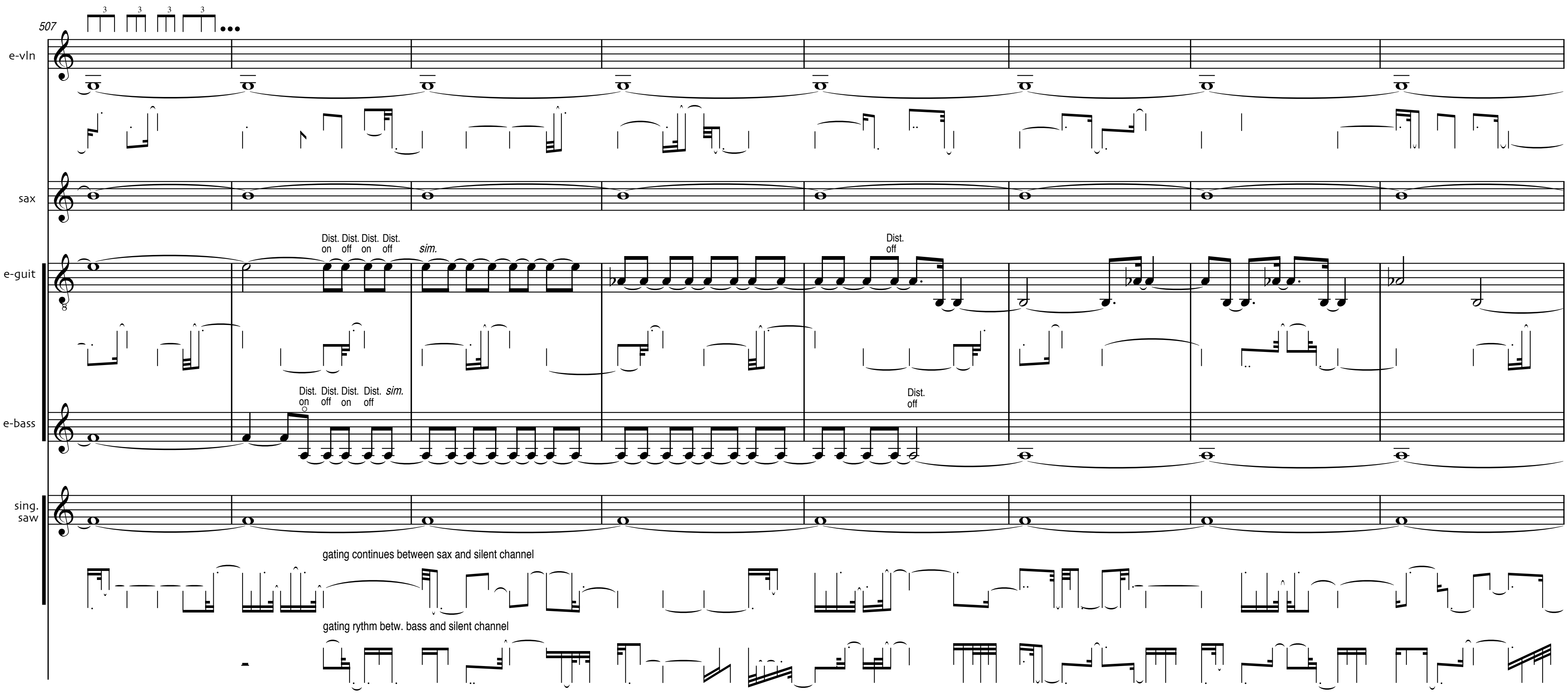

440
e-vln
didj
e-guit
e-bass
sing. saw
electr
nim

Z2
Z3
452
pizz.
e-vln
grainer
didj
ord.
e-guit
gating continues between saw and a slient channel
ord.
e-bass
sing. saw
gating between bass and silent channel
electr
nim

sax. replaces the silent channel in the bass gating

480
e-vln
sax
e-guit
e-bass
sing. saw
Z5
arco s.p.
grainer
E-bow
490
Z6
tremolo in triad tempo
I II III
ord.
lasciare vib.
ord.
sim.
keep alternating between E and A string

498
e-vln
sax
e-guit
E-bow
e-bass
E-bow
sing. saw


507
e-vln
sax
e-guit
Dist. Dist. Dist. Dist.
on off on off
sim.
Dist.
off
e-bass
Dist. Dist. Dist. Dist. sim.
on off on off
Dist.
off
sing. saw
gating continues between sax and silent channel
gating rythm betw. bass and silent channel


515
e-vln
sax
e-guit
Dist. Dist. Dist. Dist.
on off on off sim.
Dist.
off
e-bass
sing.
saw


Z7
524
e-vln
pizz.
sax
sax joins complementary into tremolo with violin
strong wind component
e-guit
ord.
lasciare vib.
tremolo between guit. and bass
e-bass
ord.
grainer
sing.
saw


Z8
535
arco
e-vln
pure noise sound
ord.
strong wind component
pure noise sound
ord.
increasing air component
sax
e-guit
e-bass
muta to cowbells
(circulating with pebble stones)
Cowbells (with circulating pebble stone)
sing.
saw
546
gating accelerates to 899Hz
pure noise sound
Dist.on
gating accelerates to 514 Hz
E-bow
cowbells

Alias

for electric violin, live electronics, lighting and laser

marko ciciliani 2007

Alias

for electric violin, live electronics, lighting and laser

commissioned by the Fonds voor de Scheppende Toonkunst

Alias is based on various techniques that are used by film. Film is based on a fast succession of images, that we see as a continuous motion. Stroboscopic effects (the fast succession of visual information which the brain still recognizes as single images), however, is very closely related to the film technique. Unlike film, it is perceived as very stressful information, though. It is a thin threshold of speed difference that separates the strenuous sensation of stroboscopic visuals, from the smooth and continuous reception of film.

While we perceive film as a continuous motion, the sound of a projector still reveals the mechanisms at work. The rattling of the shutter is clearly recognizable and its lack of quietness links closer to that of a strobe.

In Alias, I was interested to transfer various technical principles from film into music. Fast gatings and tremolos are for example applied to the violin signal, emulating acoustically the effect of stroboscopes. Recordings of film-projectors are furthermore used as closely related sonic materials.
Furthermore, I used sound excerpts from Japanese Mangas as sound material. This gives the film an acoustic presence, despite its visual absence. In the piece its visual quality is substituted by a composition of lighting and graphic laser projections.

The visual setup in the performance consists of two lamps that are placed on the far left side of the stage and two on the right. They are projected onto bright surfaces in the performance space, or on pieces of white cloth, if the space does not offer appropriate surfaces to project on.
One of the lamps on each side has green gels (usually L139), the other two magenta (L328) or pink (L148). The green has a similar colour tone like the laser, which is also green.
The performer is on the left side of the stage, relatively close to the front edge. The laser is set up so that it projects from a point, close to the performer, diagonally across the stage area to the back right side of the stage. The laser beams are supposed to come from a similar direction as the violin bow. Visually it should appear as an extension of the performer.

The live-electronics are realised with the software Logic Pro 8. Technical requirements include an Apple computer (tested minimum: G4 with 1.3 MHz/768MB) with OSX 10.4, a multichannel audio-interface (1 channel input, three channel output) and an in ear click. Also light and laser are controlled by the Logic software. A small additional program written in SuperCollider3 is required, in order to transfer midi data to dmx data. The software and details on its operation will be delivered by the composer on request.
Furthermore a LanBox is required, which is an interface that is connected to a computer (via Ethernet) and that sends out dmx512 data.

Notation:
Unterneath the violin part, the rhythmic gating is notated which runs through the major part of the piece. The gating itself is performed by the live electronics, hence it does not have to be performed by the musician. In order to stay synchronised with the electronics, an in-ear click is used.
The light is notated with lines, that display its intensity between 0% (off) and 100% (full intensity). Unless othewise indicated, the green lamps are used. The laser makes use of very basic graphic shapes, like lines, and squares. In the score those shapes are notated within a square-shaped frame. Both light and laser are notated in order to give the performer or reader orientation. It does not provide enough details to program the visual design from the score.

Alias was written for the violinist Barbara Lüneburg who premiered the piece on November 6, 2007 in the museum **Sammlung Essl** in Klosterneuburg/Austria. The concert was part of the festival **Wien Modern**. More concerts followed in Nijmegen, St.Petersburg, Hamburg and Berlin.

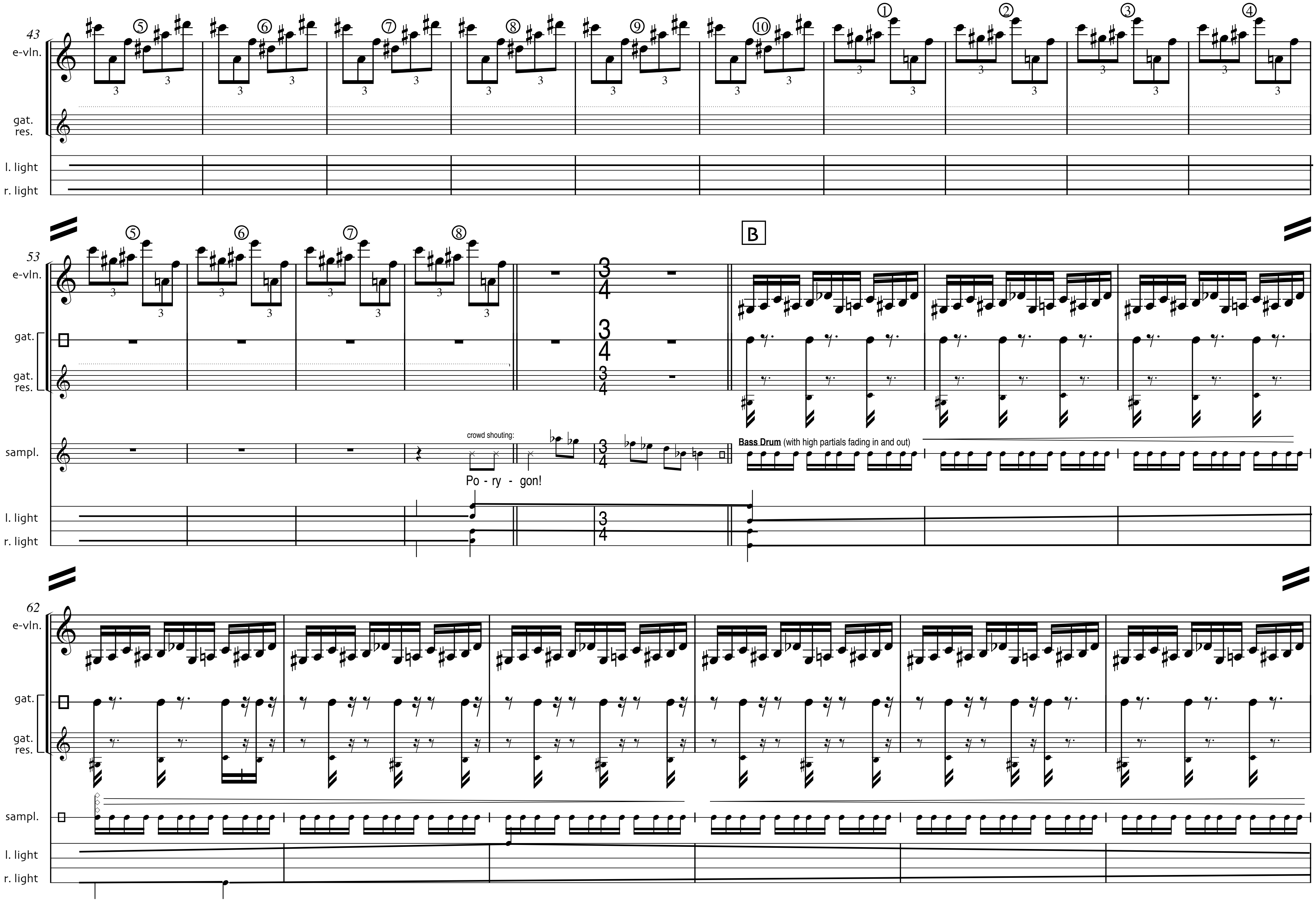
Marko Ciciliani 2007
www.ciciliani.com

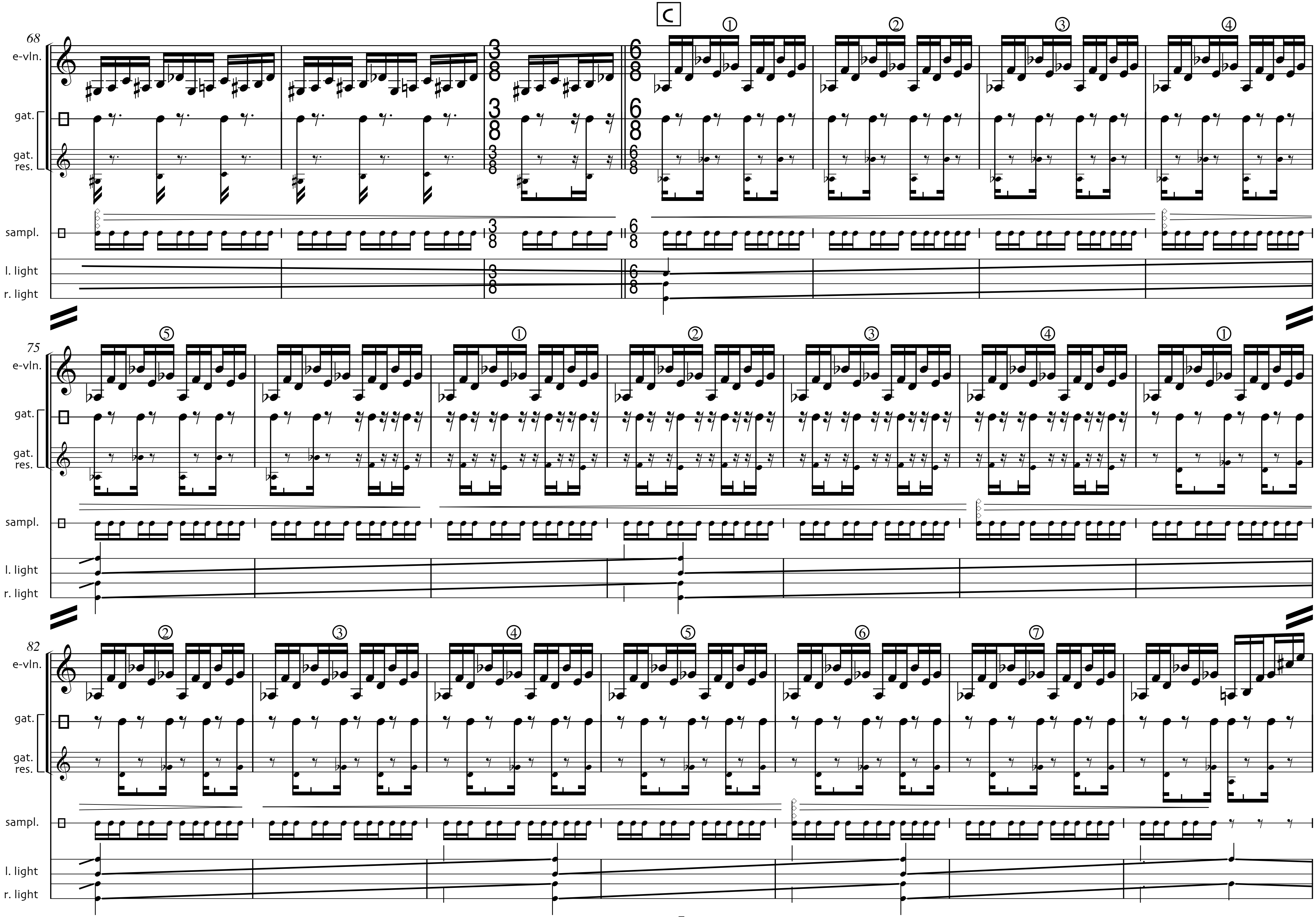
Alias

for electric violin, live-electronics, lighting and laser

Marko Ciciliani 2007


16
e-vln.
gat.
gat.
res.
sampl.
l. light
r. light
23
A
female voice:
"Denno Senshi Porygon!"
randomised gate triggers
from electronics
33
20%
20%

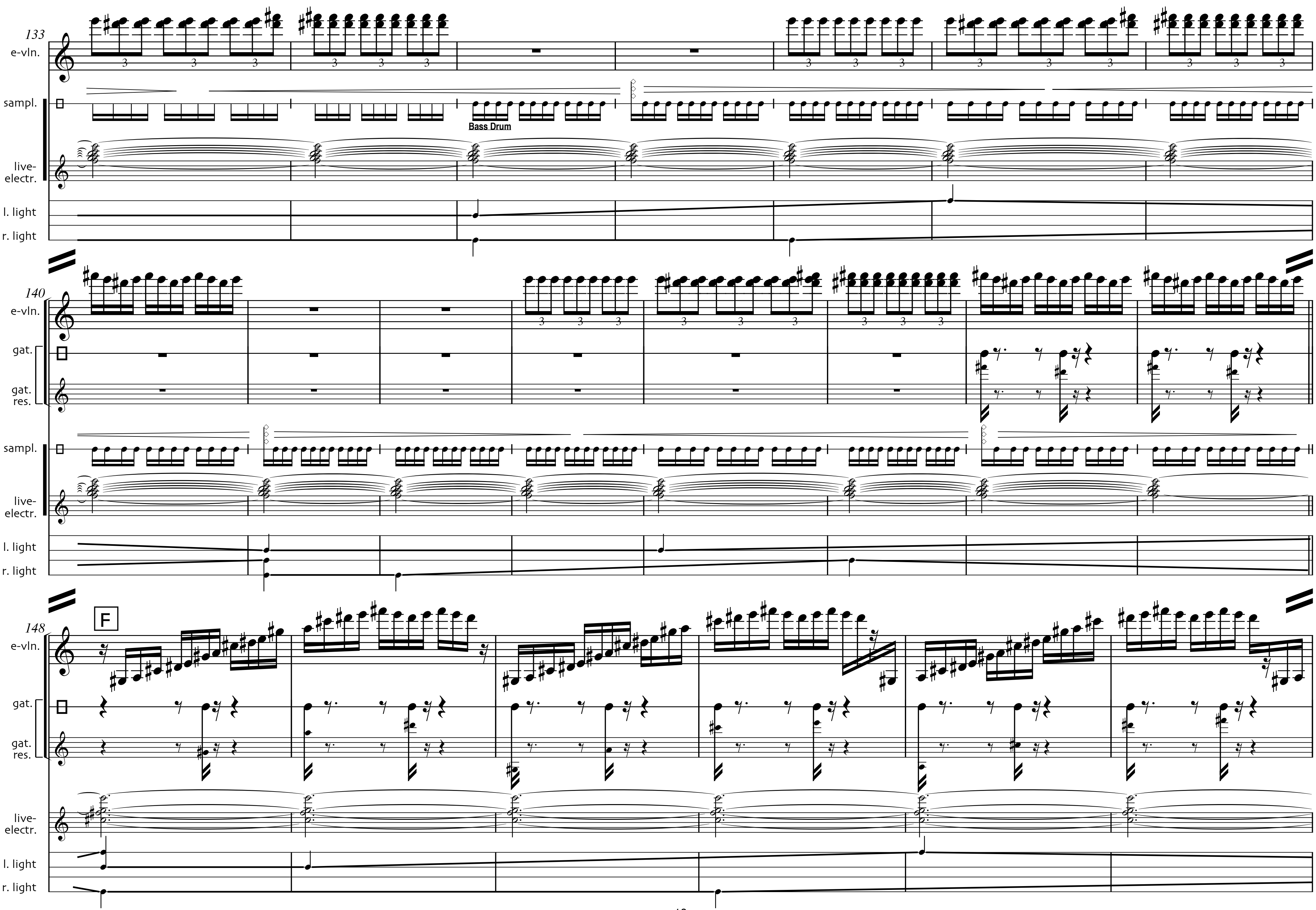

43
e-vln.
gat.
res.
l. light
r. light
53
B
gat.
sampl.
crowd shouting:
Po - ry - gon!
Bass Drum (with high partials fading in and out)
62

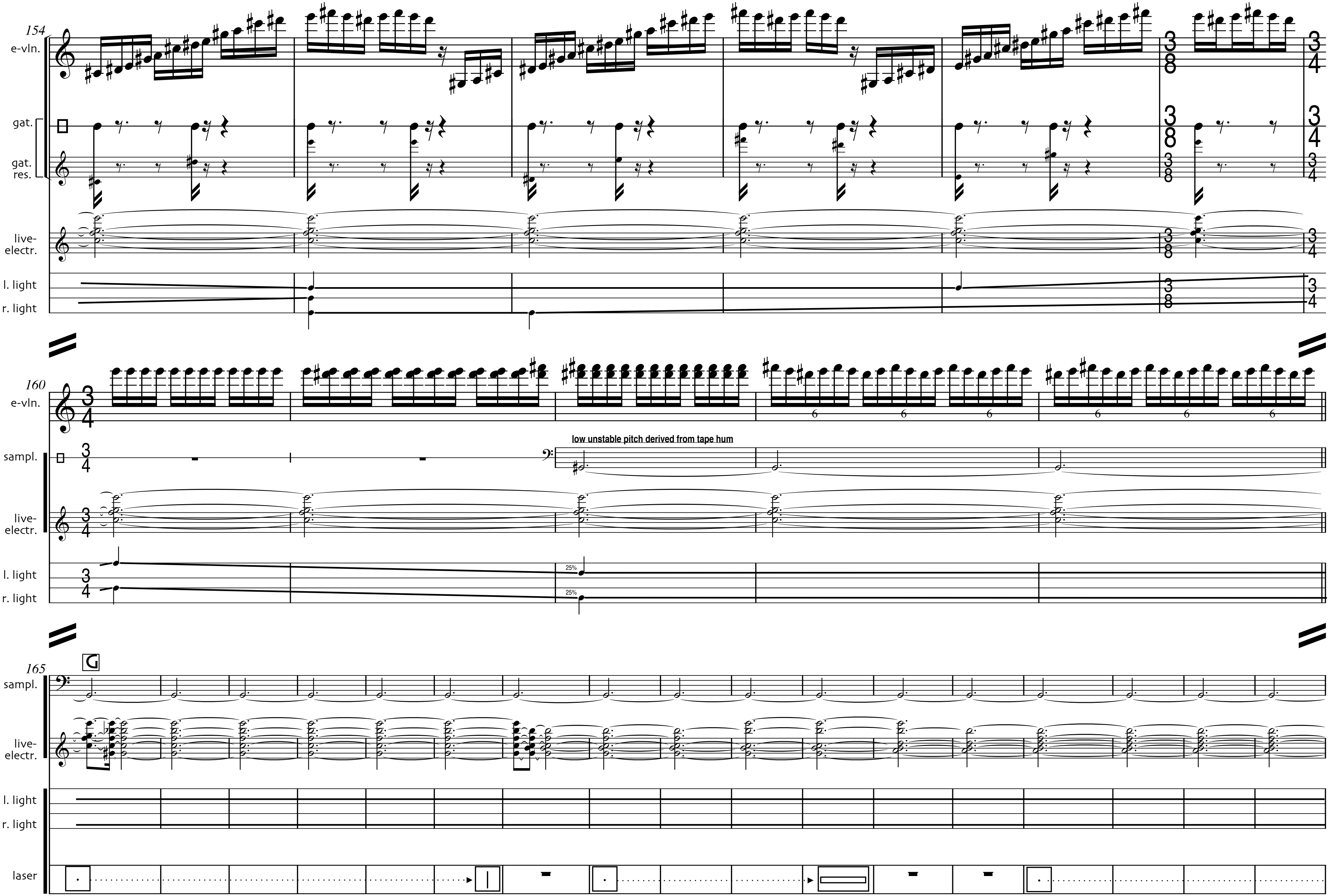


68
75
82
C
e-vln.
gat.
gat. res.
sampl.
l. light
r. light

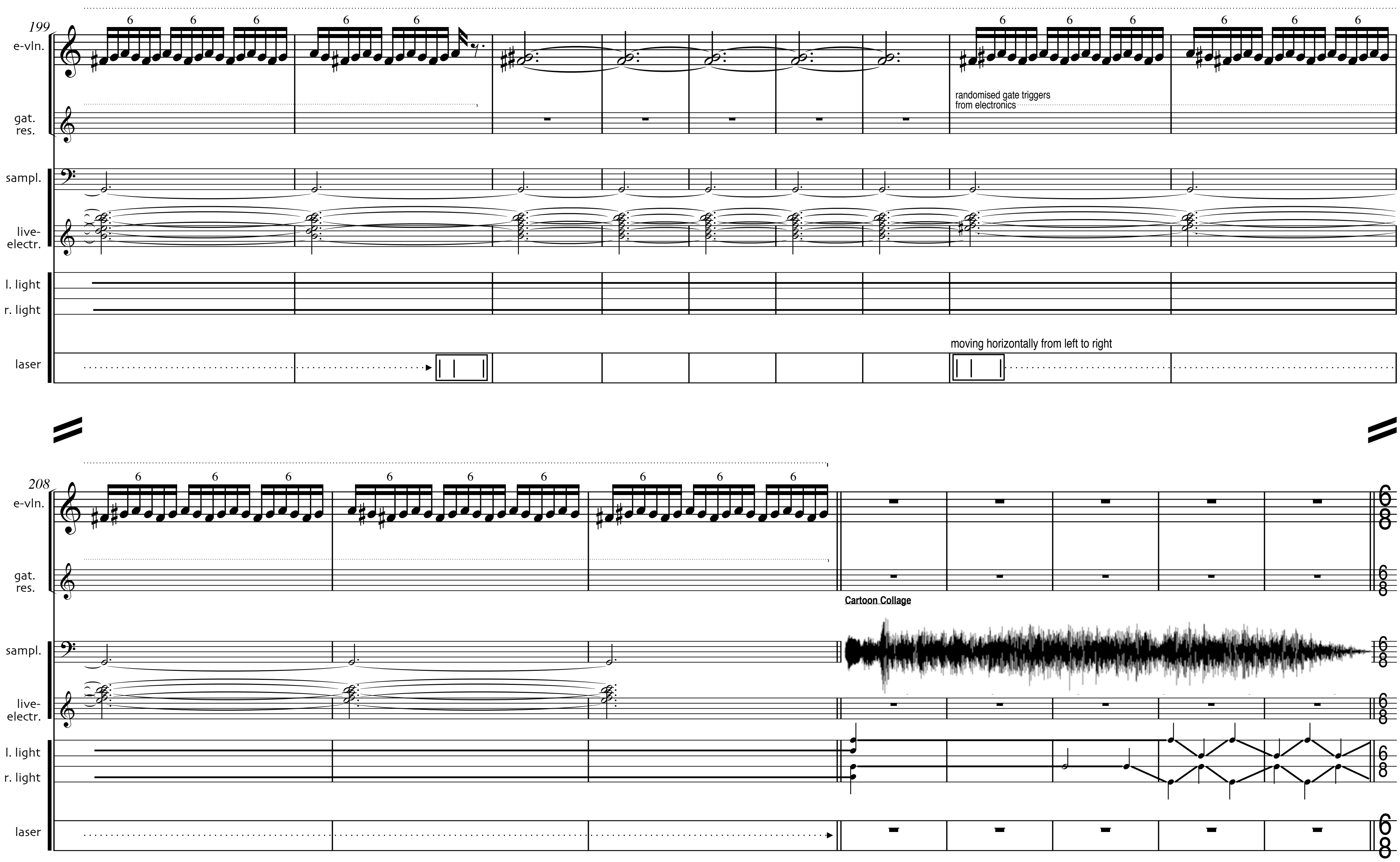

89
e-vln.
gat.
gat. res.
l. light
r. light
96
103
D
high partials
sampl.
15%

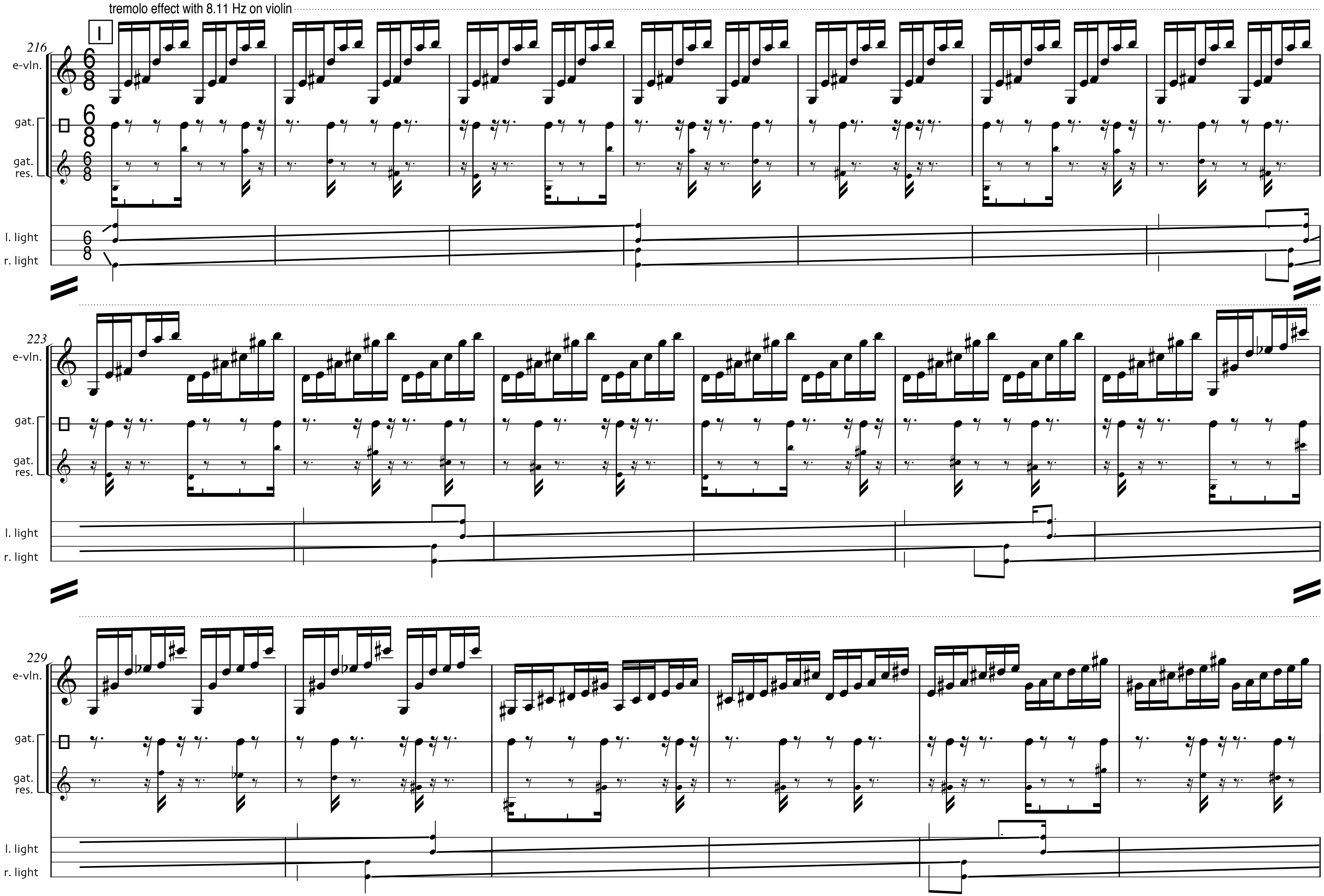

113
e-vln.
gat.
gat. res.
sampl.
l. light
r. light
124
E
live-electr.
sound of projector running through vocoder

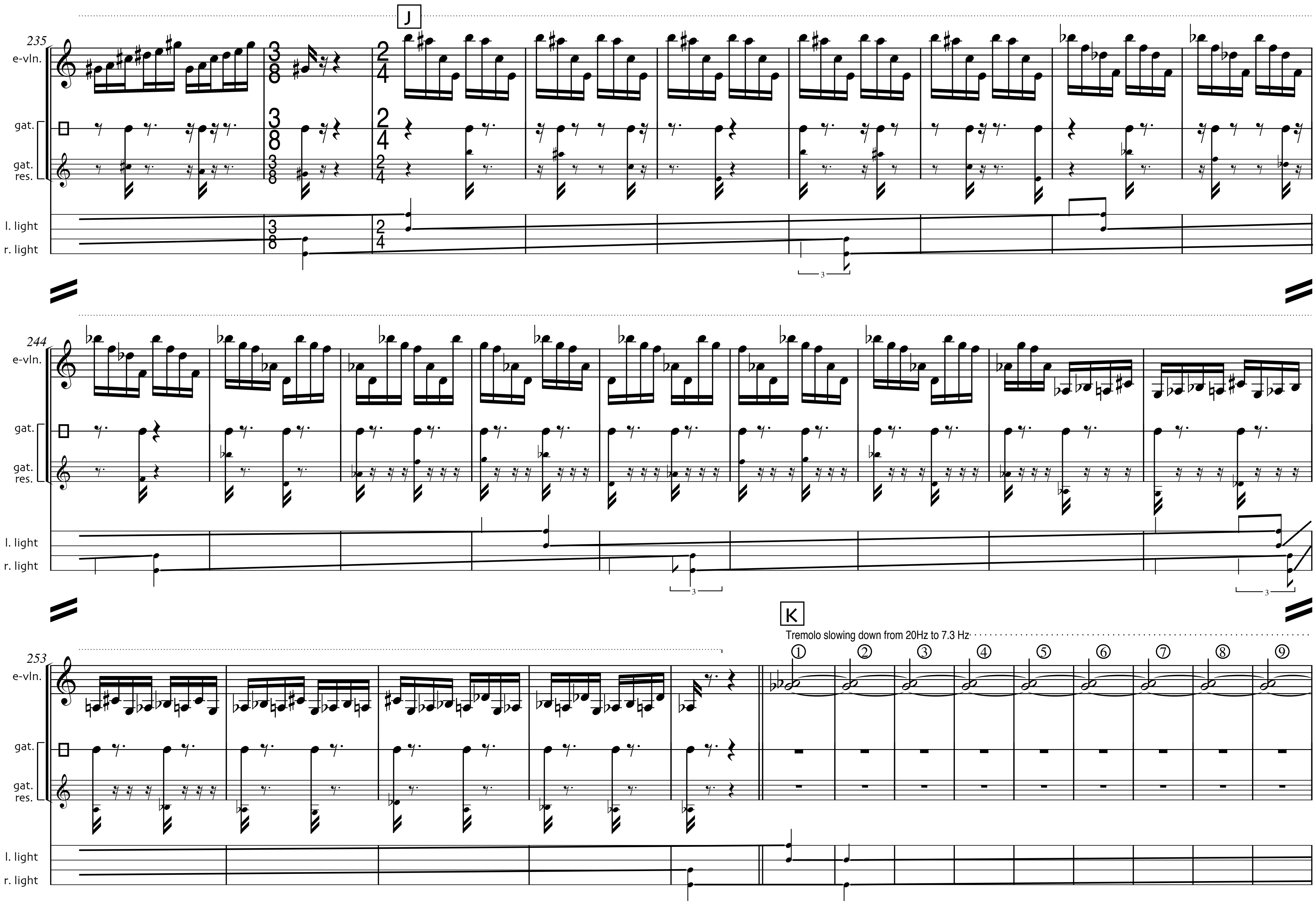

133
e-vln.
sampl.
Bass Drum
live-
electr.
l. light
r. light
140
gat.
gat.
res.
148
F


154
e-vln.
gat.
gat. res.
live-electr.
l. light
r. light
160
sampl.
low unstable pitch derived from tape hum
25%
25%
165
G
laser

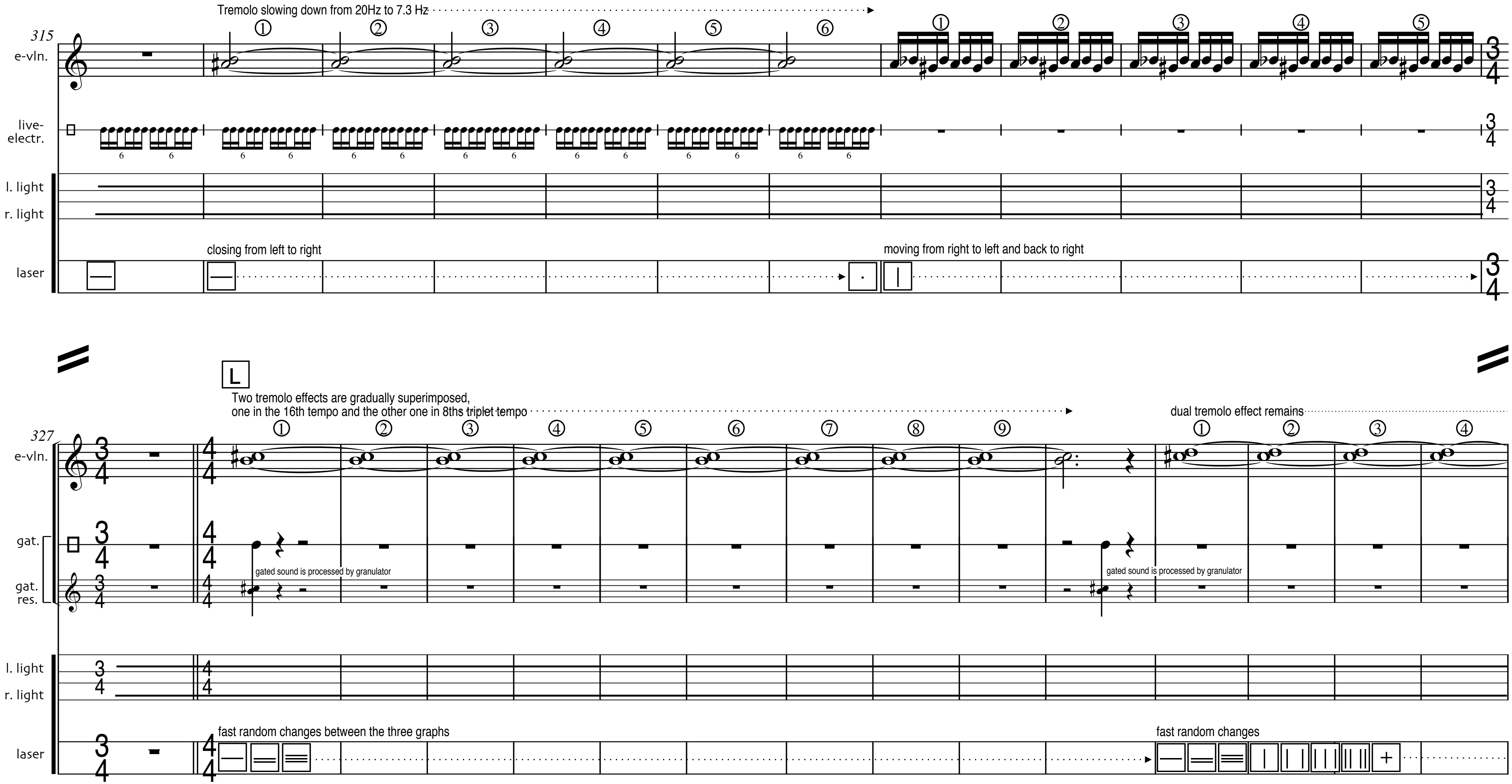

H
tremolo effect with 8.11 Hz on violin
182
e-vln.
gat.
res.
sampl.
live-
electr.
l. light
r. light
laser
mp
randomised gate triggers
from electronics
194


199
e-vln.
gat. res.
sampl.
live-electr.
l. light
r. light
laser
randomised gate triggers from electronics
moving horizontally from left to right
208
Cartoon Collage


tremolo effect with 8.11 Hz on violin
I
216
e-vln.
gat.
gat. res.
l. light
r. light
223
229


235
e-vln.
gat.
gat. res.
l. light
r. light
J
244
253
K
Tremolo slowing down from 20Hz to 7.3 Hz
①
②
③
④
⑤
⑥
⑦
⑧
⑨


Tremolo slowing down from 20Hz to 7.3 Hz
267
e-vln.
sampl.
Cartoon Music
5:4
mf
l. light
r. light
15%
285
Sound of film-projector
f
live-electr.
301
Bass Drum
laser
opening from left to right

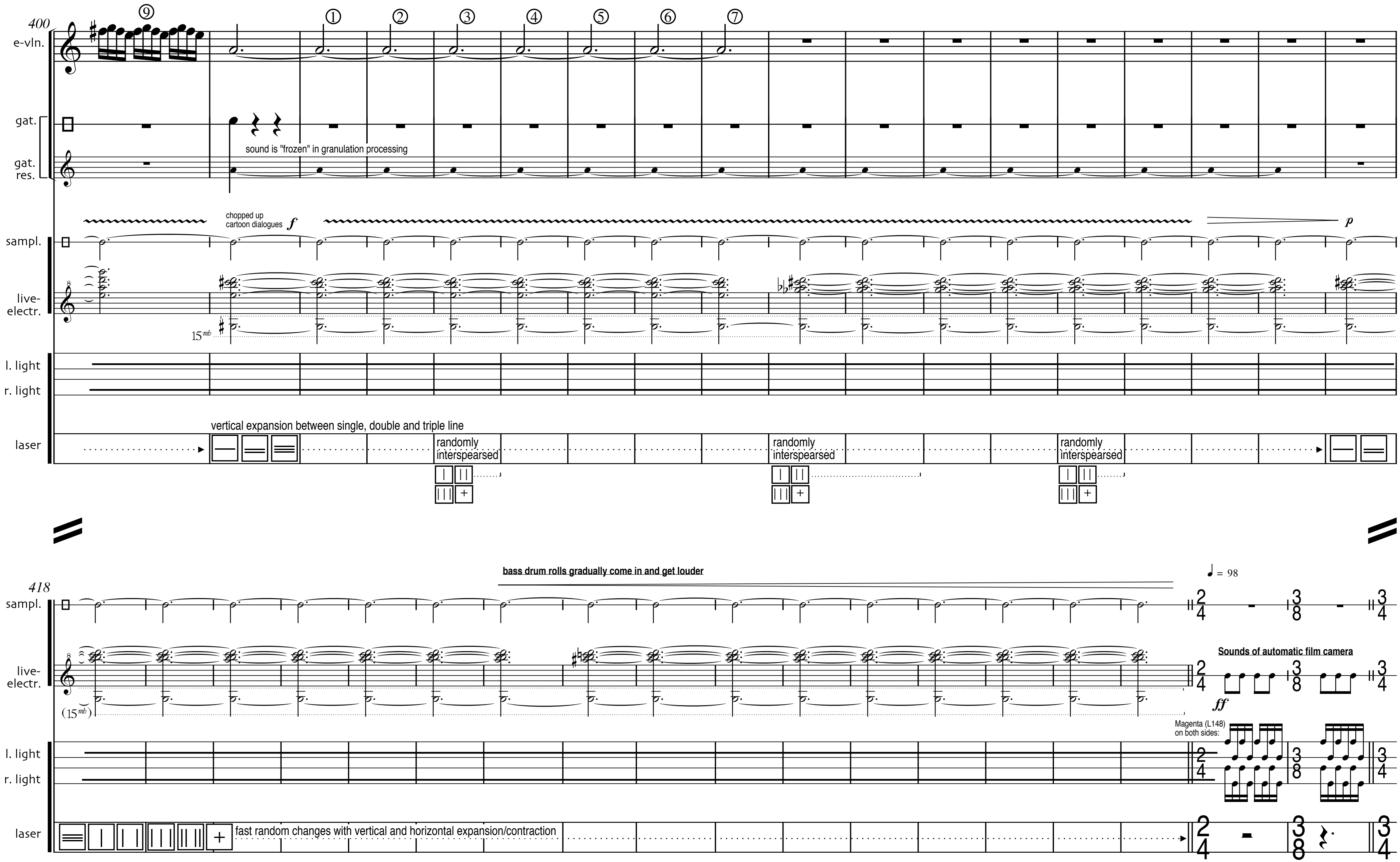


315
Tremolo slowing down from 20Hz to 7.3 Hz
e-vln.
live-electr.
l. light
r. light
closing from left to right
moving from right to left and back to right
laser
L
327
Two tremolo effects are gradually superimposed,
one in the 16th tempo and the other one in 8ths triplet tempo
dual tremolo effect remains
e-vln.
gat.
gated sound is processed by granulator
gat. res.
gated sound is processed by granulator
l. light
r. light
fast random changes between the three graphs
fast random changes
laser


342
e-vln.
gat.
gat. res.
gated sound is processed by granulator
l. light
r. light
laser
between the eight graphs
unfolding L -> R
unfolding R -> L
unfolding L -> R
354
e-vln.
gat.
gat. res.
sampl.
l. light
r. light
laser
unfolding R -> L
unfolding L -> R
unfolding R -> L
2 x unfolding L -> R
unfolding R -> L


M
363
e-vln.
gat.
gat. res.
sampl.
live-electr.
l. light
r. light
laser
unfolding L -> R
unfolding R -> L
unfolding L -> R
R -> L
L -> R
R -> L
L -> R
371
unfolding R -> L
unfolding up -> down
unfolding down-> up
up -> down
unfolding down-> up
unfolding up -> down
down-> up
down-> up
unfolding L -> R
unfolding R -> L

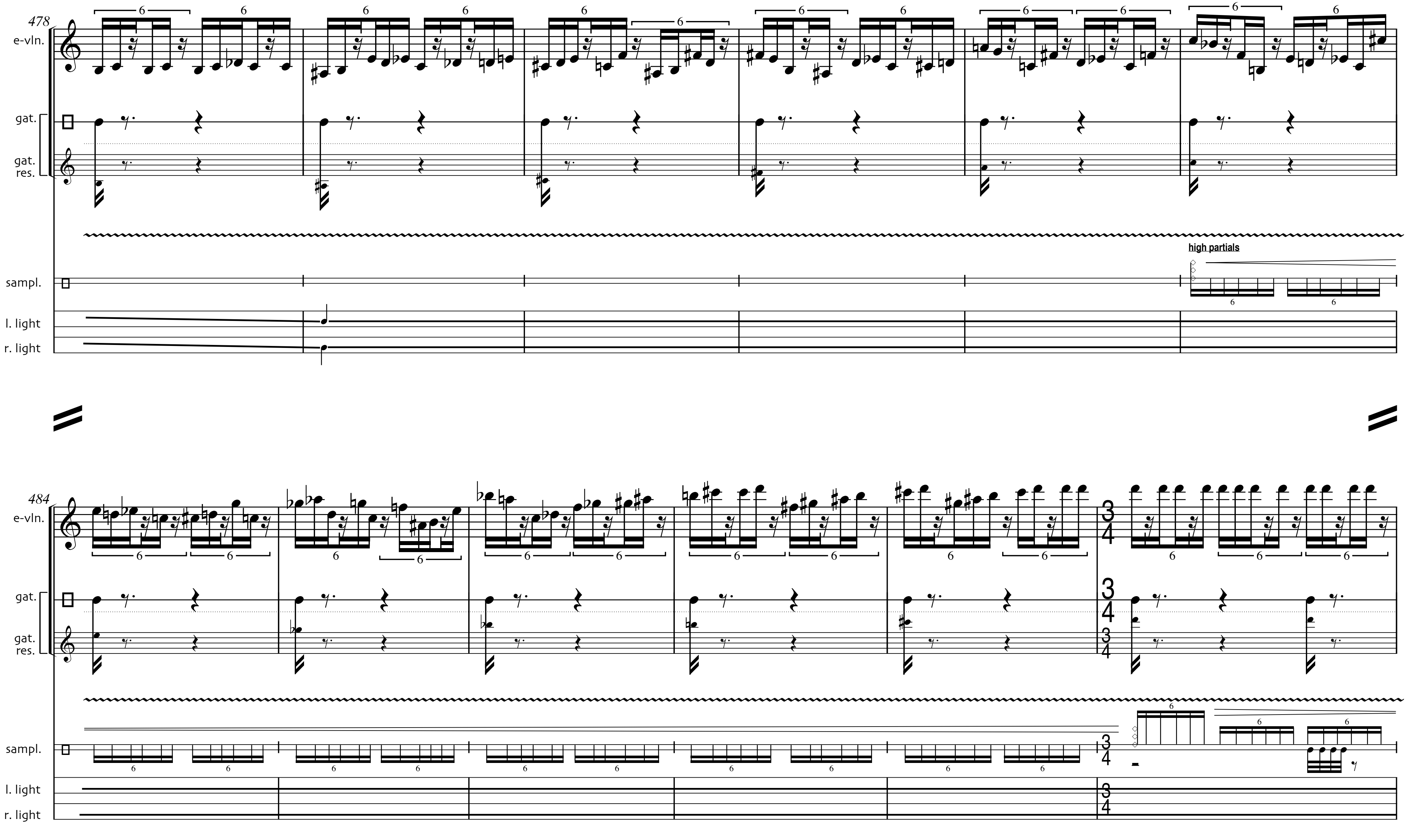
N
380
e-vln.
gat.
gat. res.
sampl.
live-electr.
l. light
r. light
laser
down-> up
up -> down
unfolding L -> R
unfolding R -> L
up -> down
unfolding down-> up
unfolding up -> down
unfolding down-> up
up -> down
down-> up
up -> down
down-> up
up -> down
fold up R-> L
392
①
②
③
④
⑤
⑥
⑦
⑧
chopped up cartton diologues slowly come up in the background
p
L -> R
unfolding R -> L
unfolding L -> R
unfolding R -> L
fold up down -> up


400
e-vln.
gat.
gat. res.
sound is "frozen" in granulation processing
chopped up cartoon dialogues
sampl.
live-electr.
l. light
r. light
vertical expansion between single, double and triple line
laser
randomly interspearsed
randomly interspearsed
randomly interspearsed
418
bass drum rolls gradually come in and get louder
♩ = 98
Sounds of automatic film camera
Magenta (L148) on both sides:
fast random changes with vertical and horizontal expansion/contraction

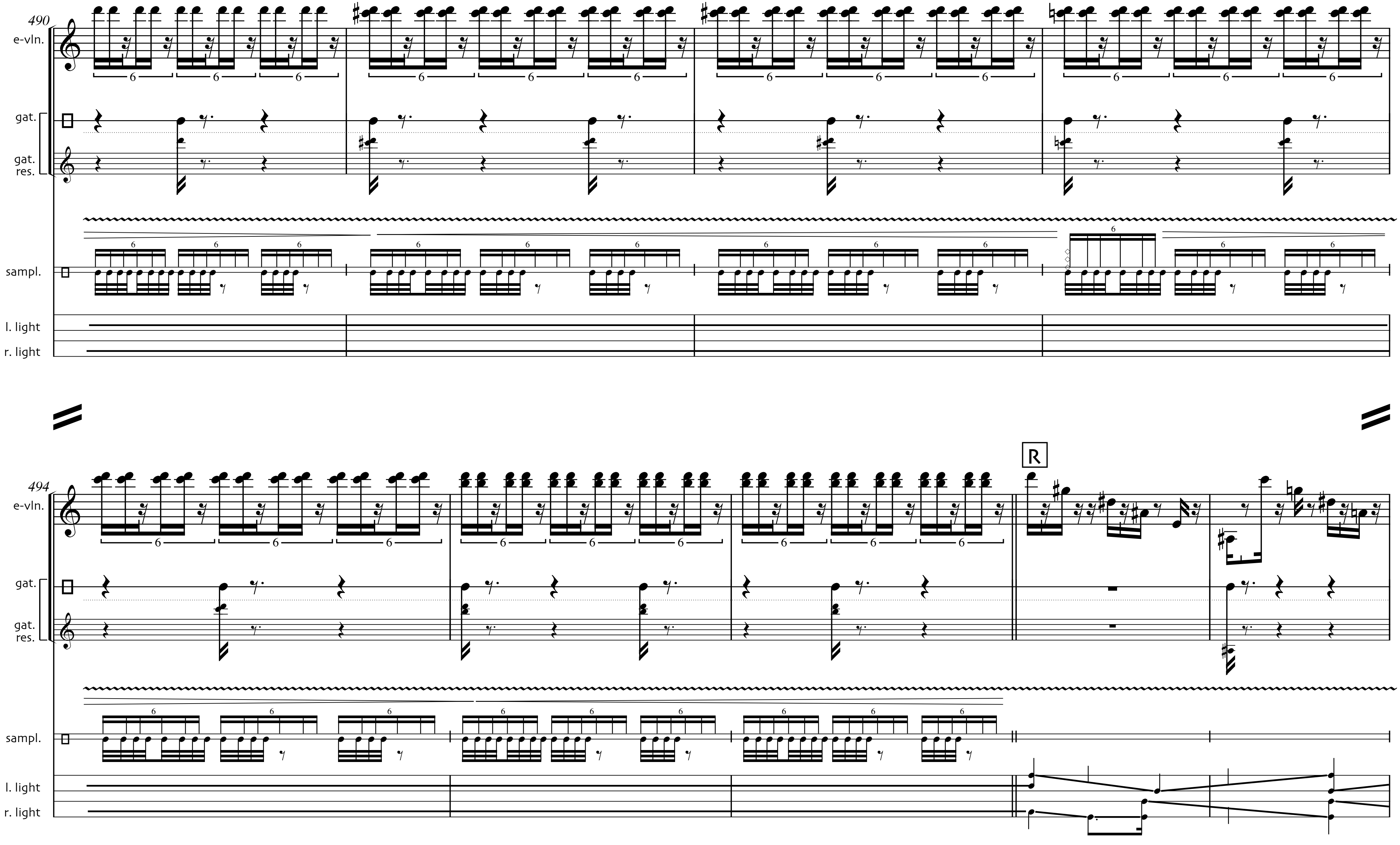

O
436
e-vln.
gat.
gat. res.
rhythmisised tap delay on gated signal
l. light
r. light
442
sampl.
chopped up cartoon voices and bass drum
laser
L -> R


448
e-vln.
gat.
gat. res.
sampl.
chopped up cartoon voices and bass drum
l. light
r. light
unfolding R -> L
laser
454
e-vln.
gat.
gat. res.
sampl.
chopped up cartoon voices and bass drum
l. light
r. light
unfolding R -> L
unfolding up -> down
laser


P
462
e-vln.
gat.
gat. res.
l. light
r. light
471
Q
sampl.
chopped up cartoon voices and bass drum
granulated and FFT filtered text fragments keep ringing on
laser
unfolding up -> down
fold up R-> L
unfolding L -> R



478
e-vln.
gat.
gat. res.
high partials
sampl.
l. light
r. light
484
e-vln.
gat.
gat. res.
sampl.
l. light
r. light

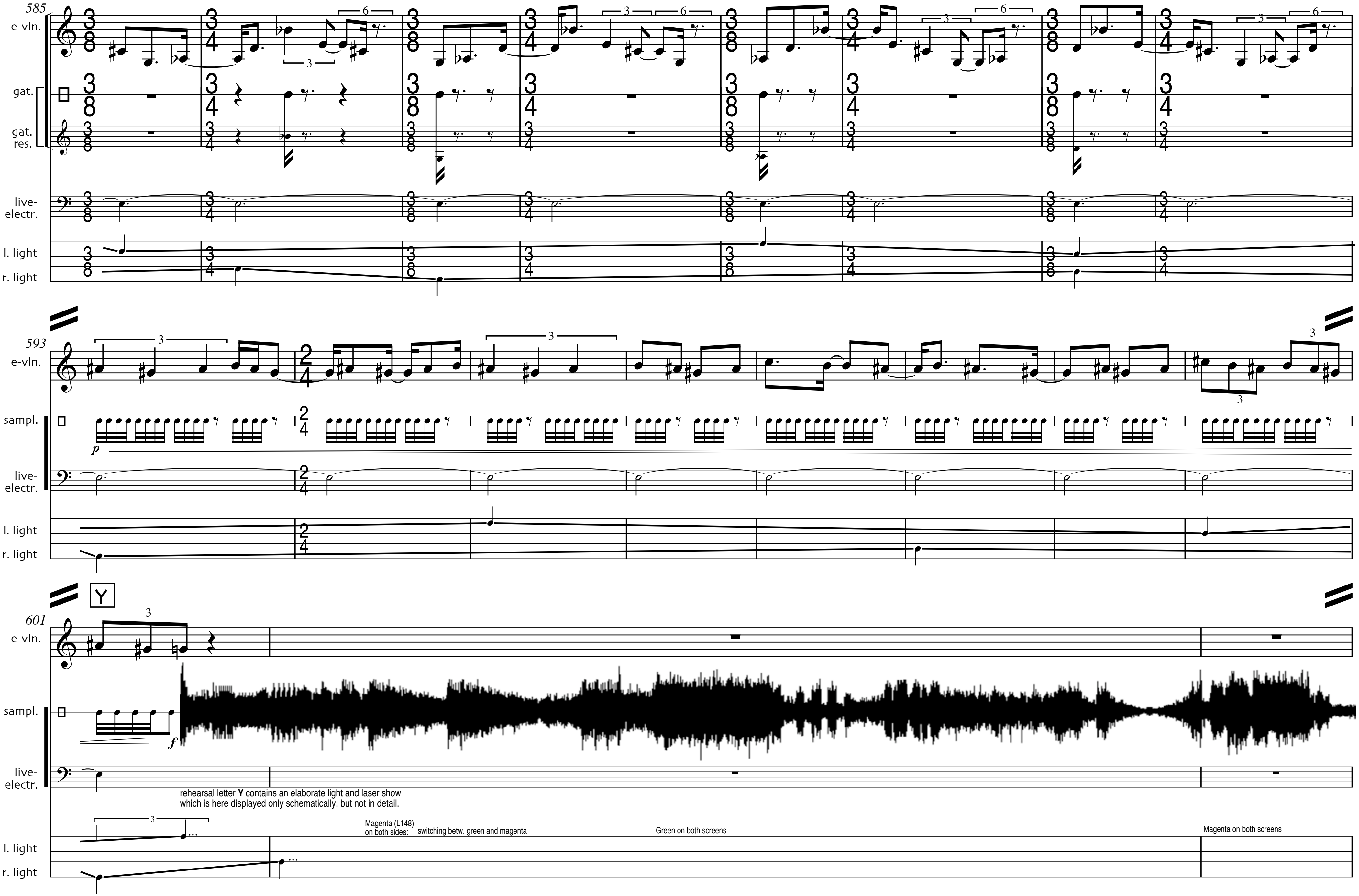

490
e-vln.
gat.
gat. res.
sampl.
l. light
r. light
494
R

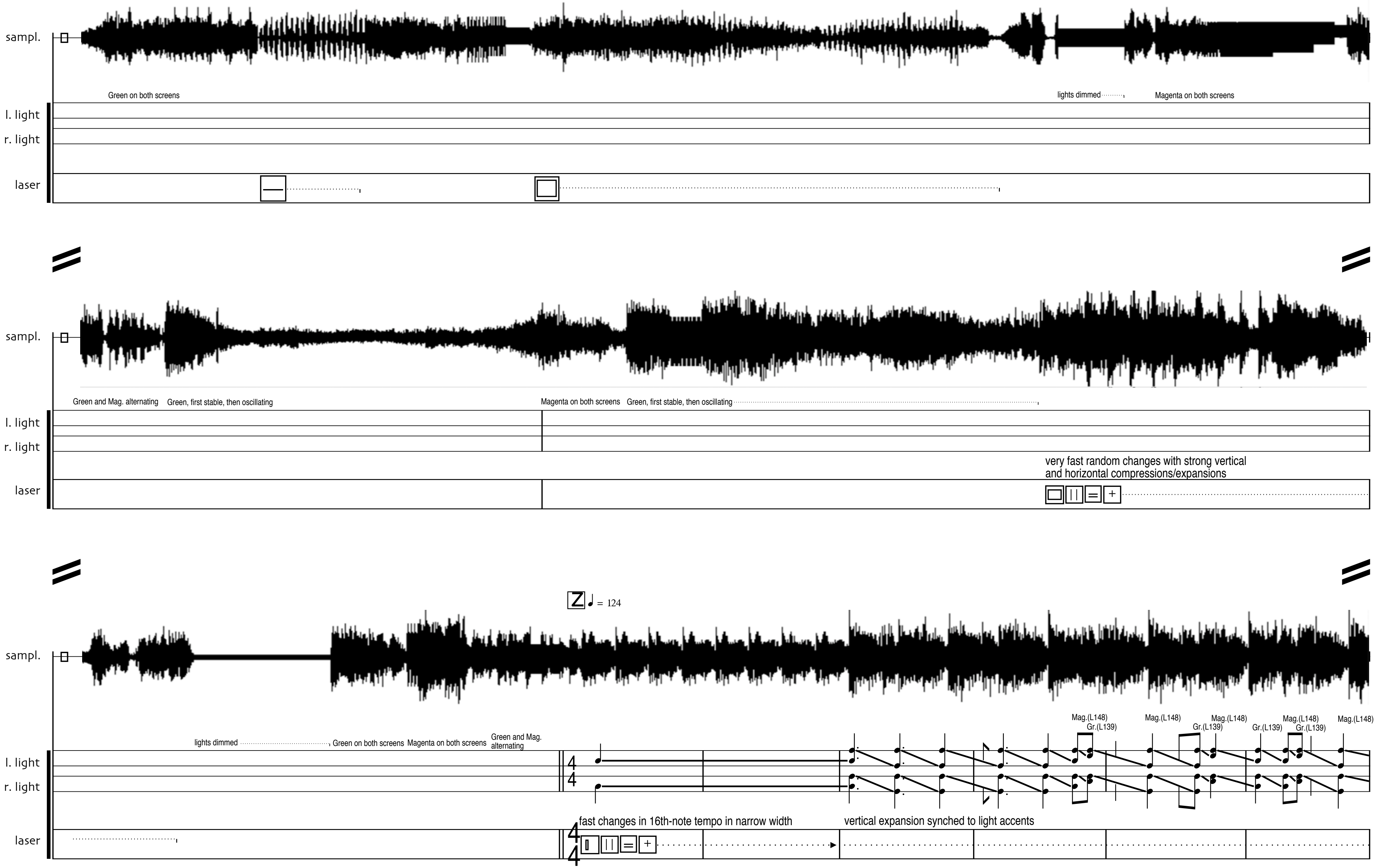

499
S
e-vln.
gat.
gat. res.
granulation is very gradually getting sparser
sampl.
l. light
r. light
507
519

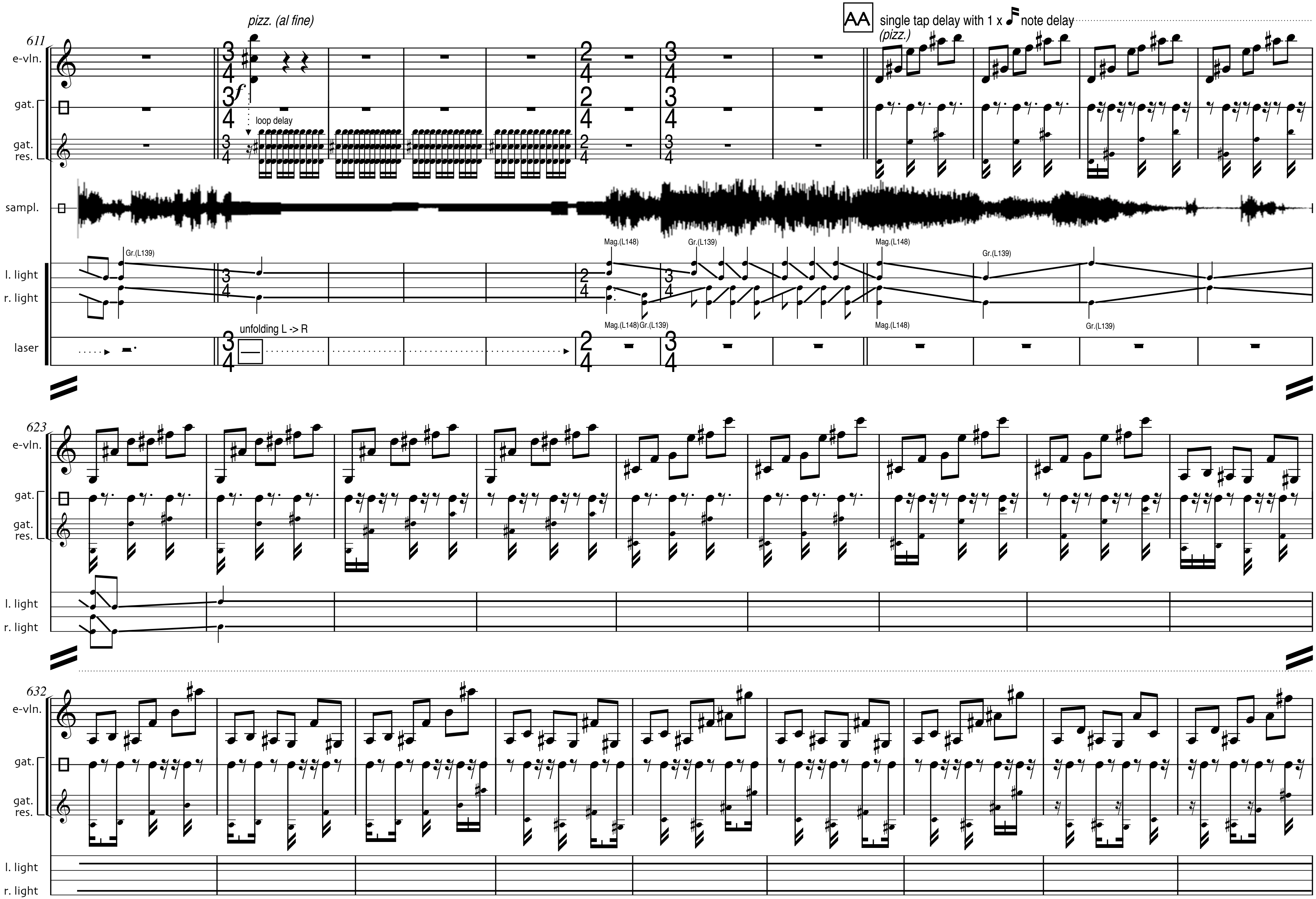

T
531
e-vln.
gat.
gat. res.
sampl.
l. light
r. light
540
U
6
6
6
live-electr.
dal niente

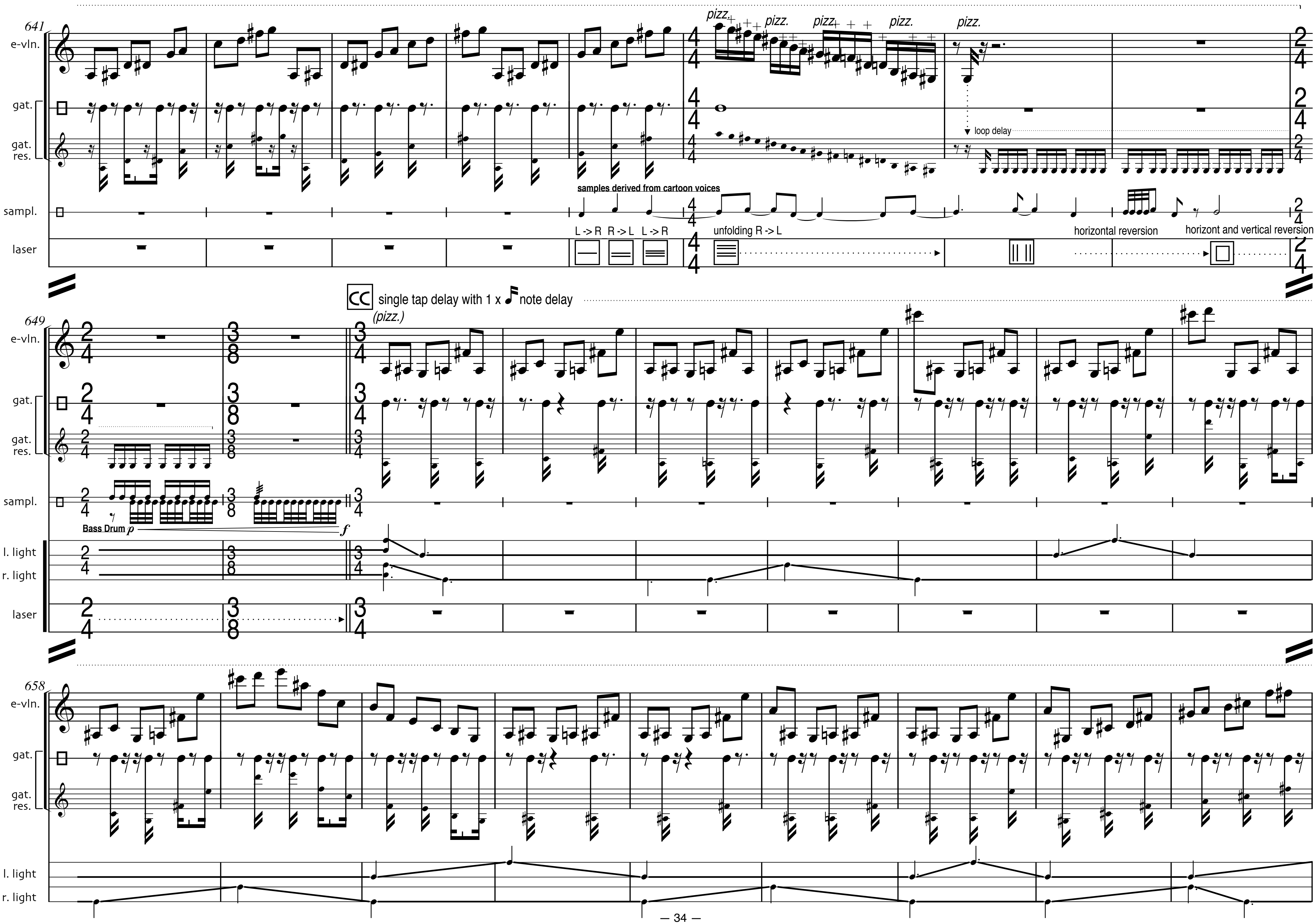

550
e-vln.
gat.
gat. res.
sampl.
live-electr.
l. light
r. light
V
Bass Drum
p
f
ppp
560


W
568
e-vln.
gat.
gat. res.
sampl.
live-electr.
l. light
r. light
Cartoon Music
sound gets gradually more and more fragmented
X
578


585
e-vln.
gat.
gat. res.
live-electr.
l. light
r. light
593
sampl.
Y
601
rehearsal letter **Y** contains an elaborate light and laser show
which is here displayed only schematically, but not in detail.
Magenta (L148) on both sides:
switching betw. green and magenta
Green on both screens
Magenta on both screens


sampl.
l. light
r. light
laser
Green on both screens
lights dimmed
Magenta on both screens
Green and Mag. alternating
Green, first stable, then oscillating
Magenta on both screens
Green, first stable, then oscillating
very fast random changes with strong vertical and horizontal compressions/expansions
Z
♩ = 124
lights dimmed
Green on both screens
Magenta on both screens
Green and Mag. alternating
4/4
fast changes in 16th-note tempo in narrow width
vertical expansion synched to light accents
Mag.(L148)
Gr.(L139)
Mag.(L148)
Gr.(L139)
Mag.(L148)
Gr.(L139)
Mag.(L148)
Gr.(L139)
Mag.(L148)


pizz. (al fine)
AA
single tap delay with 1 x note delay
(pizz.)
611
e-vln.
gat.
gat.
res.
loop delay
sampl.
Gr.(L139)
Mag.(L148)
Gr.(L139)
Mag.(L148)
Gr.(L139)
l. light
r. light
Mag.(L148) Gr.(L139)
Mag.(L148)
Gr.(L139)
unfolding L -> R
laser
623
e-vln.
gat.
gat.
res.
l. light
r. light
632
e-vln.
gat.
gat.
res.
l. light
r. light


641
e-vln.
gat.
gat. res.
sampl.
laser
pizz.
pizz.
pizz.
pizz.
pizz.
loop delay
samples derived from cartoon voices
L -> R
R -> L
L -> R
unfolding R -> L
horizontal reversion
horizont and vertical reversion
CC
single tap delay with 1 x note delay
649
(pizz.)
Bass Drum p
f
l. light
r. light
658

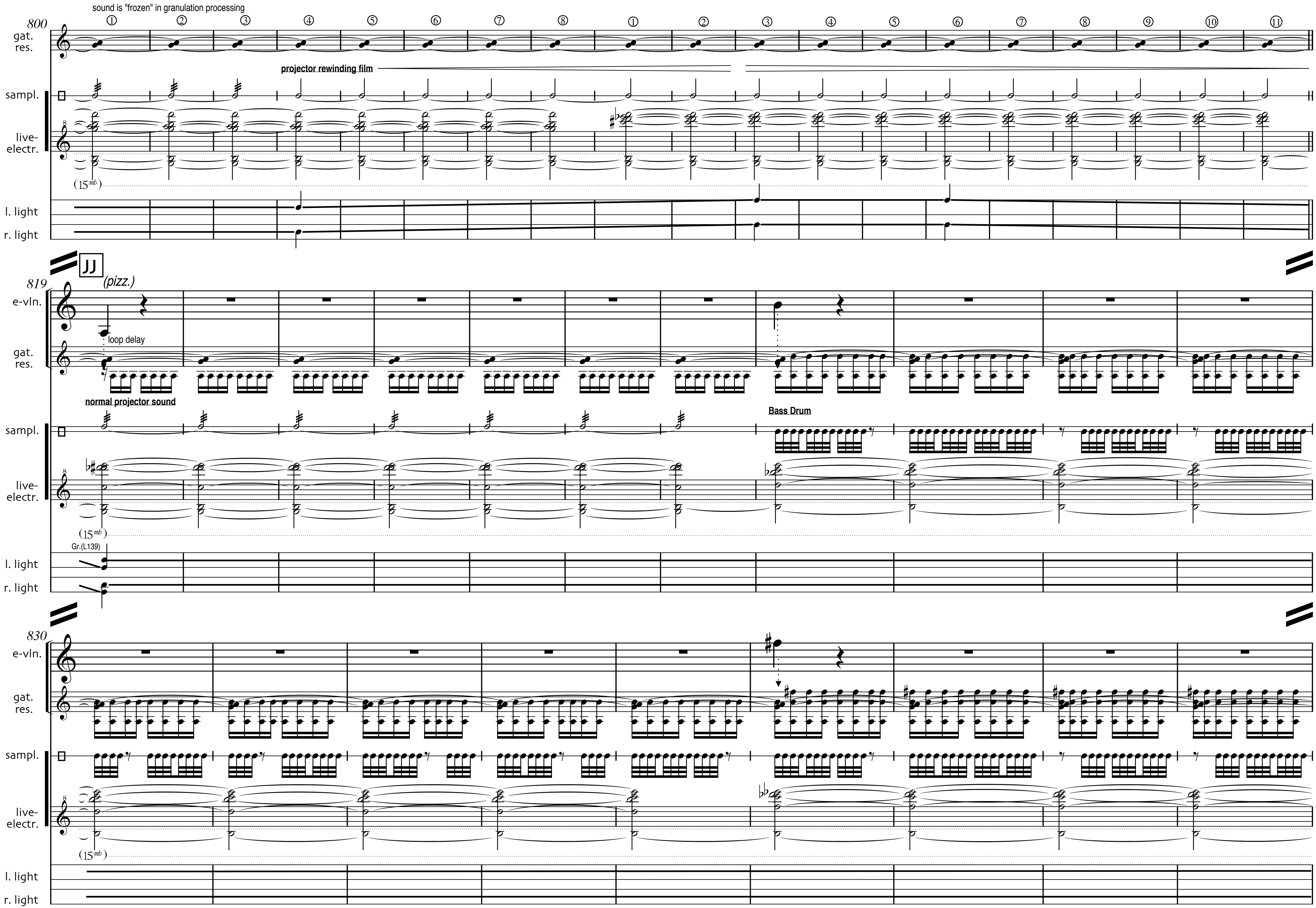

667
e-vln.
gat.
gat. res.
l. light
r. light
pizz.
pizz.
pizz.
pizz.
CC
(pizz.)
676
sampl.
samples derived from cartoon voices
unfolding L -> R
vertical expansion and contraction
laser
685
DD
cartoon speech
Bass Drum
p
f
Mag.(L148)
random in eight triplet tempo with continuous vertical expansion and contraction

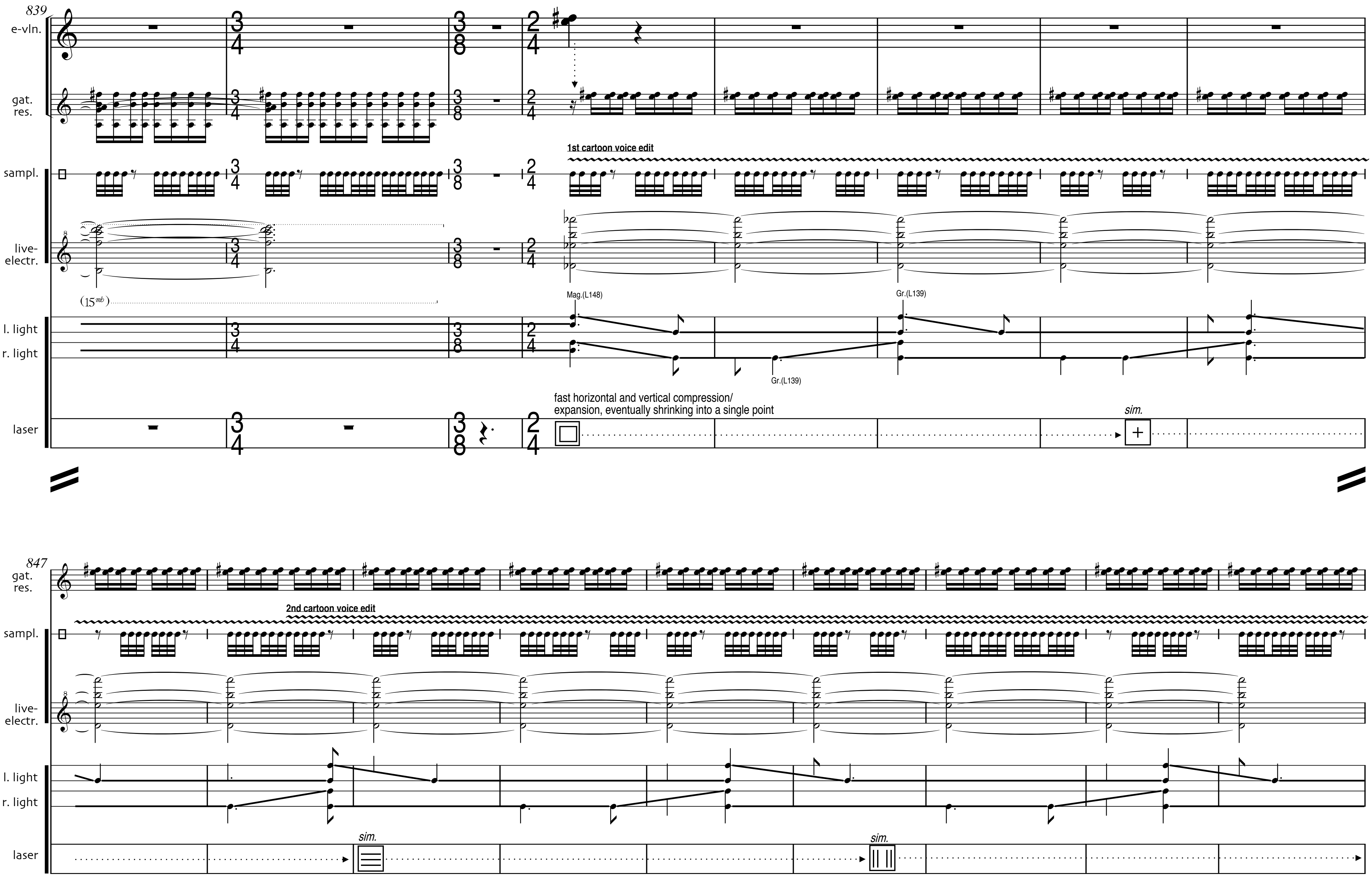

EE
692
e-vln.
gat.
gat. res.
sampl.
l. light
r. light
laser
loop delay
Cartoon voice
slow unfolding R -> L
701
Sound of projector
slow unfolding up -> down
vertical expansion and contraction
FF
712
strumming (guitar like)
pizz technique
sim.
projector sound through vocoder
live-electr.
L -> R
R -> L
L -> R
vertical compression
unfolding R -> L

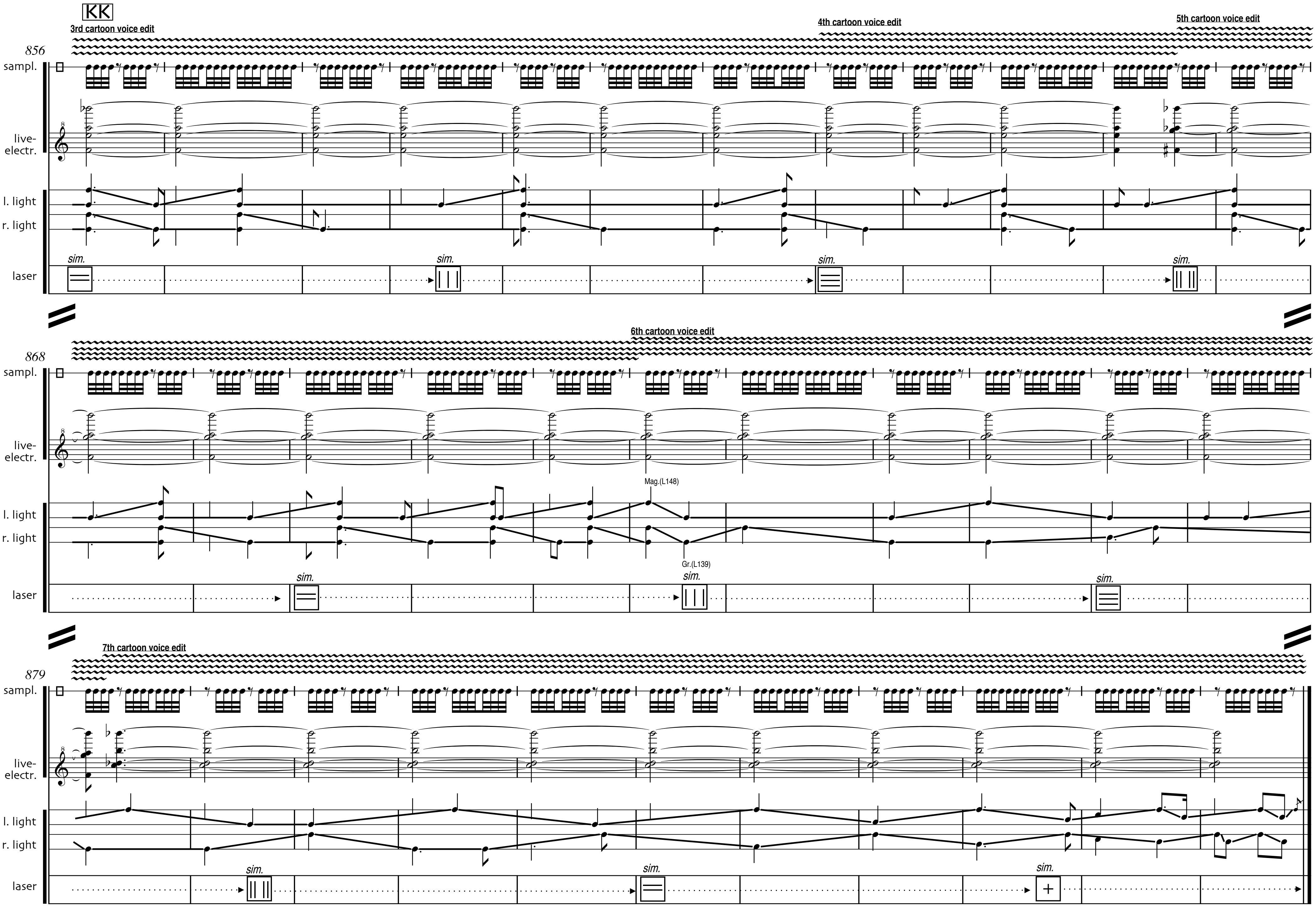

723
e-vln.
live-
electr.
horizont and vertical reversion in many variations
random changes
laser
733
e-vln.
live-
electr.
horizont and vertical reversion continues
compresses to:
Mid -> L
L -> R
vertical compression
unfolding R -> L
laser
743
GG
pizz. ord.
e-vln.
high partials
sampl.
Bass Drum
Bass Drum
live-
electr.
15mb
random selection of shapes in the given rhythm, while undergoing strong vertical and horizontal strechings and compressions
laser


752
e-vln.
gat.
gat. res.
sampl.
live-electr.
laser
pizz.
pizz.
pizz.
pizz.
HH
(pizz.)
Bass Drum
Bass Drum
(15mb)
761
e-vln.
sampl.
live-electr.
laser
Bass Drum
Bass Drum
(15mb)


774
e-vln.
gat.
gat. res.
sampl.
Bass Drum
live-electr.
(15mb)
laser
horizontal and vertical compression/
expansion, shrinking into a single point
varied horizontal and vertical compression/
expansion, eventually shrinking into a single point
sim.
786
Sound of projector
ff
Mag.(L148)
l. light
r. light
sim.
sim.


sound is "frozen" in granulation processing
800
gat.
res.
projector rewinding film
sampl.
live-
electr.
(15mb)
l. light
r. light
JJ
(pizz.)
819
e-vln.
loop delay
gat.
res.
normal projector sound
sampl.
Bass Drum
live-
electr.
(15mb)
Gr.(L139)
l. light
r. light
830
e-vln.
gat.
res.
sampl.
live-
electr.
(15mb)
l. light
r. light


839
e-vln.
gat. res.
sampl.
live-electr.
(15mb)
l. light
r. light
laser
1st cartoon voice edit
Mag.(L148)
Gr.(L139)
Gr.(L139)
fast horizontal and vertical compression/ expansion, eventually shrinking into a single point
sim.
847
gat. res.
sampl.
live-electr.
l. light
r. light
laser
2nd cartoon voice edit
sim.
sim.


KK
3rd cartoon voice edit
4th cartoon voice edit
5th cartoon voice edit
856
sampl.
live-electr.
l. light
r. light
laser
sim.
sim.
sim.
sim.
6th cartoon voice edit
868
sampl.
live-electr.
Mag.(L148)
l. light
r. light
Gr.(L139)
laser
sim.
sim.
sim.
7th cartoon voice edit
879
sampl.
live-electr.
l. light
r. light
laser
sim.
sim.
sim.

Rational Cantilenae in Nine Triads

for a roaring pianist and lighting

marko ciciliani 2008

Rational Cantilenae in Nine Triads

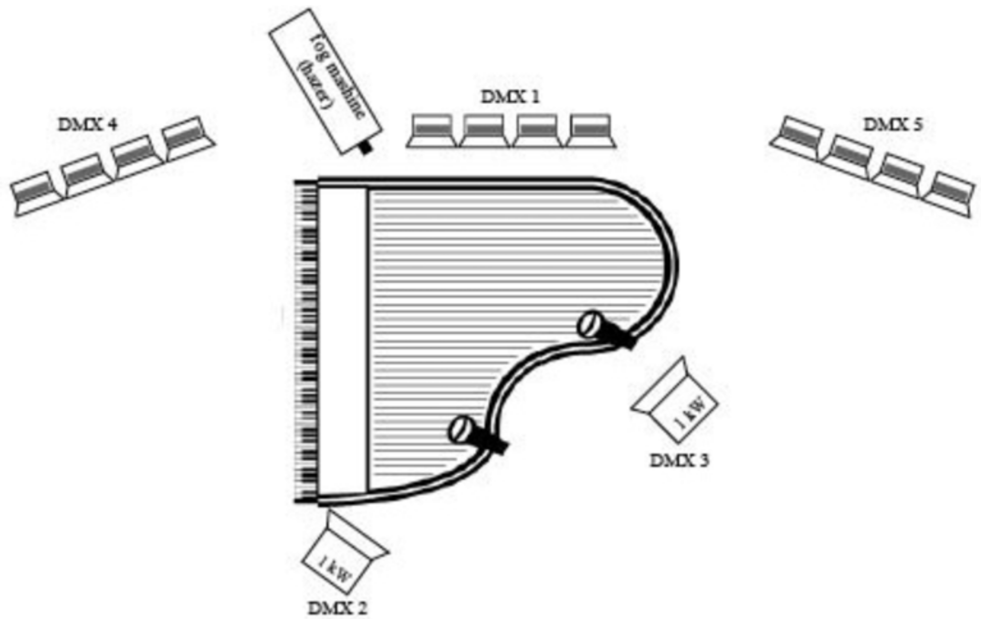
for a roaring pianist and lighting

commissioned by the Fonds voor de Scheppende Toonkunst

When I started working on this piece I was interested in Heavy Metal and its affinity to ancient cults and occultism. While doing research on this subject-matter on the internet, I discovered that not far from my house in Amsterdam, there is a private library with the world largest collection of hermeneutic and alchemist literature. I went there and read with fascination about the world-view of Middle-Age and Renaissance alchemists.
Images that inspired me while working on the music include: the holistic understanding of the universe which is inherently bi-polar, the spiritual aspect of science, the divine aspect of light through stellar constellations, the circular aspect of time, putrification of soul and matter through ritual.
I am not sharing these beliefs, but I am fascinated by Alchemy because of its complex mixture of science, christianity and occult beliefs based in Hellenism. It accumulated very diverse aspects of western history and religion and I wonder how much of these ideas still exist today in an altered form.

Marko Ciciliani, April 2008

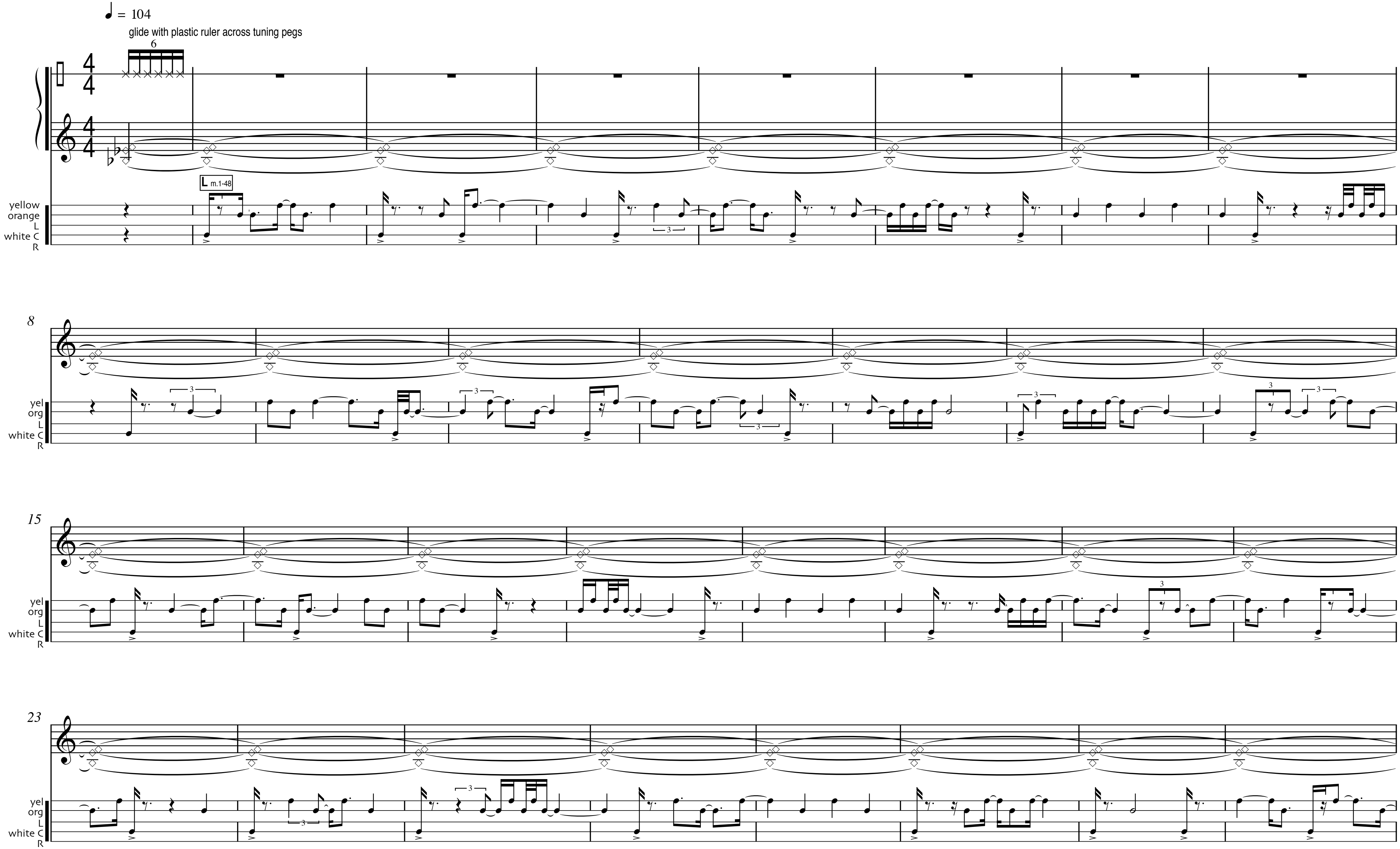
Light requirements:
- DMX dimmer pack with 6 channels of 2kW each;
- 3 x flood lights of 500 W, preferably doubled, tripled or even quadroupled, all with Lee 201 and a frost filter;
- 2 x flood lights of 1 kW, one with Lee 025, the other with Lee 104;
- a fog-mashine of type 'hazer' (it is important that it operates at a low noise level);
- a LanBox dmx interface;
- Apple computer, minimum requirements 1GHz, 512MB, OSX 10.4;
- installation of SuperCollider 3.2 or higher, to be downloaded at no charge at www.audiosynth.com;
- the program to be run on SuperCollider contains all light sequences. Upon request, it will be delivered by the composer (marko@ciciliani.com);

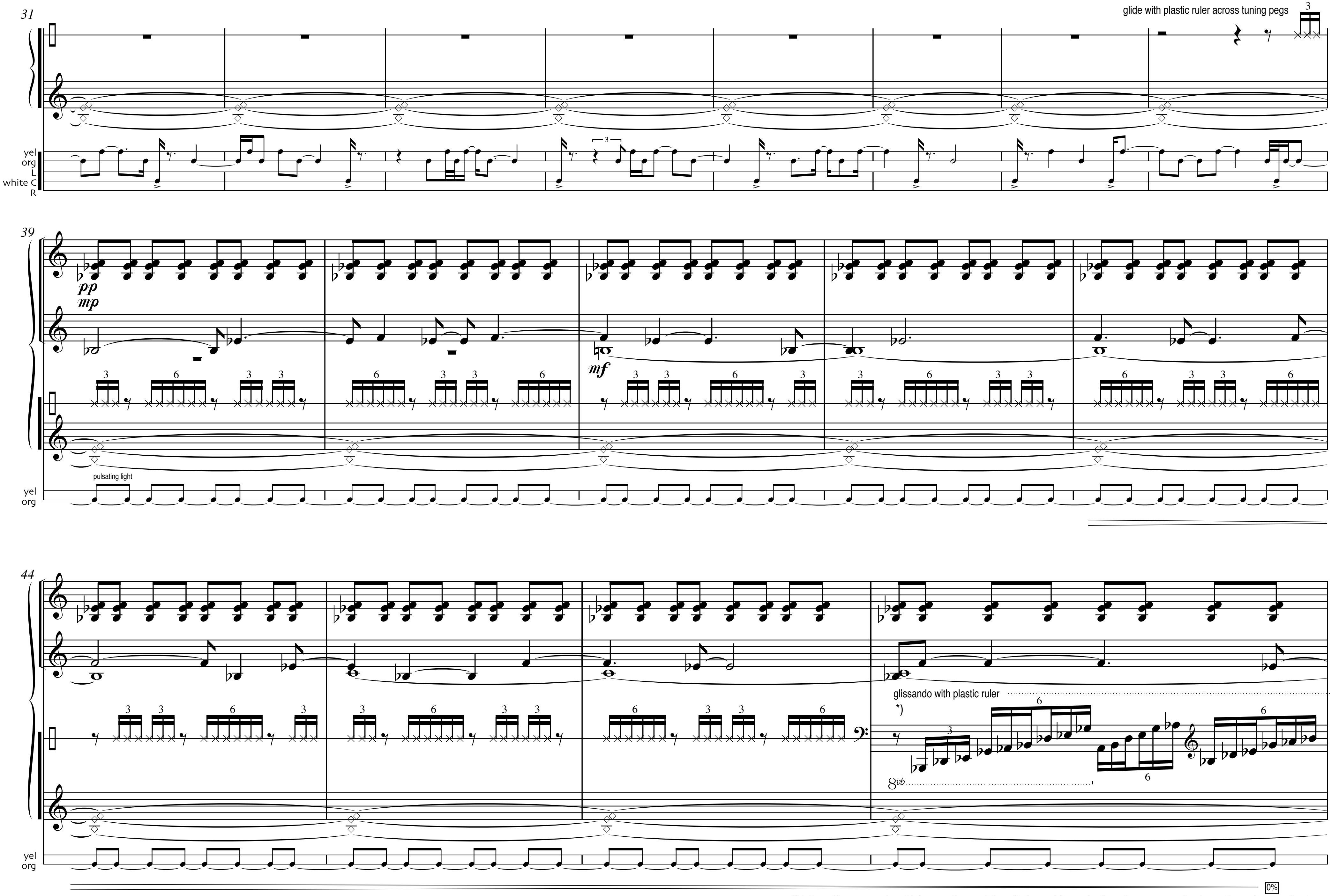


Rational Cantilenae in Nine Triads

for a roaring pianist and lighting

Marko Ciciliani 2008

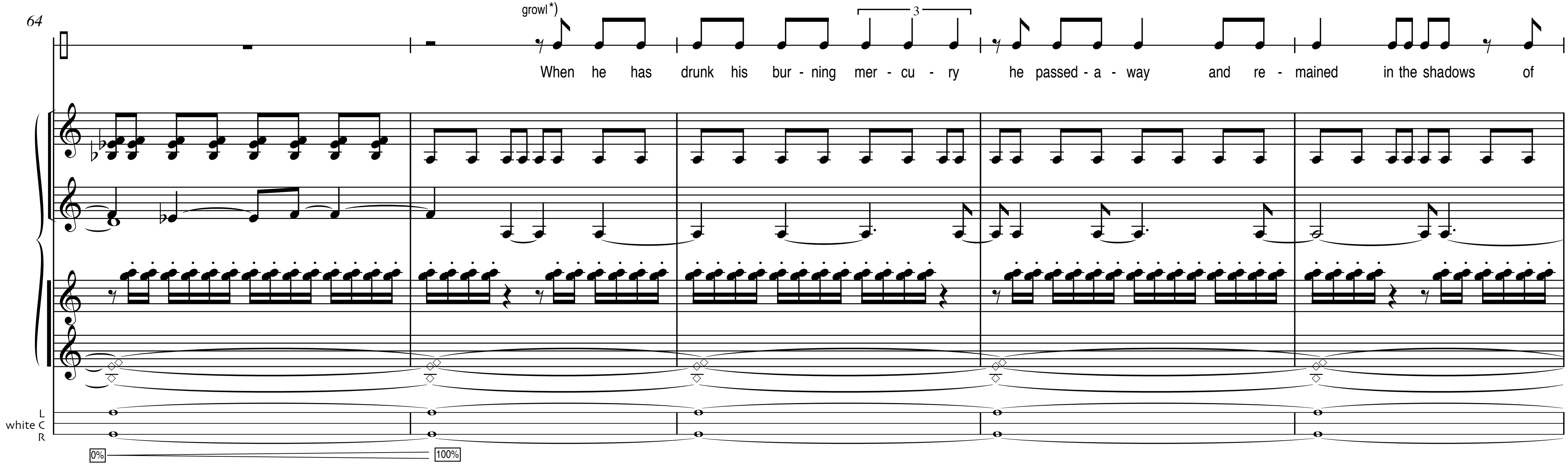




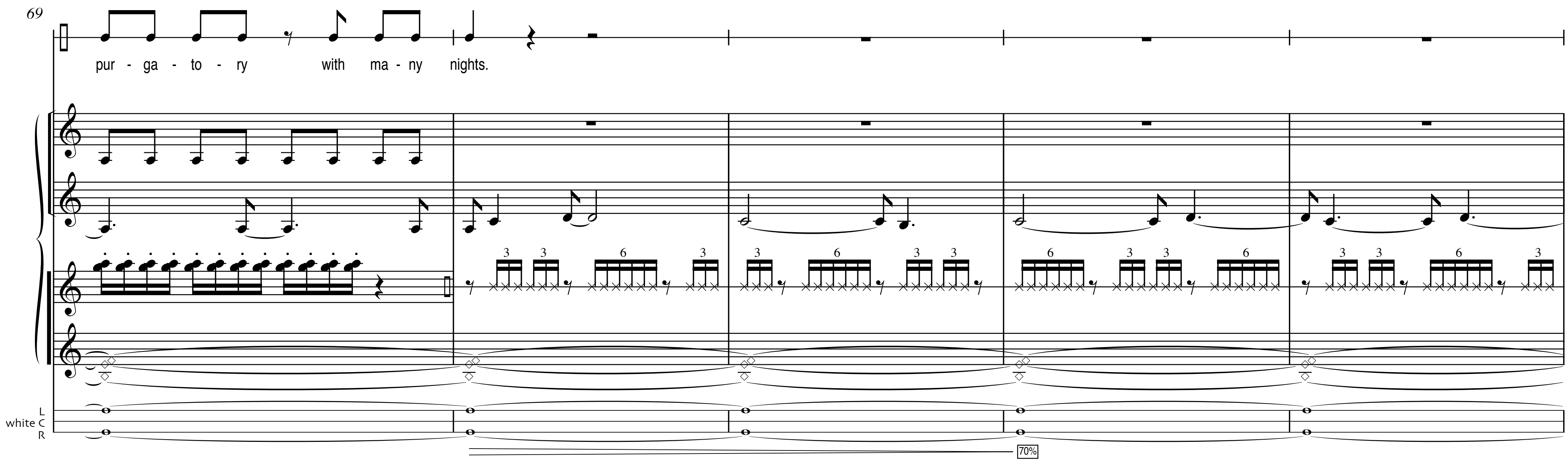
*) The glissanso should be performed by gliding with a plasic ruler across the keys in order to obtain a percussive sound along with the pitches, that relates directly to the sound produced on the tuning pegs. Alternatively a large plectrum or similar objects could be used, while attention should be paid so that the keys don't get scratched or damaged.


48
8va
8va
8vb
51
as previously with ruler
8vb
55
8va
8va
8vb

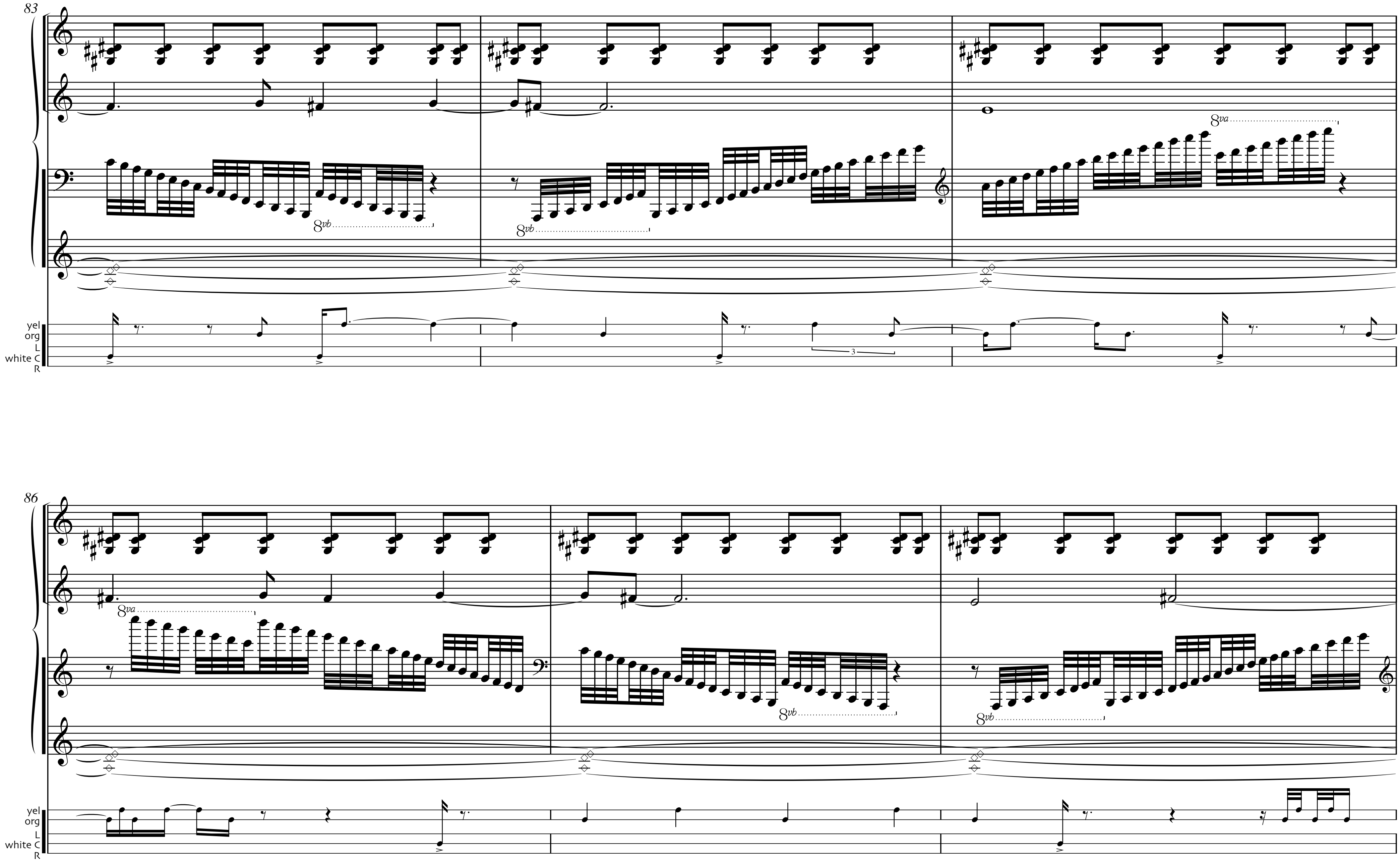

58
8va
8vb
61
8va
8vb

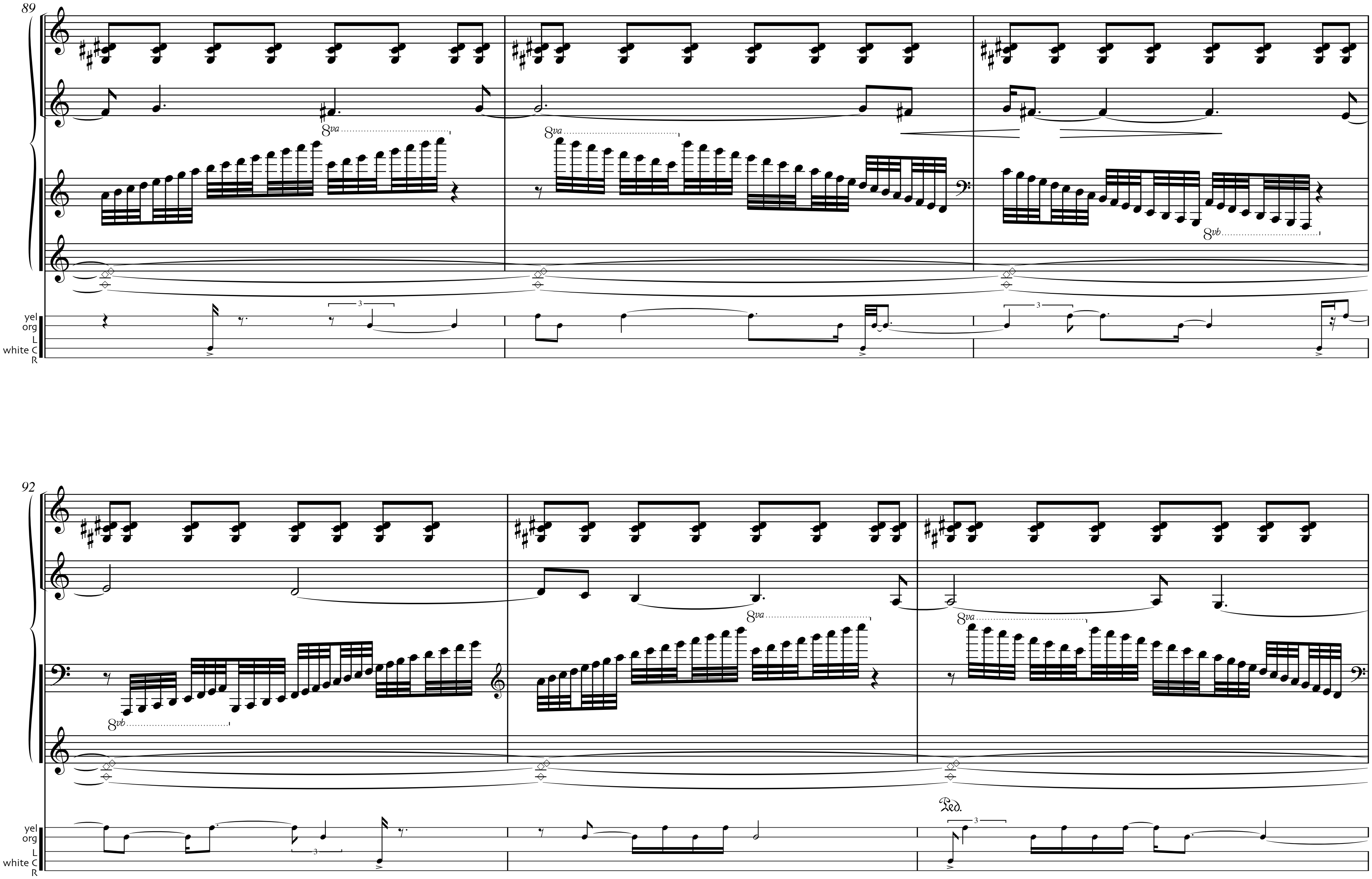


*) The text should be "shouted" by the pianist by emulating a vocal style which is typical for death metal, namely harsh,non-pitched, guttural, growling vocals (also sometimes referred to as Sesame Street's Cookie Monster vocals). This shouting should be agressive in its quality, but nevertheless **soft** in its dynamic.

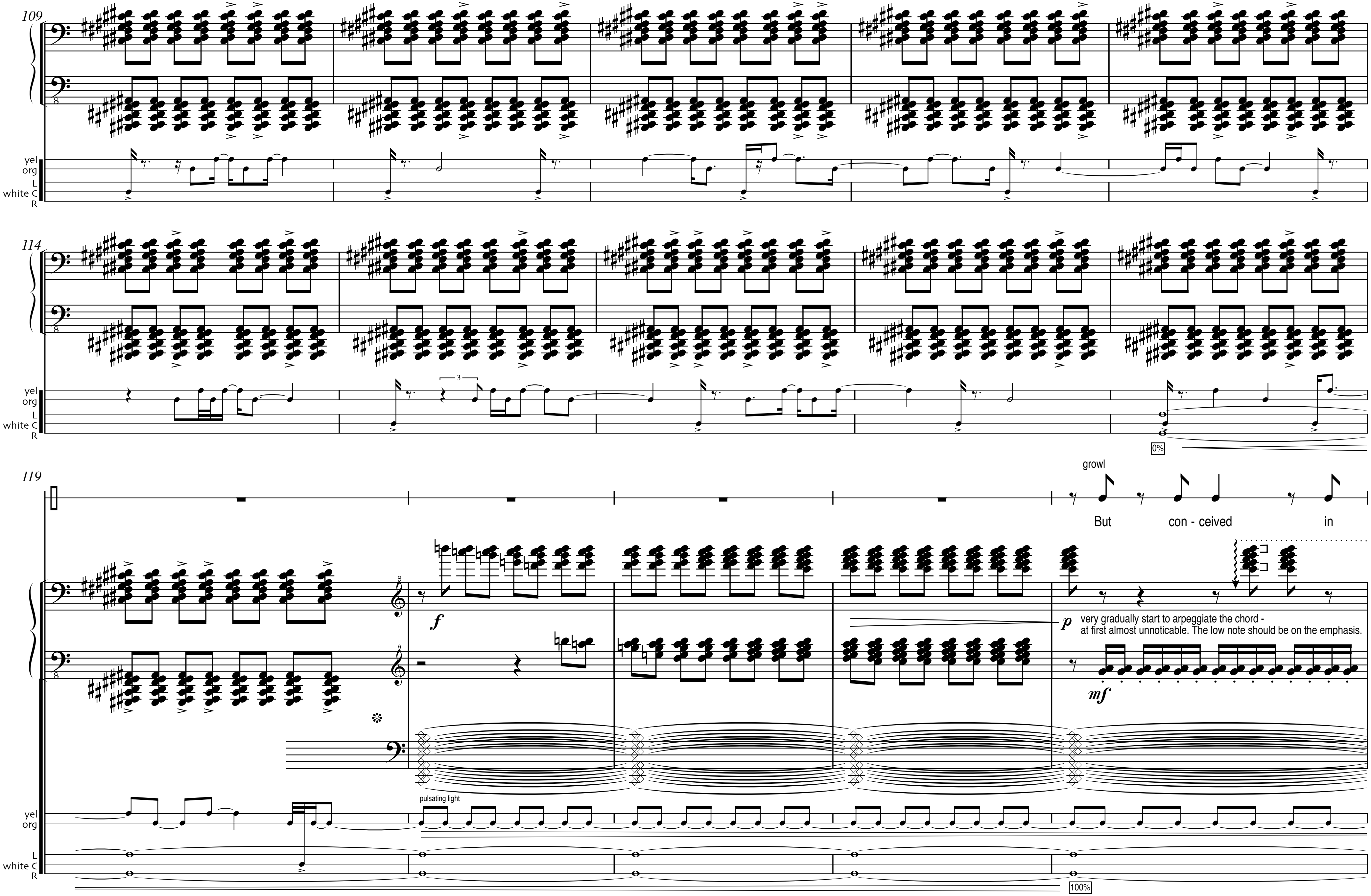


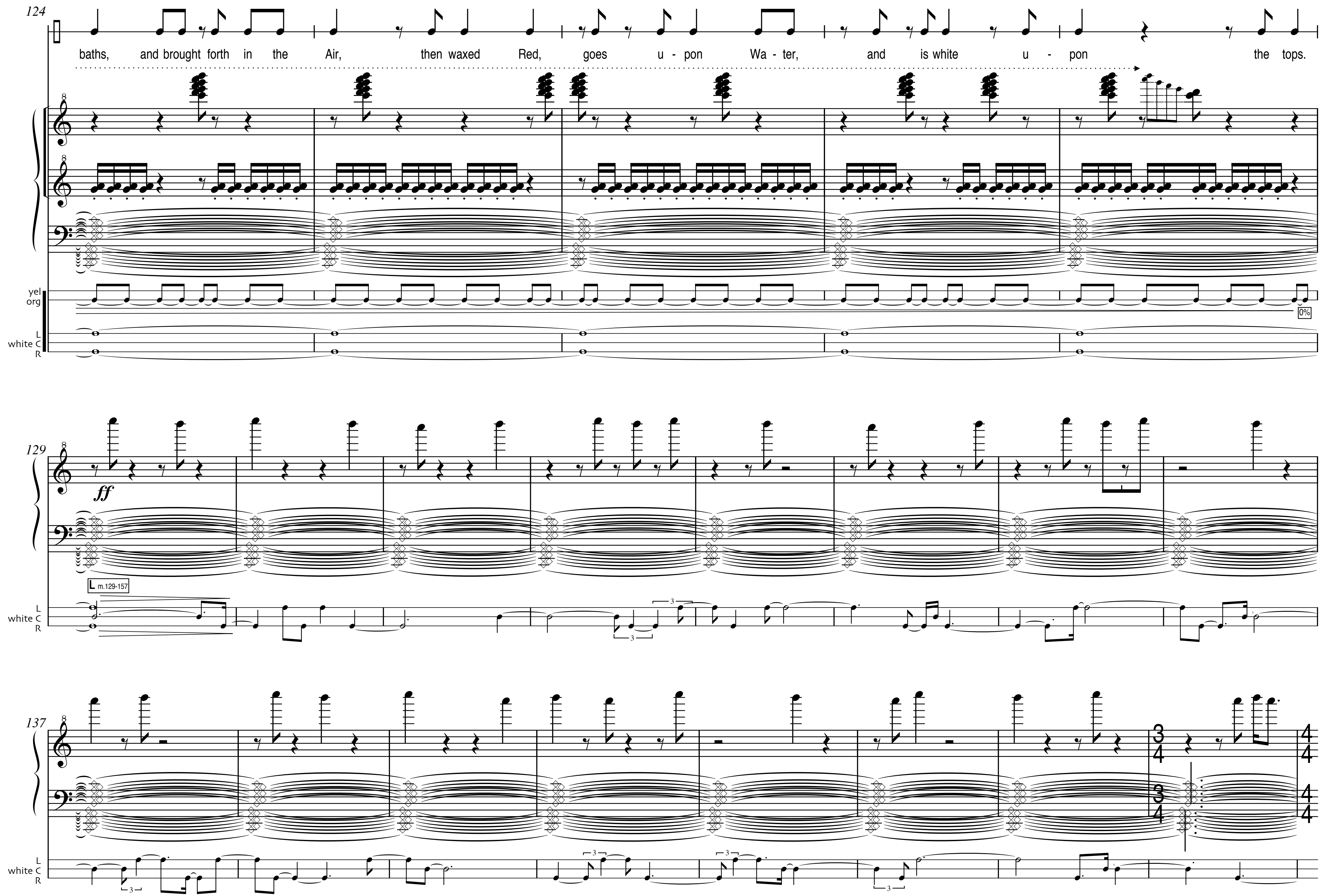

74
L
white C
R
79
as previously with ruler
8va
L m.82-128
yel
org
L
white C
R
0%


83
8vb
8vb
8va
3
yel
org
L
white C
R
86
8va
8vb
8vb
yel
org
L
white C
R


89
8va
8vb
yel
org
L
white C
R
3
92
Ped.


95
8vb
yel
org
L
white C
R
perform accents very gently - rather like a timbral fluctuation, than a dynamic event
99
104


109
yel
org
L
white C
R
114
0%
119
growl
But con - ceived in
very gradually start to arpeggiate the chord -
at first almost unnoticable. The low note should be on the emphasis.
pulsating light
100%


124
baths, and brought forth in the Air, then waxed Red, goes u - pon Wa - ter, and is white u - pon the tops.
yel
org
0%
L
white C
R
129
ff
L m.129-157
137


glissando with plastic ruler
gliss. with fingernail across strings (inside piano)
"Strobe"
white
L
C
R


166
glissando with plastic ruler
white
L
C
R
"Strobe"
173
glissando with plastic ruler
179
glissando with plastic ruler
"Strobe"


185
glissando with plastic ruler
8va
Ped.
191
ff
8vb
Ped.
p
mf
196
mp


203
mp
Ped.
208
214

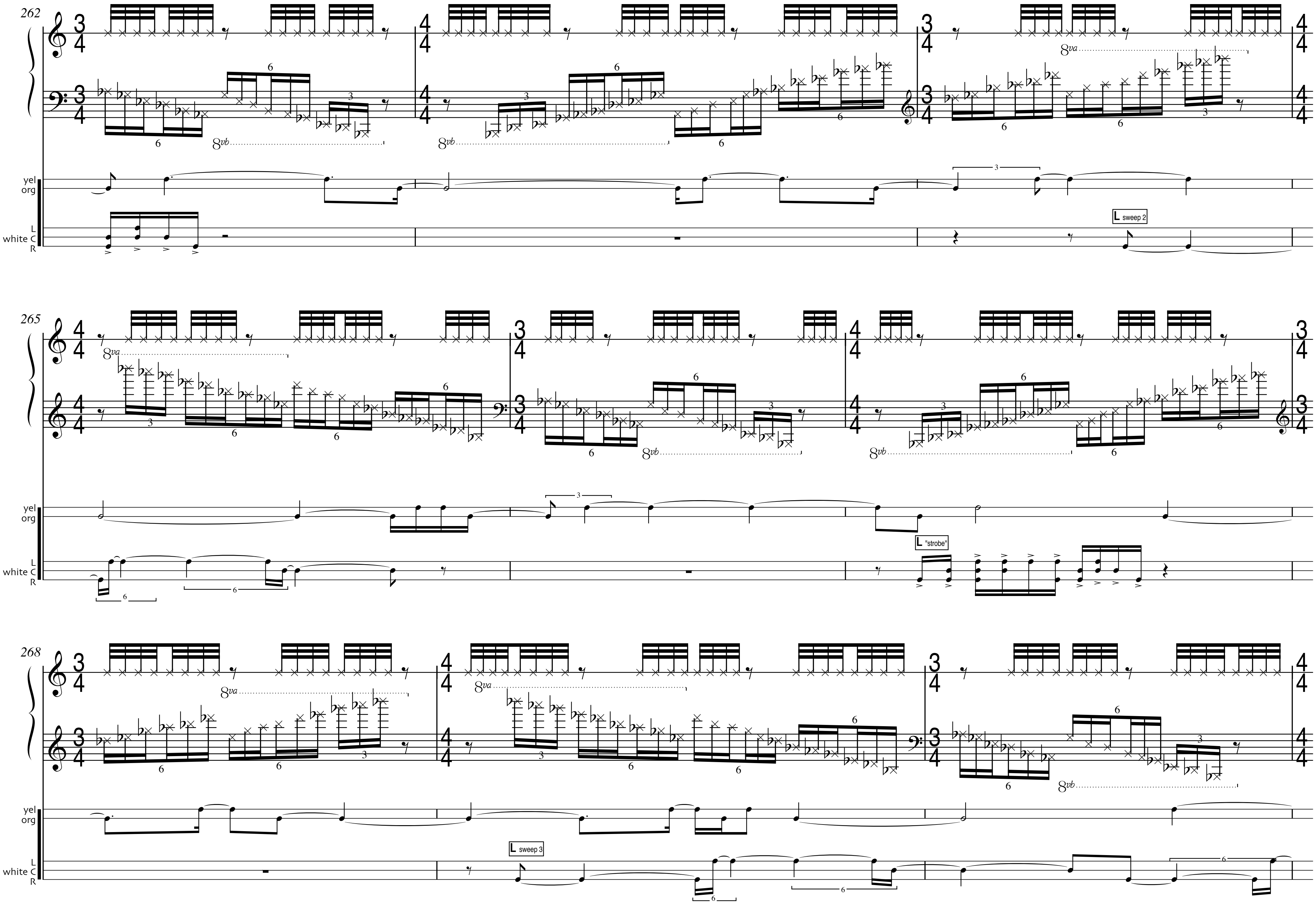

220
225
glissando with plastic ruler
Ped.
3rd ped.
8vb
L m.225
sim.
yel
org
230
8va
Ped.
3rd ped.
L m.231
sim.
yel
org


235
glissando with plastic ruler
8va
8vb
Ped.
yel
org
L m.237
238
L "strobe"
sim.
sim.
glissando with plastic ruler
3rd ped.
8vb
L
white C
R

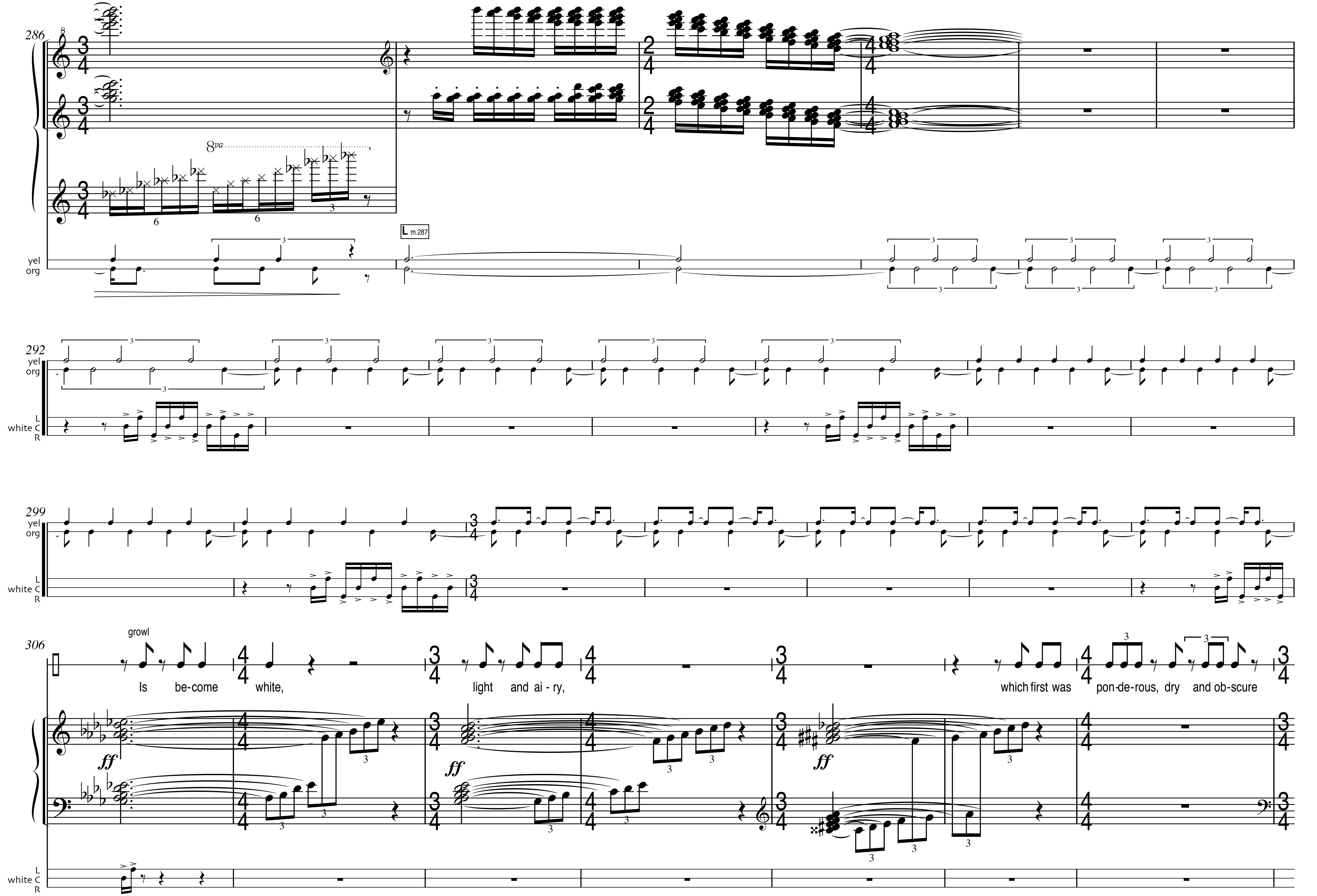

241
glissando with plastic ruler across black keys, without pressing them down
L m.243-270
sim.
yel
org
L
white C
R
244
sim.
yel
org
L
white C
R


247
8vb
8va
yel
org
L
white C
R
L "strobe"
250
regular glissando with plastic ruler

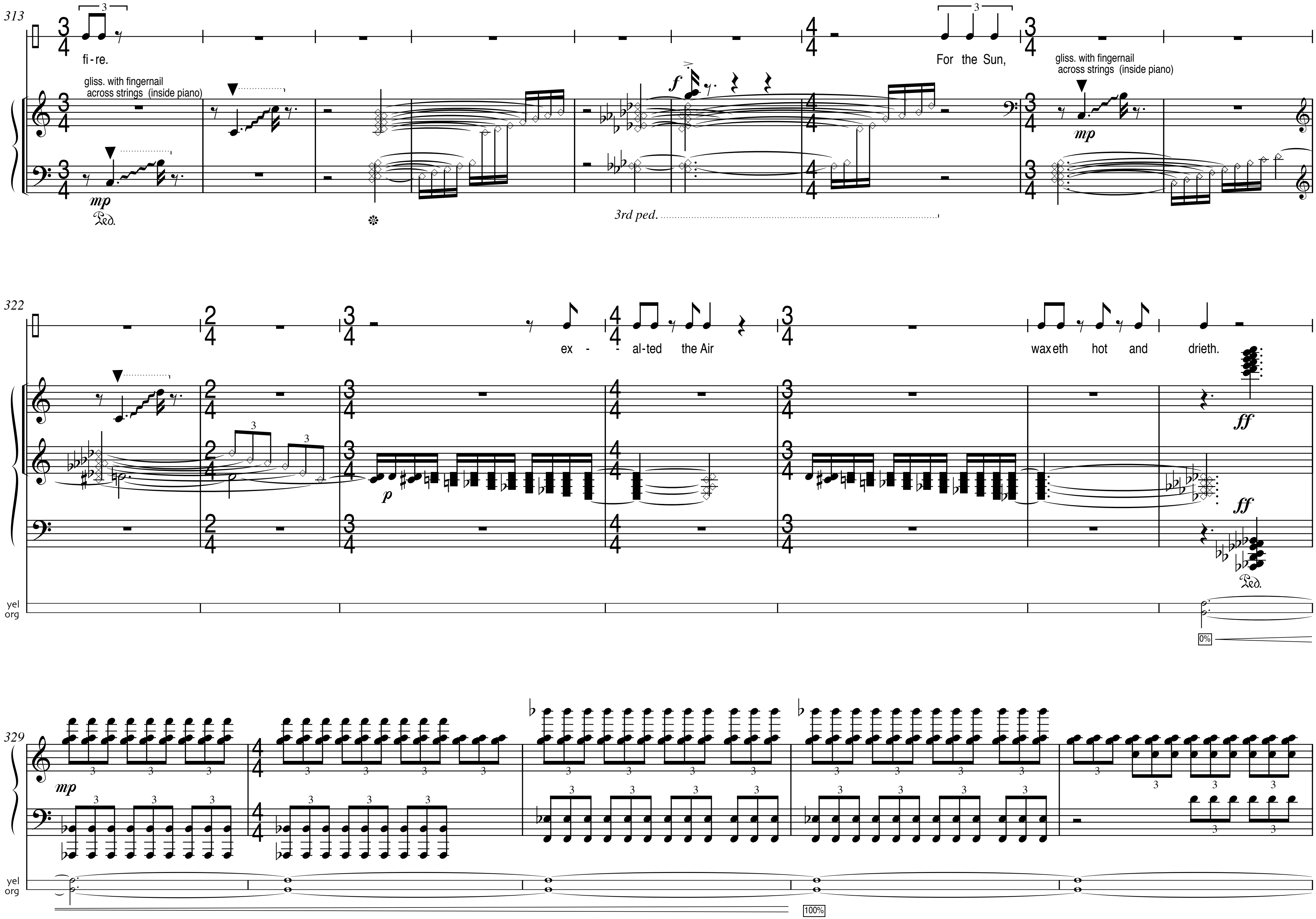

253
L m.253
as previously with ruler
Ped.
yel
org
L
white C
R
256
L "strobe"
259
L sweep1
L "strobe"

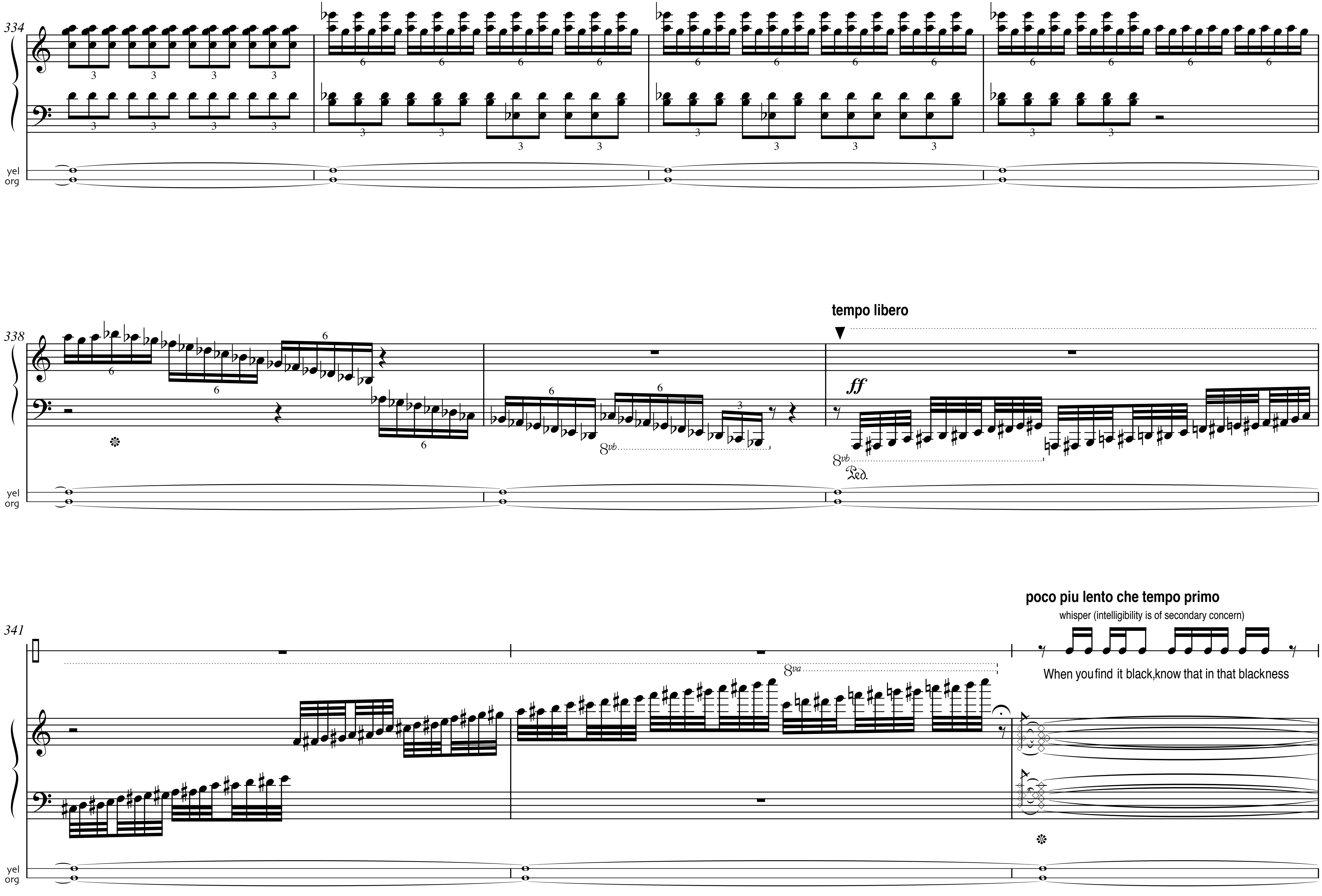

262
yel
org
L
white C
R
L sweep 2
265
L "strobe"
268
L sweep 3
8va
8vb

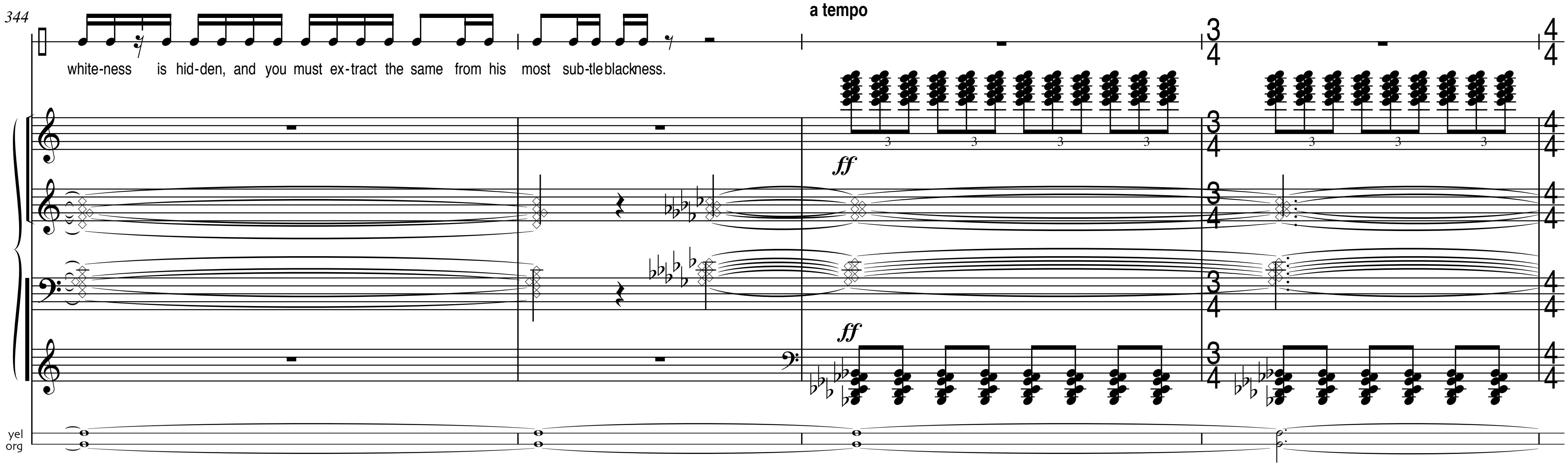

271
yel
org
L
white C
R
8va
8vb
L "strobe"
274
L m.275
sim.
280
L m.281

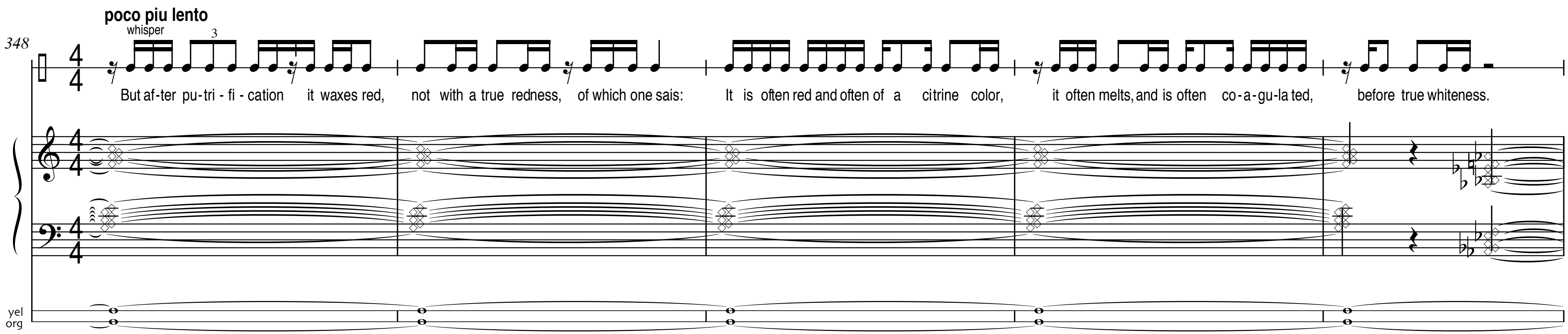


286
8va
L m.287
yel
org
292
L
white C
R
299
306
growl
Is be-come white,
light and ai - ry,
which first was pon-de-rous, dry and ob-scure
ff

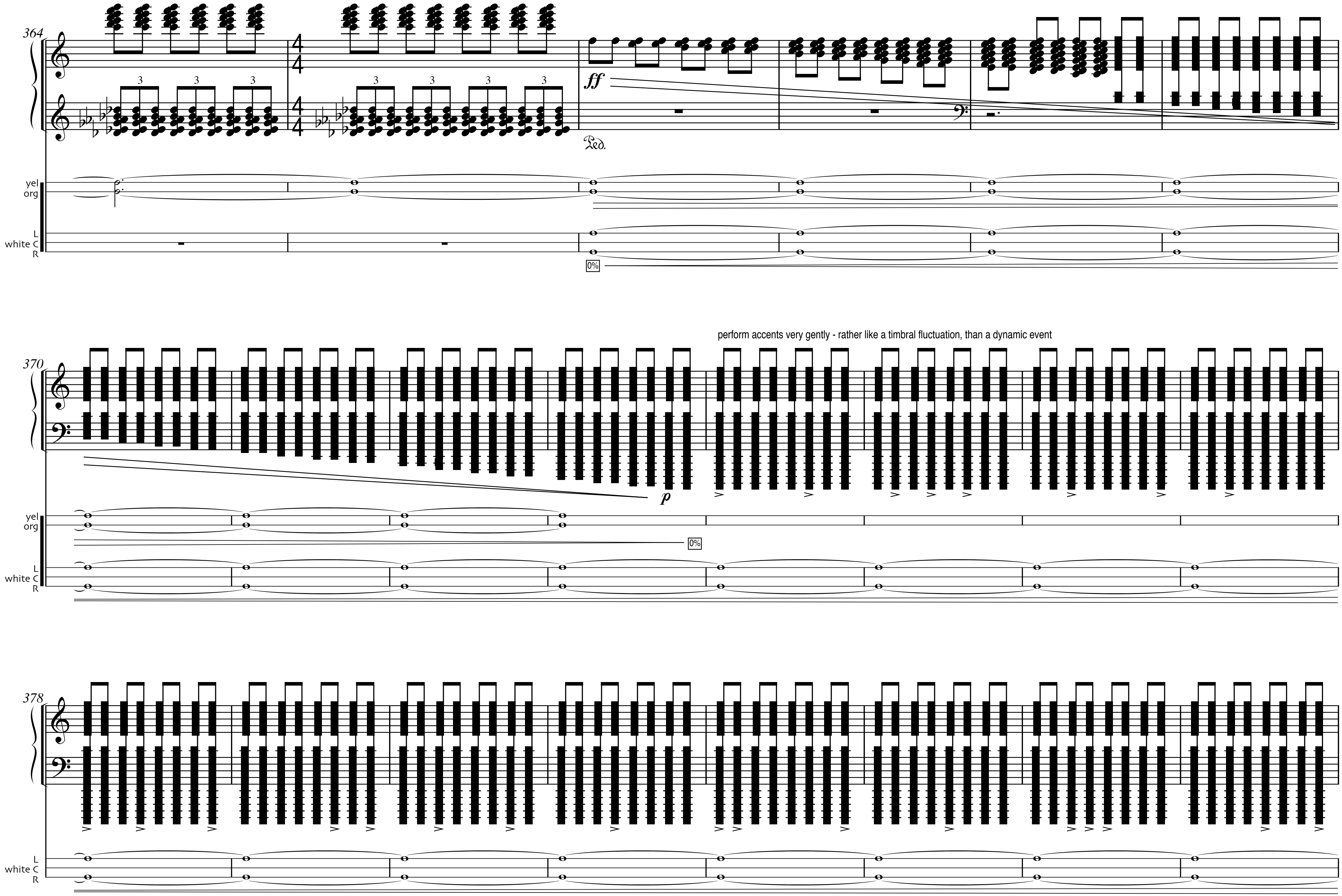

313
fi - re.
For the Sun,
gliss. with fingernail across strings (inside piano)
gliss. with fingernail across strings (inside piano)
3rd ped.
322
ex - - al-ted the Air
waxeth hot and drieth.
yel org
0%
329
yel org
100%

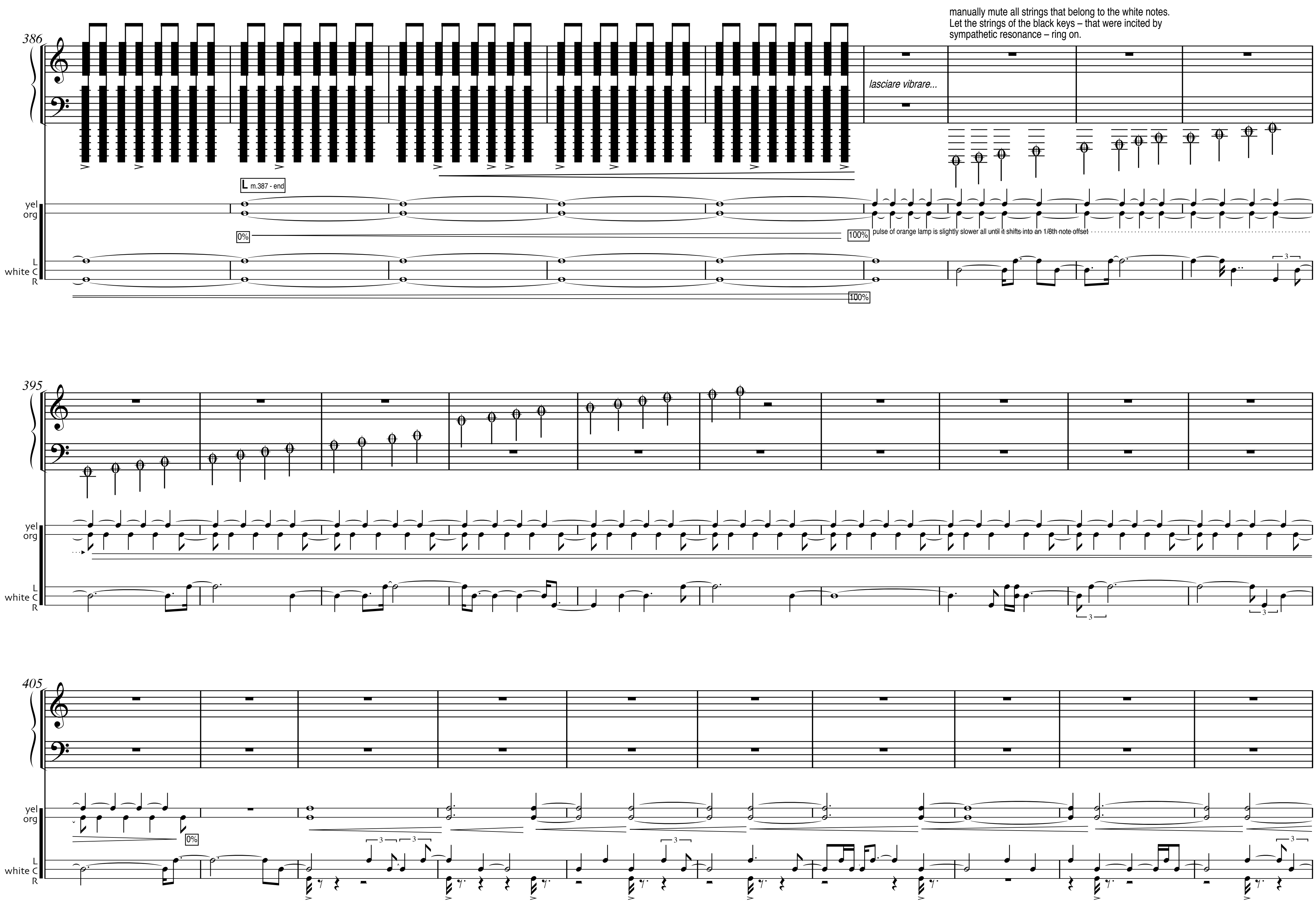

334
yel
org
338
tempo libero
ff
8vb
Ped.
341
poco piu lento che tempo primo
whisper (intelligibility is of secondary concern)
When you find it black, know that in that blackness
8va


344
a tempo
white-ness is hid-den, and you must ex-tract the same from his most sub-tle blackness.
ff
ff
yel
org


poco piu lento
348
whisper
But af-ter pu-tri-fi-cation it waxes red, not with a true redness, of which one sais: It is often red and often of a citrine color, it often melts, and is often co-a-gu-la ted, before true whiteness.
yel
org


353
a tempo
poco piu lento
whisper
And it dissolves itself, it co-a-gulates it-self, it pu-tri fies it-self, it colors it-self it mor ti-
ff
ff
yel
org
358
fies it-self, it quickens it-self it makes it-self black, it makes it-self white, it makes it self red. Of which one sais:
a tempo
growl
Con coct it, till it appears green un-to you, and that is the soul.
f
yel
org


364
yel
org
L
white C
R
ff
Ped.
0%
370
perform accents very gently - rather like a timbral fluctuation, than a dynamic event
p
0%
378


manually mute all strings that belong to the white notes.
Let the strings of the black keys – that were incited by
sympathetic resonance – ring on.
386
lasciare vibrare...
L m.387 - end
yel
org
0%
100%
pulse of orange lamp is slightly slower all until it shifts into an 1/8th note offset
L
white C
R
100%
3
395
405
0%


415
stop the light sequence earlier, if the piano chord has already completely decayed
yel
org
L
white C
R
425
435

Jeanne of the Dark

for electric 5-string violin, electric guitar, electric bass (6-string), percussion, electronics/keyboards, lighting and video

marko ciciliani 2008

Jeanne of the Dark

for electric 5-string violin, electric guitar, electric bass (6-string), percussion, electronics/keyboards, lighting and video

composed by
Marko Ciciliani

for
Bakin Zub
with a commission by the
Fonds voor de scheppende Toonkunst

2008

Jeanne of the Dark is an exploration of the image of the vamp. Rather than tell a story, composer Marko Ciciliani has created an unconventional artwork - a music performance piece incorporating film and composed lighting - that derives its imagery and its sound world from a range of reference points transgressing stylistic and cultural boundaries, from vampire movies to eroticism, from heavy metal to cannibalism. The stereotype of the vamp - the seductive but dangerous woman, man-eater, femme fatale, inseparable from the dualistic male view of the female as virgin/whore - is teased out and recontextualised, and a consuming process of attraction and repulsion is set in motion for the listener.

The work is structured in four large panels. The first three, exploring respectively vampirism, eroticism and cannibalism, has each its own particular style. These three parts are then ingeniously superimposed to create the final panel, the most dense part of the work, which both manifests and unpicks the multiple threads of the vamp's complex, even contradictory nature.

One of the points of departure for Jeanne of the Dark was the 1916 black-and-white crime serial Les Vampires by director Louis Feuillade, filmed in the streets and interiors of World War I Paris. The film, initially banned by the French police for its supposed glorification of a band of criminals, became a hit and, later, something of a cult item, ensuring vampire-like immortality for its star Jeanne Roques (aka Musidora), emblematic in a black body suit and mascara-laden eyes in the role of Irma Vep (anagram-spotters take note), the cinema's first screen vamp.

Musically, *Jeanne of the Dark* sucks blood from a range of innocent and not-so-innocent victims. The line-up of Bakin Zub (electric violin, electric guitar/bass guitar, synthesizer/electronics and percussion) resembles a rock band more than a contemporary music ensemble; the virtuosic and fully-notated score flits over and between the worlds of Heavy Metal and Goth, the easy-listening schmooze of porn soundtracks, the sharp edges of present-day electronica, and much else. The result is a haunting and multi-layered world that is both entertaining and provocative: as with the vamp herself, we find ourselves questioning if it's OK to be seduced by its charms. But perhaps we should relax: during the time we spend in the company of Jeanne of the Dark, seduction is the only game in town.

Bob Gilmore

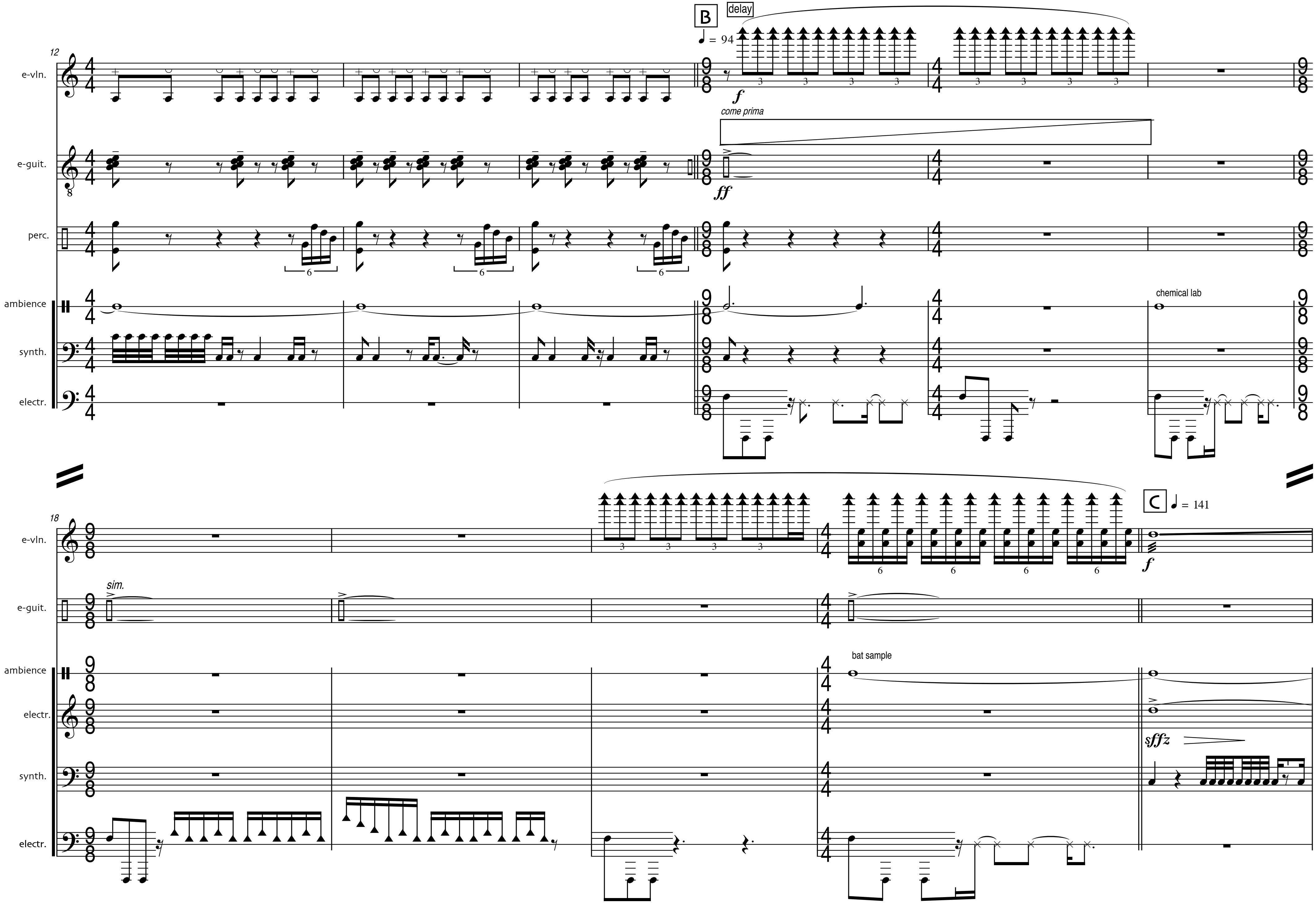
Jeanne of the Dark consists of four sections, three of which are traditionally notated. The fourth section consists of a literal superimposition of the previous three section, while the third one is played back in reverse. This is realised with a pre-produced recording of the music through a hexaphonic speaker system (1st section is played throught the front 2 speakers, 2nd section through the side speakers and the third section through the speakers in the back). During this section, the musicians are idle, exept for the moments when instrumental insertions are played, which are printed as the appendix. The 'score' of the 4th section does not display the actual music but how the measures of the individual sections come to interlock with each other. It is also displayed where the instrumental insertions are started.

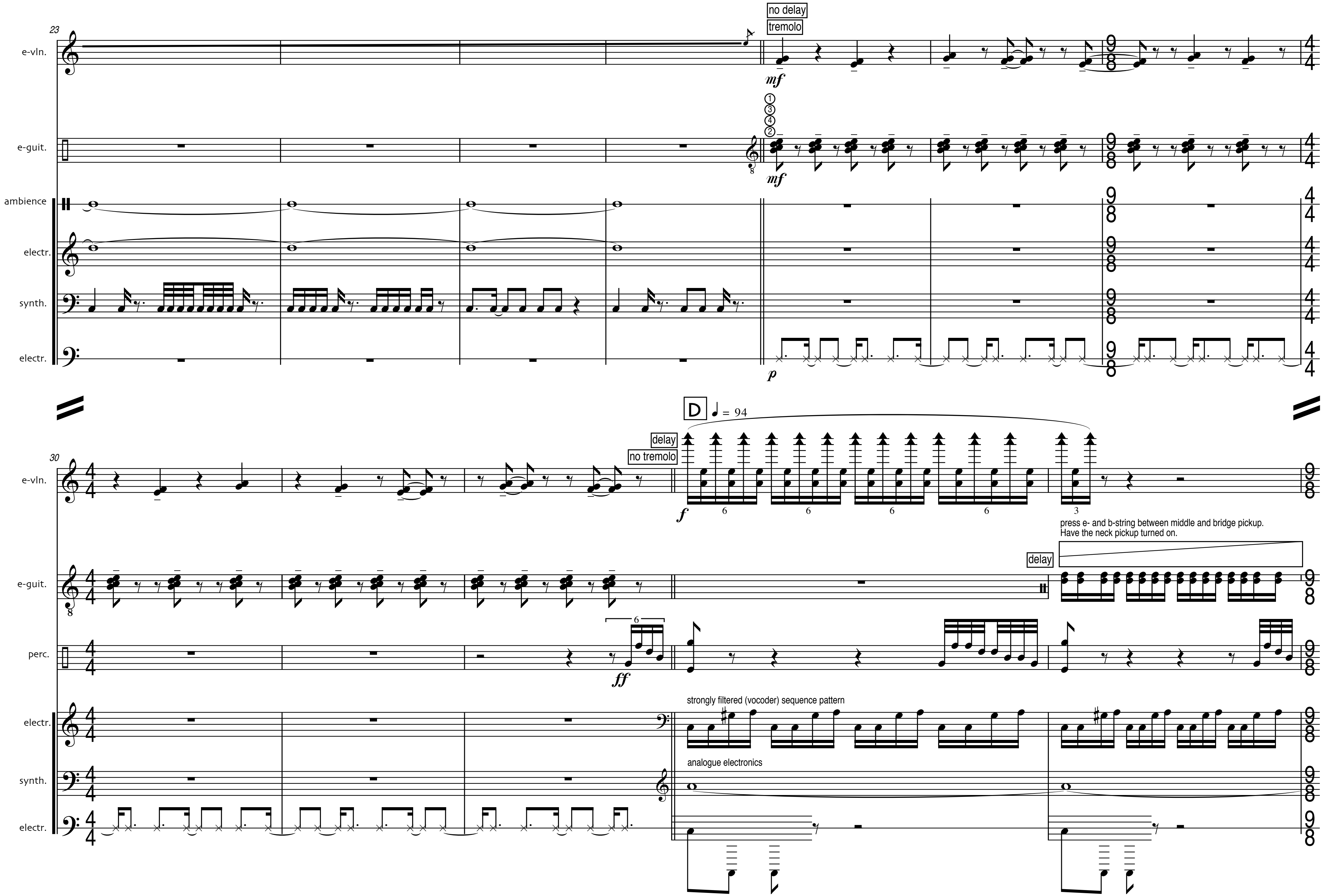
Jeanne of the Dark is performed by four musicians and a sound-engineer who also has to be part of the rehearsal processes. Electric violin uses three stompfoot pedals: a loop-delay (Boss DD-20), a tremolo and an overdrive. Electric guitar uses two stompfoot pedals: a delay and a distortion pedal. The percussionists uses an acoustic jazz-setup, a grand-cassa, tam-tam, small bell, shaker and drum-pads.

As part of the composition, video fragments are played back that have been compound of the film material of Louise Feuillade's *Les Vampires* from 1914-15. A beamer and video screen are required for its display. Jeanne of the Dark uses a rather elaborate light setup, which is controlled by a laptop computer and a DMX interface (LanBox). Details on the set-up of the light and video screen, the required fixtures and technical specifications can be obtained by the composer upon request (e-mail: marko@ciciliani.com). The image on the right shows the basic stage set-up including the lighting and video screen:

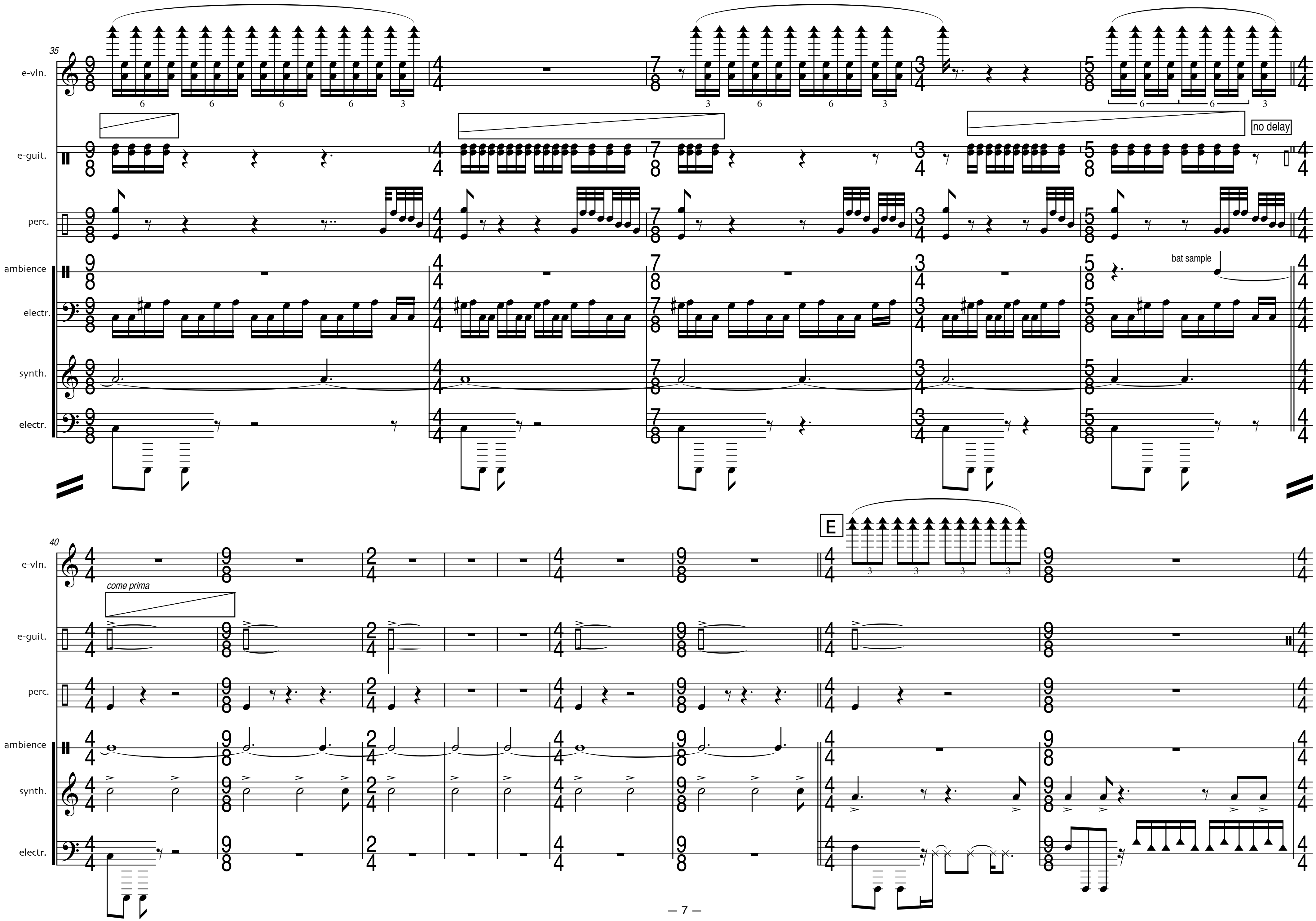
Nr.1 Vampire

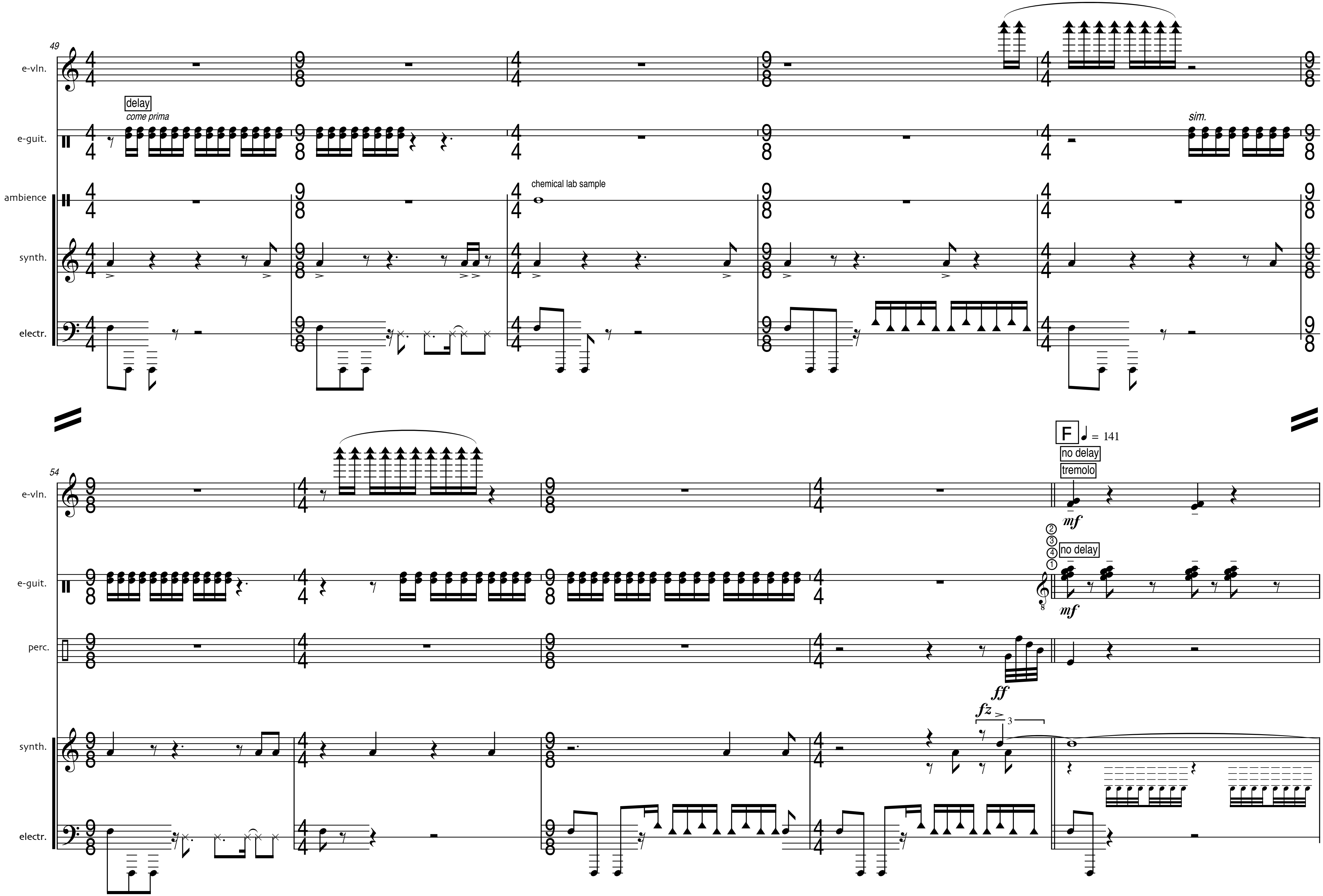
♩ = 94
play the strings in the highest register.
Make glissandos within each phrase with both fingers glissing into opposite directions of max. ±3 semitones
delay
electric violin
hit body of the guitar and let strings ring.
At the same time hold whammy-bar to its lowest position and slowly release it.
whammy:
electric guitar
bat sample
ambience
analogue synth, when stem down: normal, when stem up: overdriven
electronics
A ♩ = 141
+ = l.h. pizz
◡= col legno batt.
no delay
e-vln.
sim.
e-guit.
Set (drum pads):
tomtom high/cymbal
tomtom middle
tomtom low
snare
bassdrum
perc.
analogue 'dirty' electronics
synth.
electr.


12
e-vln.
e-guit.
perc.
ambience
synth.
electr.
B
delay
♩ = 94
f
come prima
ff
chemical lab
18
sim.
C
♩ = 141
bat sample
sffz

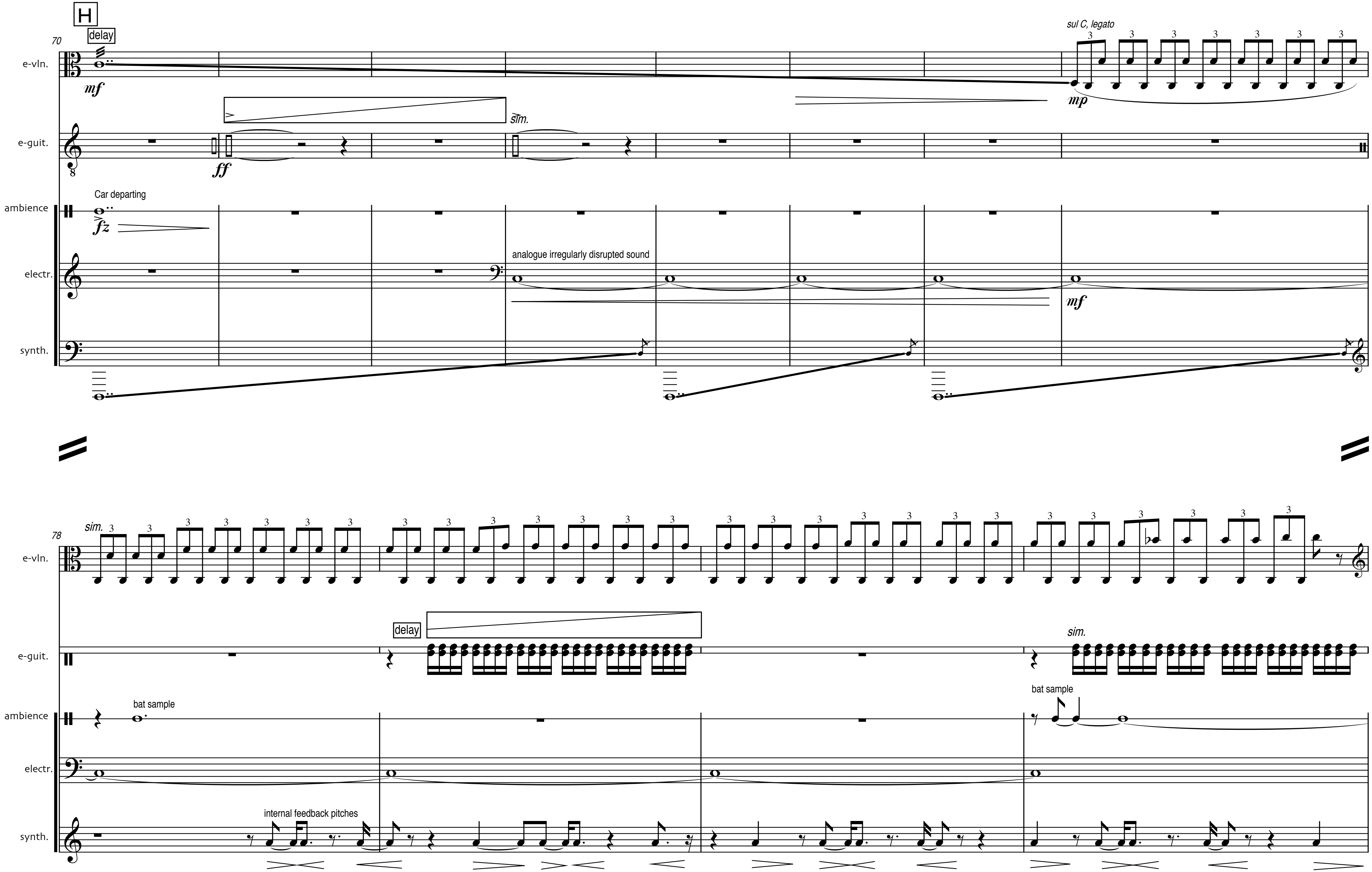


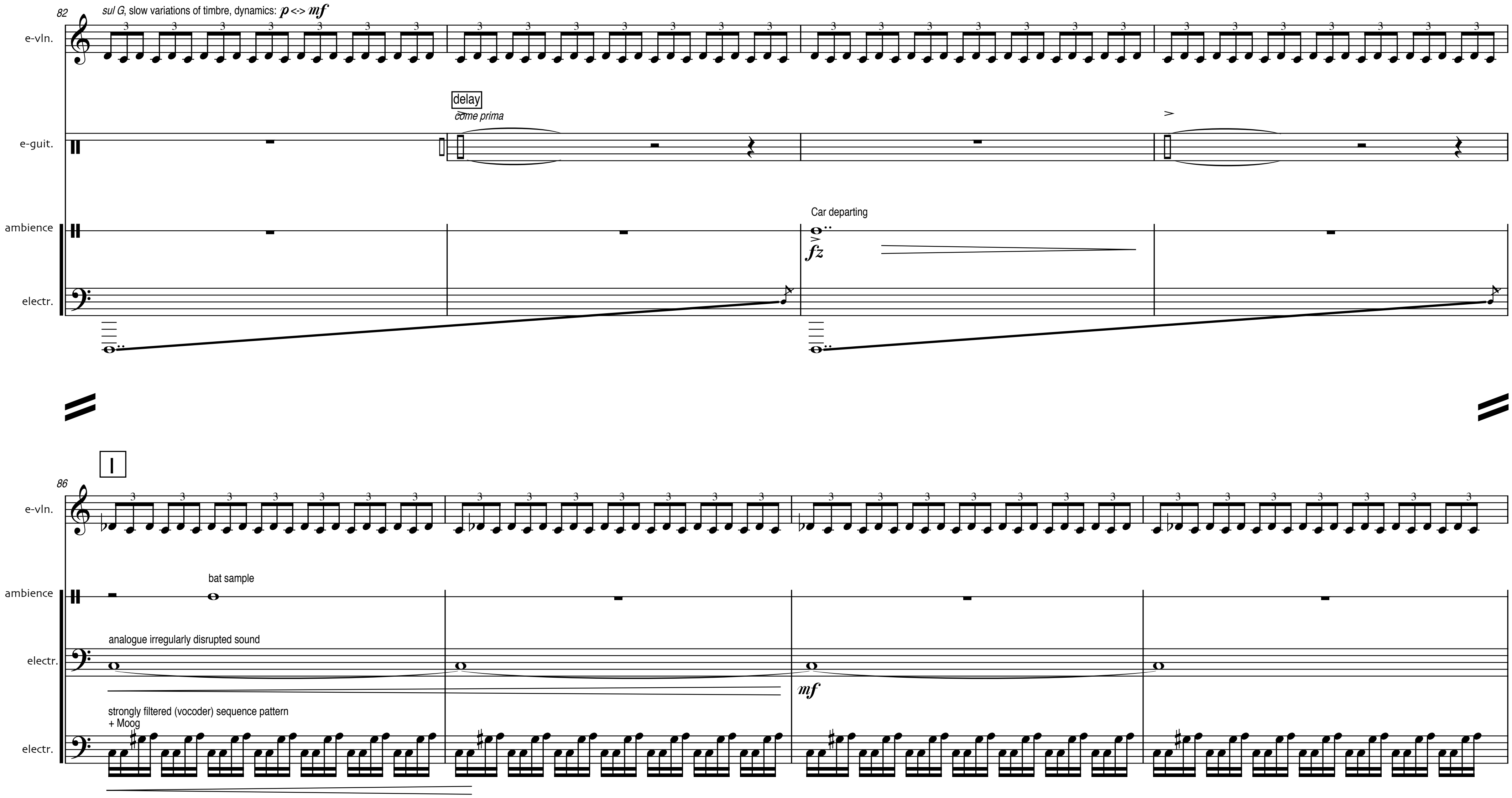
23
e-vln.
no delay
tremolo
mf
e-guit.
mf
ambience
electr.
synth.
electr.
p
30
e-vln.
D
= 94
delay
no tremolo
f
press e- and b-string between middle and bridge pickup.
Have the neck pickup turned on.
delay
e-guit.
perc.
ff
electr.
strongly filtered (vocoder) sequence pattern
synth.
analogue electronics
electr.

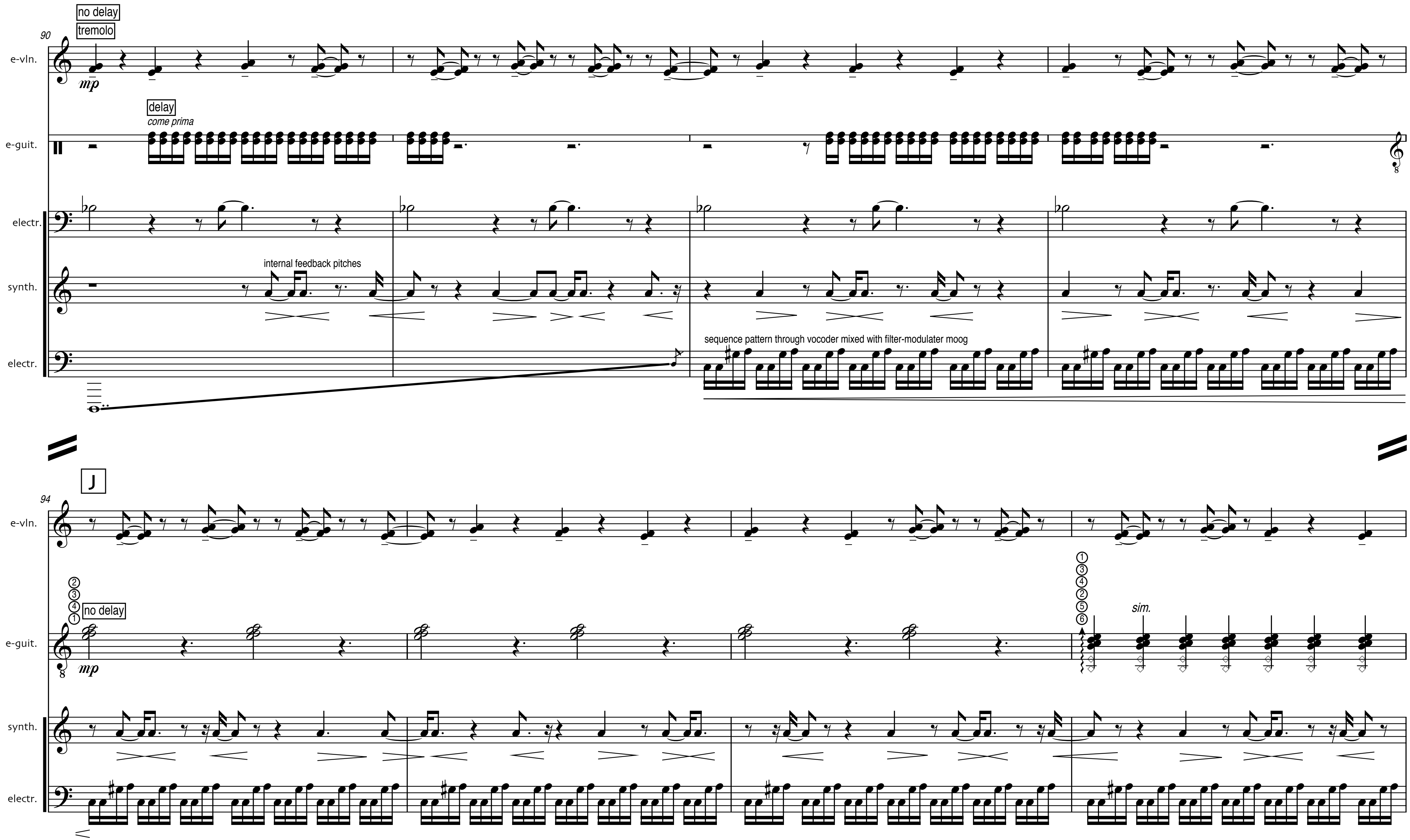

35
e-vln.
e-guit.
perc.
ambience
electr.
synth.
electr.
no delay
bat sample
40
E
come prima


49
e-vln.
e-guit.
ambience
synth.
electr.
delay
come prima
chemical lab sample
sim.
54
e-vln.
e-guit.
perc.
synth.
electr.
F
= 141
no delay
tremolo
mf
no delay
mf
ff
fz


59
e-vln.
e-guit.
synth.
64
no tremolo
G
= 94
f
Car-engine sample
ambience
electr.
Moog
mf

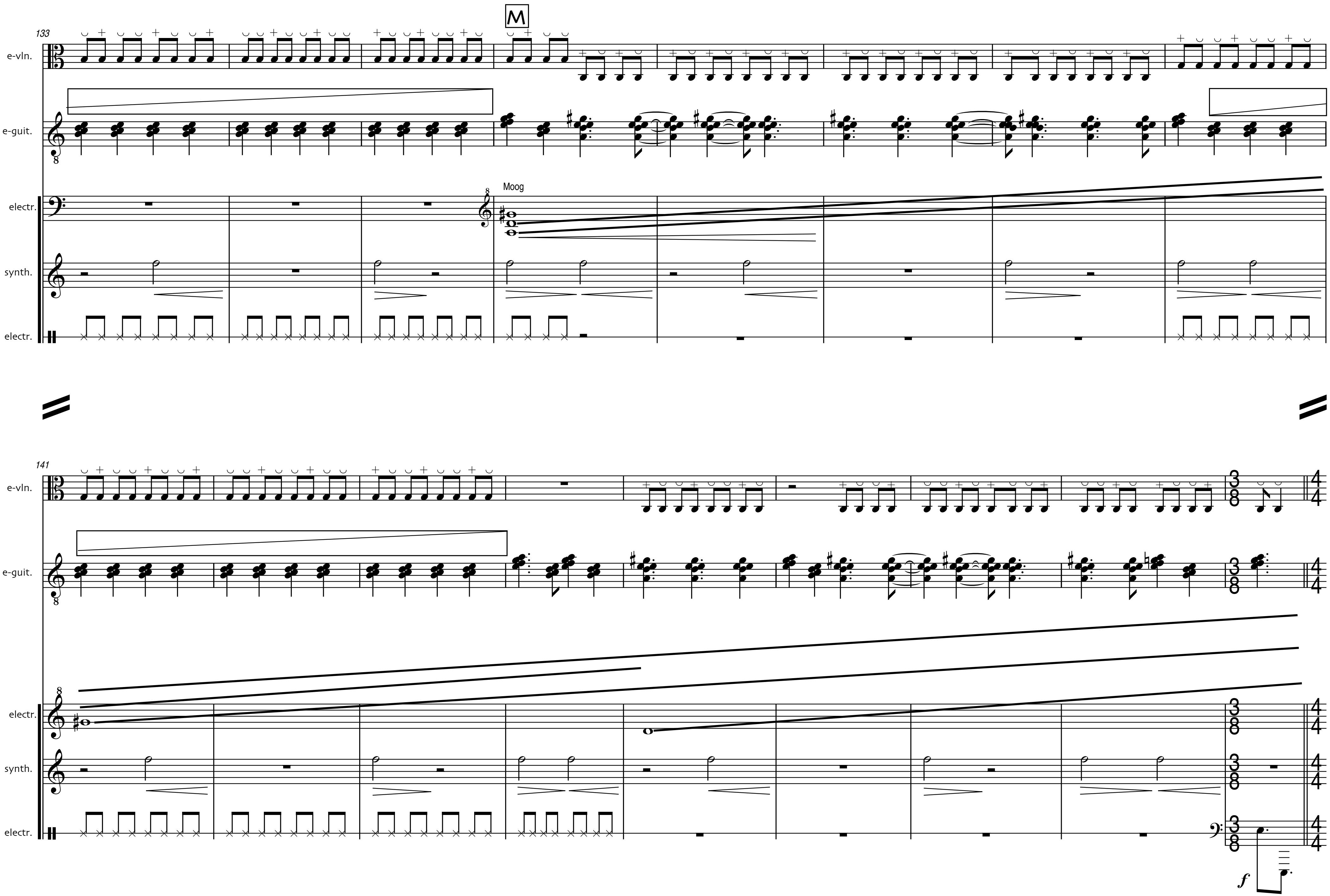

H
delay
70
e-vln.
mf
sul C, legato
mp
sim.
e-guit.
ff
ambience
Car departing
fz
electr.
analogue irregularly disrupted sound
mf
synth.
78
sim.
delay
sim.
bat sample
bat sample
internal feedback pitches


82
sul G, slow variations of timbre, dynamics: p <-> mf
e-vln.
delay
come prima
e-guit.
Car departing
fz
ambience
electr.
I
86
e-vln.
bat sample
ambience
analogue irregularly disrupted sound
electr.
mf
strongly filtered (vocoder) sequence pattern
+ Moog
electr.


no delay
tremolo
90
e-vln.
mp
delay
come prima
e-guit.
electr.
internal feedback pitches
synth.
electr.
sequence pattern through vocoder mixed with filter-modulater moog
J
94
e-vln.
no delay
e-guit.
mp
sim.
synth.
electr.


K
♩ = 141
overdrive
no tremolo
analogue 'dirty' electronics
98
103
110
e-vln.
e-guit.
perc.
synth.
electr.
f
ff


117
L
e-vln.
no overdrive
mf
e-guit.
distortion
f
no distortion
mp
perc.
synth.
electr.
p
125
e-vln.
e-guit.
chemical lab sample
ambience
synth.
internal feedback pitches
electr.


133
M
e-vln.
e-guit.
Moog
electr.
synth.
electr.
141
e-vln.
e-guit.
electr.
synth.
electr.


N
♩ = 94
150
e-guit.
perc.
ambience
electr.
electr.
bat sample
city ambience with bird
park with city ambience
sim.
Car-engine sample
158
e-vln.
tremolo
overdrive
no tremolo
delay
e-guit.
perc.
ambience
analogue 'dirty' electronics
electr.
sim.
electr.


163
e-vln.
e-guit.
perc.
ambience
synth.
come prima
no overdrive
O
Car driving
Car driving
(muffled)
172
tremolo
no delay
P
no tremolo
city ambience
analogue 'dirty' electronics
electr.


Q
R
tremolo
e-vln.
e-guit.
perc.
ambience
electr.
synth.
sound of chemical lab
delay
no delay
sound of driving car from the inside
Moog


195
e-vln.
no tremolo
delay
no delay
e-guit.
perc.
ambience
electr.
synth.
internal feedback pitches
electr.
200
e-vln.
e-guit.
perc.
sound of driving car from the outside
ambience: birds, distand traffic
ambience: birds and city noises
ambience
electr.
Moog
synth.
electr.

S
210
e-vln.
e-guit.
ambience
electr.
synth.
electr.
distortion
217
T
delay
no distortion
ambience: muffeled sounds of distanced party
analogue sound


229
♩ = 106
U ♩ = 94
no delay
tremolo
e-vln.
delay
no delay
e-guit.
mf
ff
perc.
f
synth.
Moog
electr.
239
no tremolo
♩ = 116
delay
no delay
mf
3

V
♩ = 94
246
e-vln.
perc.
electr.
electr.
253
delay
distortion
no distortion
e-guit.
bats
ambience
synth.

W
♩ = 141
259
e-vln.
e-guit.
sim.
sim.
perc.
ambience
electr.
265
e-vln.
free detaché, barriolage
perc.
electr.
analogue 'dirty' electronics
synth.
mf
electr.


273
e-vln.
e-guit.
perc.
electr.
synth.
electr.
mf
282
legato
sul D
mp
gradually more and more legato
X
mp
Moog


292
♩ = 94
e-vln.
e-guit.
perc.
synth.
Y
298
distortion
electr.
Moog


Z
303
e-vln.
no distortion
e-guit.
delay
sim.
perc.
electr.
synth.
309
ord.
no delay
no delay
distortion
no distortion
ambience
car departing

Nr.2 Eroticism


D
♩ = 94
33
e-vln.
e-bass
rhodes
mf
E
45
perc
electr.
f
F
♩ = 141
♩ = 94
54
Set (played on drum-pads):
Sample
Ride
Hi-Hat (closed)
Snare (normal/rimshot)
BD1/BD2


62
G
e-vln.
e-bass
perc.
rhodes
organ
electr.
f
mf
mp
68


H
74
e-vln.
mf
e-bass
perc.
Gong
Gong
Clap
ambience
rainstick
rhodes
organ
electr.
80
e-bass
perc.
Clap
ambience
shaker
also used as 'rainstick', for continuous rustling textures
rhodes
organ
electr.


85
I
e-vln.
e-bass
perc.
ambience
rhodes
organ
electr.
mf
f
90
mp


J
= 141
96
e-vln.
e-bass
perc.
organ
mp
p
acoustic drum-set
(jazz style)
"jazzy"
108
e-vln.
e-bass
perc.
organ
mf


K
115
e-vln.
e-bass
perc.
rhodes
organ
123
Bass Drum
Bells
electr.

131
L
e-vln.
e-bass
perc.
rhodes
organ
electr.
139


M
♩ = 94
146
e-vln.
e-bass
perc.
rhodes
electr.
sanding cloth
BD
sanding cloth
BD
Clap
Bells
154
sanding cloth
Set


N
O
e-vln.
e-bass
perc.
rhodes
organ
electr.
Clap
drum pads
mp
f
mf
pp

P
179
e-vln.
e-bass
perc.
ambience
rhodes
organ
electr.
drum pads
ride
BD
Sn.
Clap
rattle snake
sound of driving car
sound of driving car
mf
f
f
mf
f
pp
f
187
city ambience with birds singing
mp


Q
195
e-vln.
e-bass
perc.
ambience
rhodes
organ
drum pads
muffled crowd chattering
204


216
R
S
♩ = 106
e-vln.
e-bass
perc.
ambience
rhodes
organ
acoustic drum-set
(jazz style)
"jazzy"
city ambience with birds singing
white-ish noise
226
♩ = 94
T
♩ = 116
city ambience
muffled crowd chattering
"jazzy"
white-ish noise


233
e-vln.
e-bass
perc.
rhodes
organ
U
♩ = 94
241
V
poco a poco accelerando
mp
mp
p
rainstick
ambience

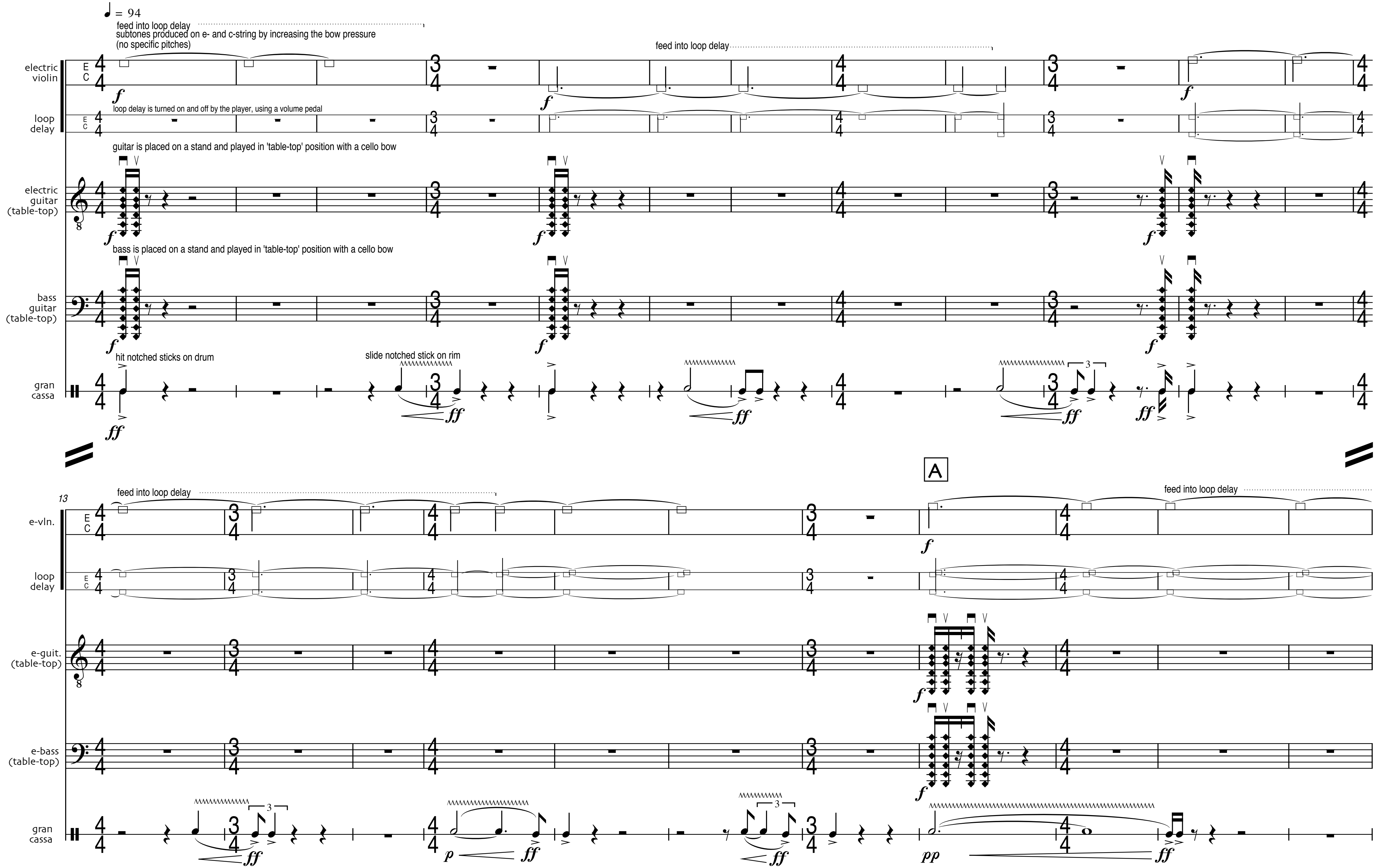

253
e-vln.
e-bass
perc.
ambience
rhodes
organ
bells
263
W
= 141
"jazzy"

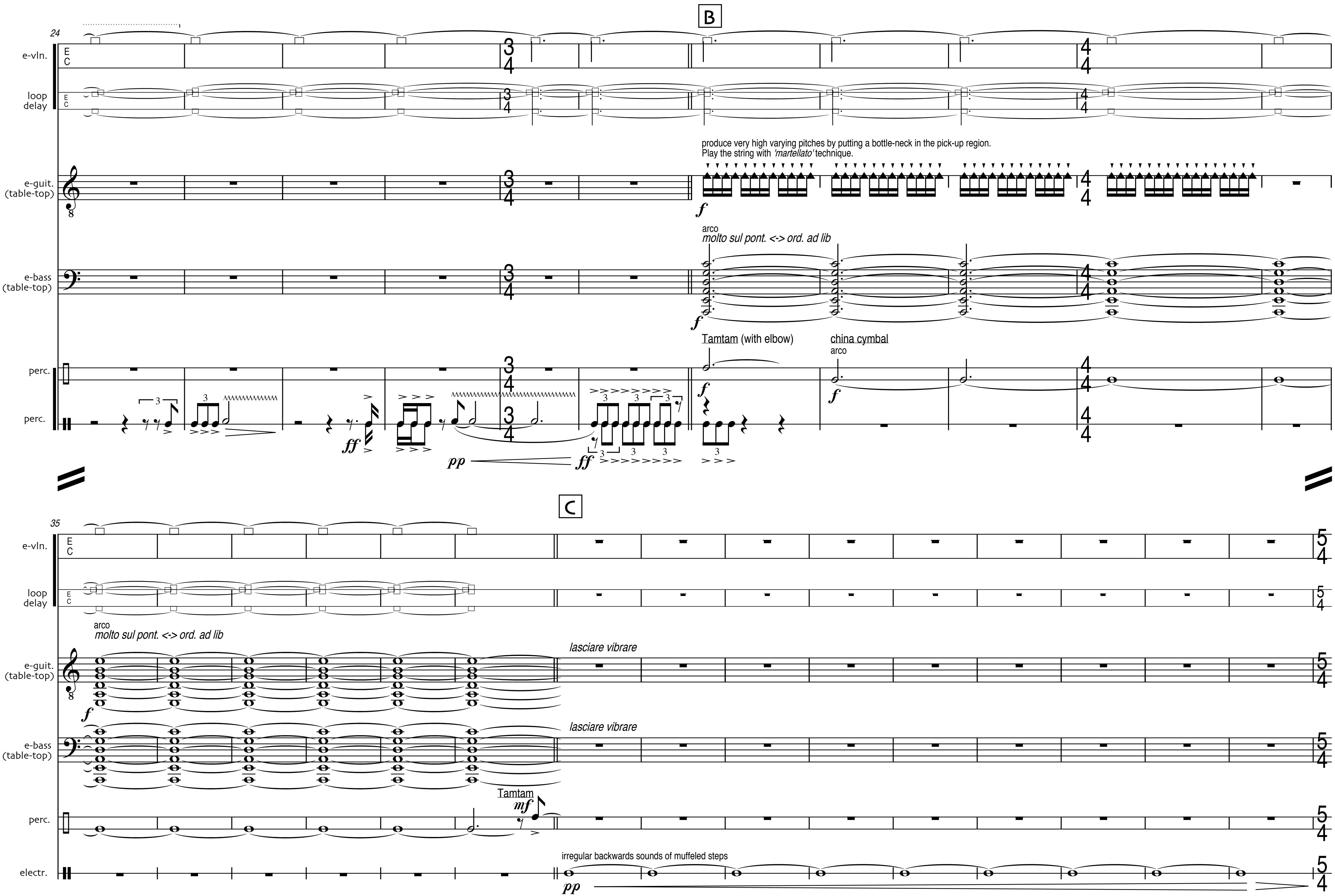

272
X
e-vln.
e-bass
perc.
rhodes
organ
282
Y
♩ = 154


290
e-vln.
e-bass
perc.
rhodes
organ
298
♩ = 172
Z
f

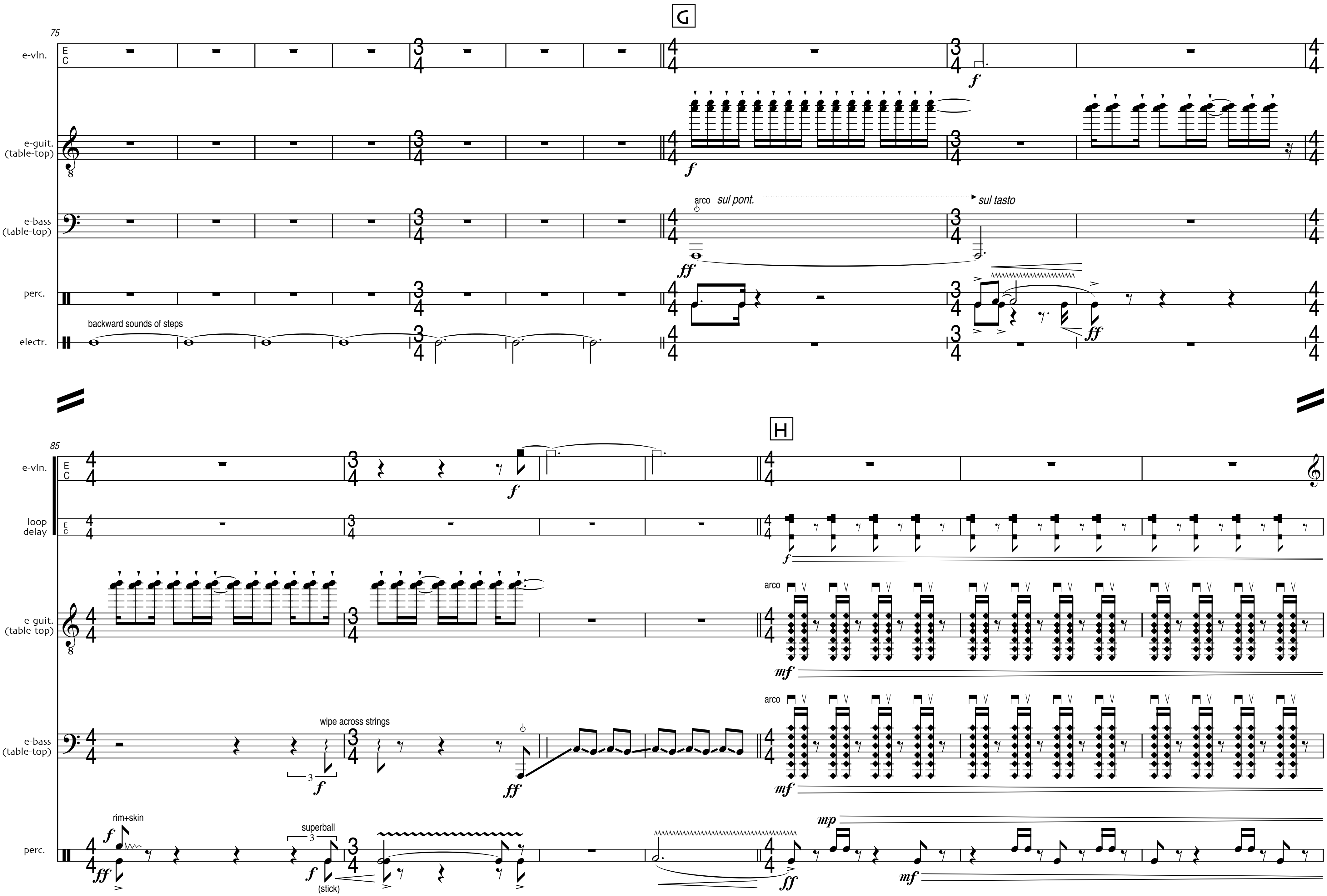
♩ = 188
304
e-vln.
e-bass
perc.
ambience
rhodes
organ
mf
ZZ
310
f
mf

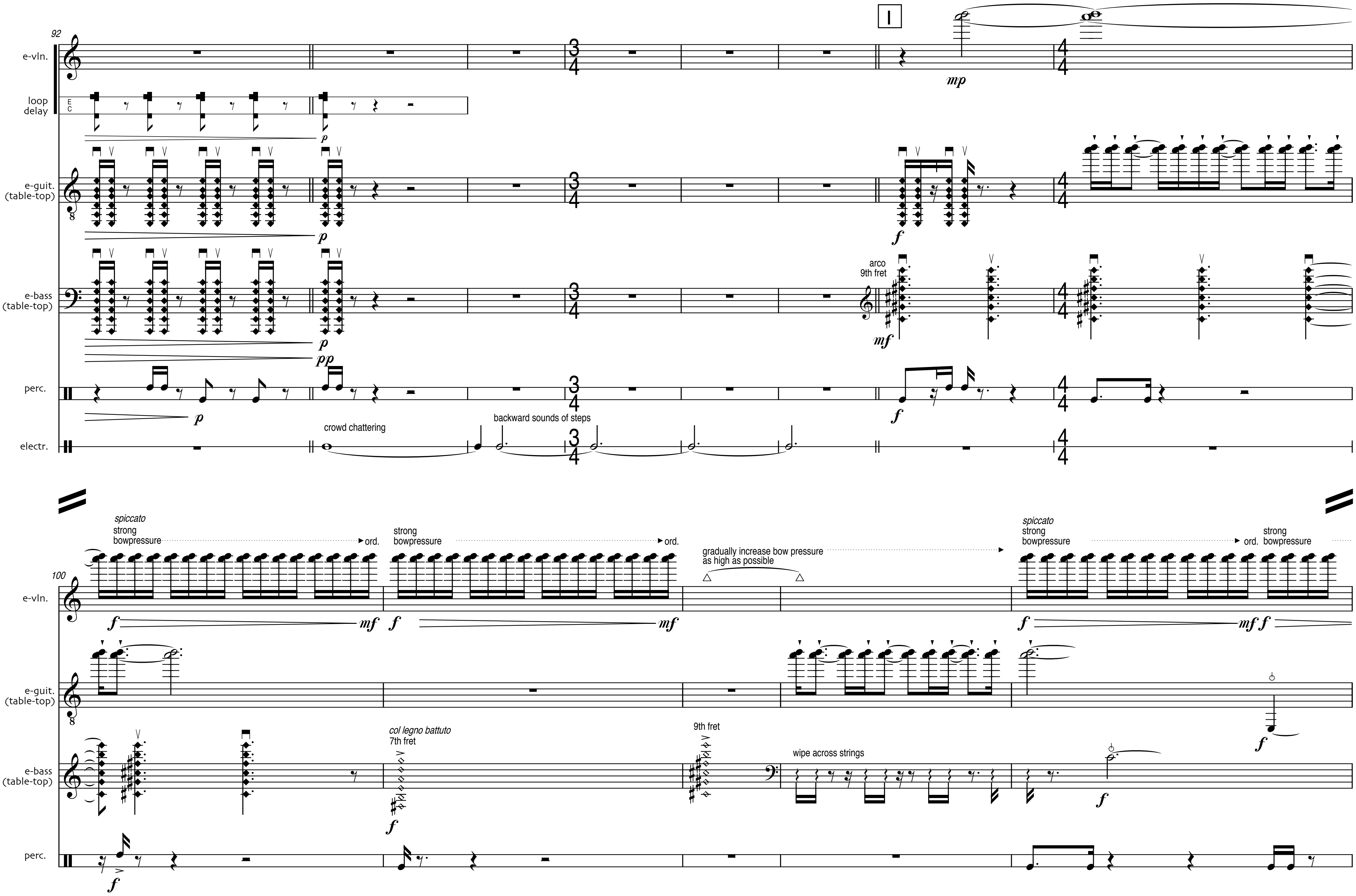
Nr.3 Cannibalism

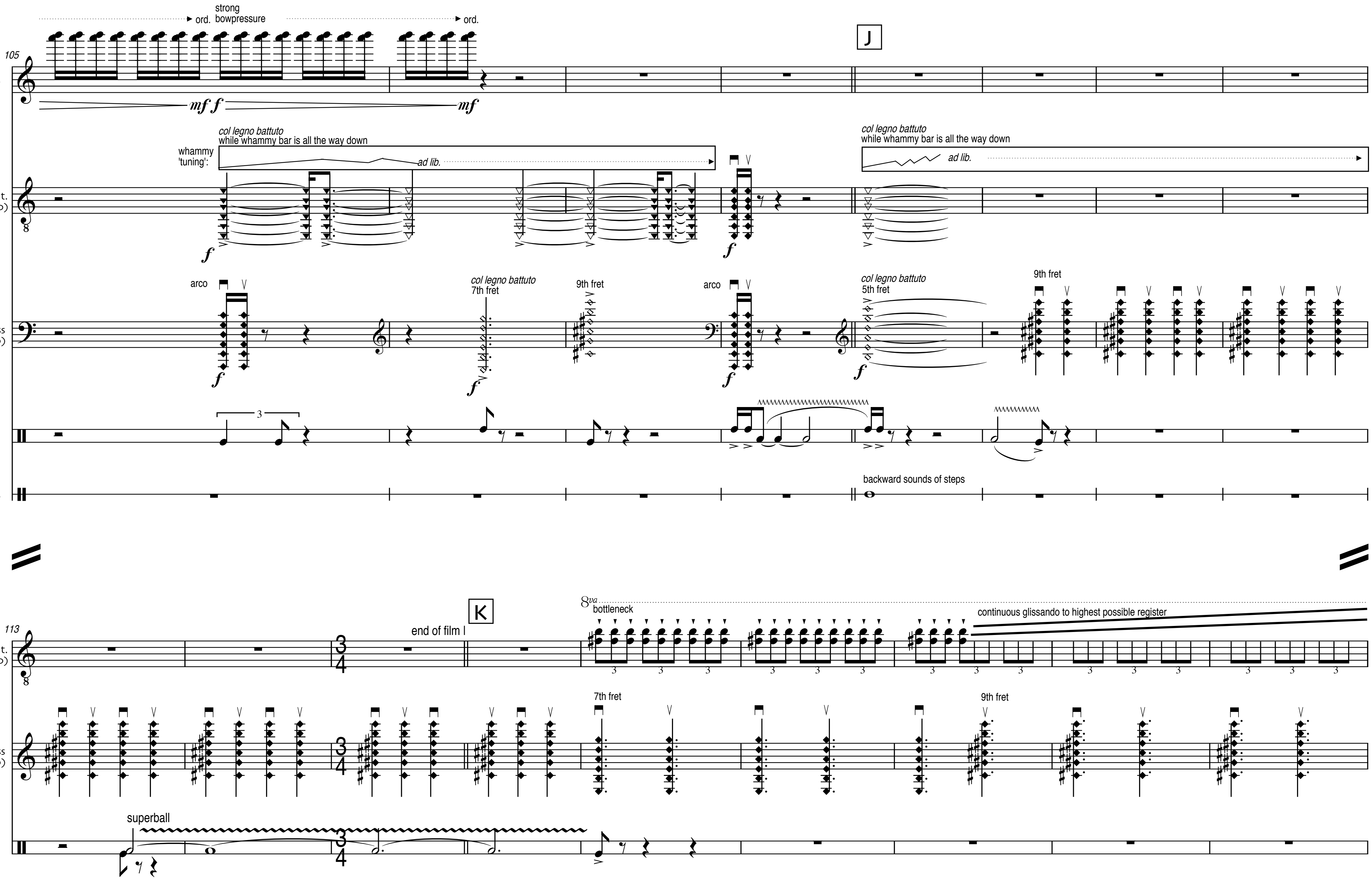


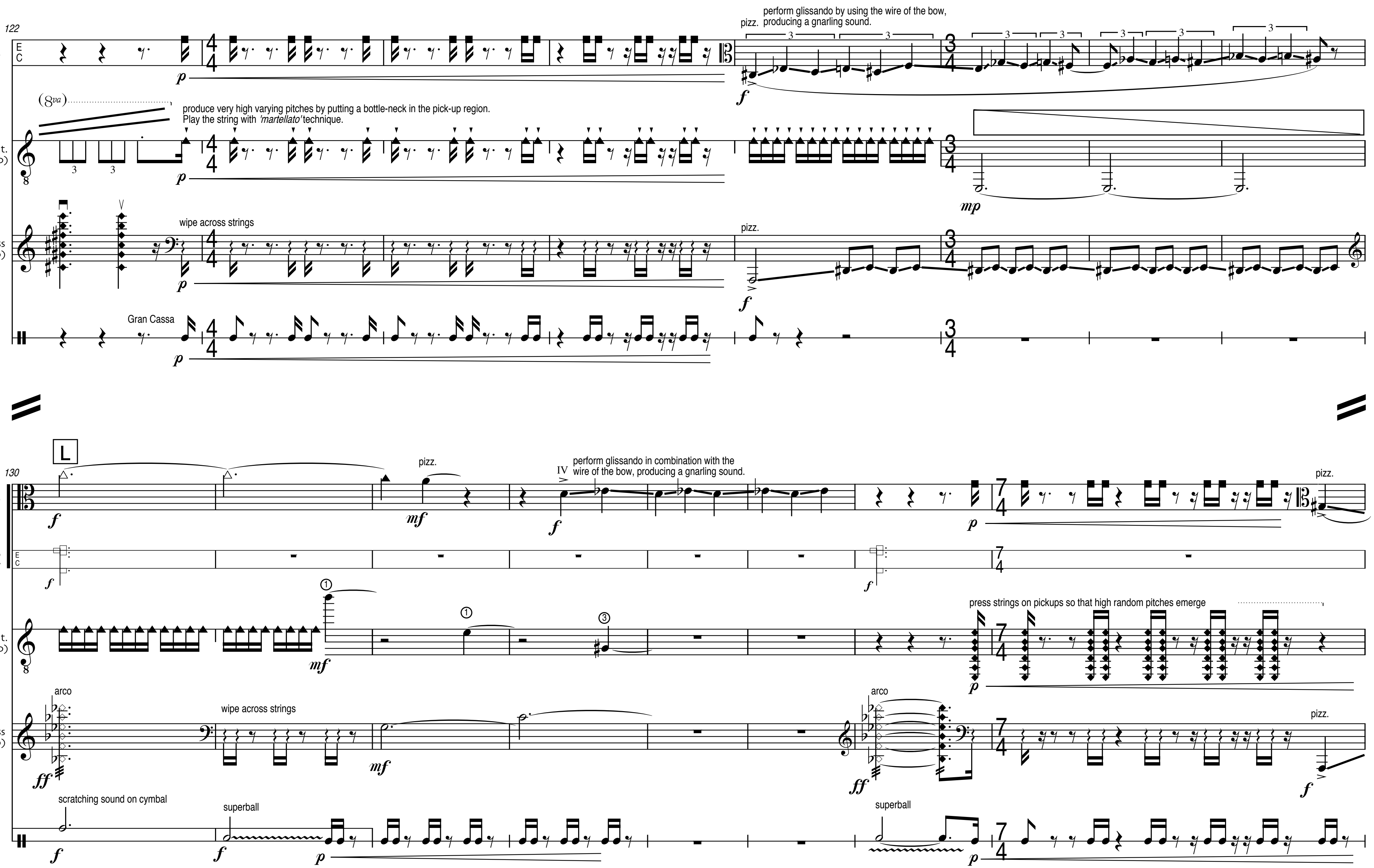

B
24
e-vln.
loop delay
e-guit. (table-top)
e-bass (table-top)
perc.
perc.
produce very high varying pitches by putting a bottle-neck in the pick-up region.
Play the string with 'martellato' technique.
arco
molto sul pont. <-> ord. ad lib
Tamtam (with elbow)
china cymbal
arco
C
35
e-vln.
loop delay
e-guit. (table-top)
e-bass (table-top)
perc.
electr.
arco
molto sul pont. <-> ord. ad lib
lasciare vibrare
lasciare vibrare
Tamtam
irregular backwards sounds of muffeled steps

50
D
♩ = 116
E
♩ = 94
♩ = 106
e-bass
(table-top)
perc.
electr.
5th fret
col legno battuto
lasciare vibrare
gran cassa
hit with notched stick
superball
snare drum
ricochet
superball
crowd chattering
backward sounds of steps
crowd chattering
65
F
♩ = 94
e-vln.
E
C
col legno battuto
while whammy bar is all the way down
whammy
'tuning':
ad lib.
e-guit.
(table-top)
e-bass
(table-top)
col legno battuto
perc.
slide notched stick on rim
superball
electr.
backward sounds of steps
backwards explosion

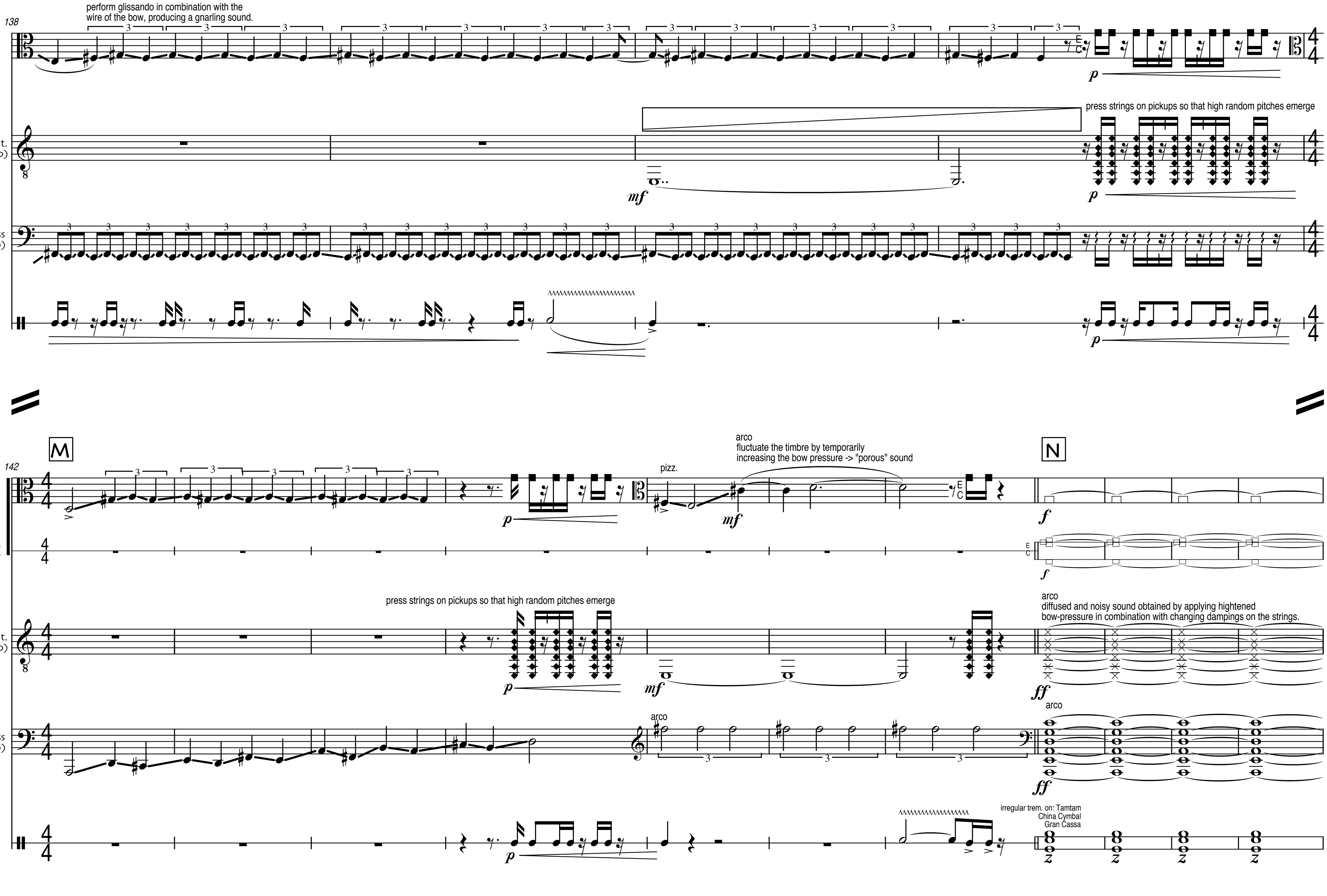

G
H
75
85
e-vln.
e-guit. (table-top)
e-bass (table-top)
perc.
electr.
loop delay
backward sounds of steps
arco
sul pont.
sul tasto
wipe across strings
rim+skin
superball
(stick)
f
ff
mf
mp

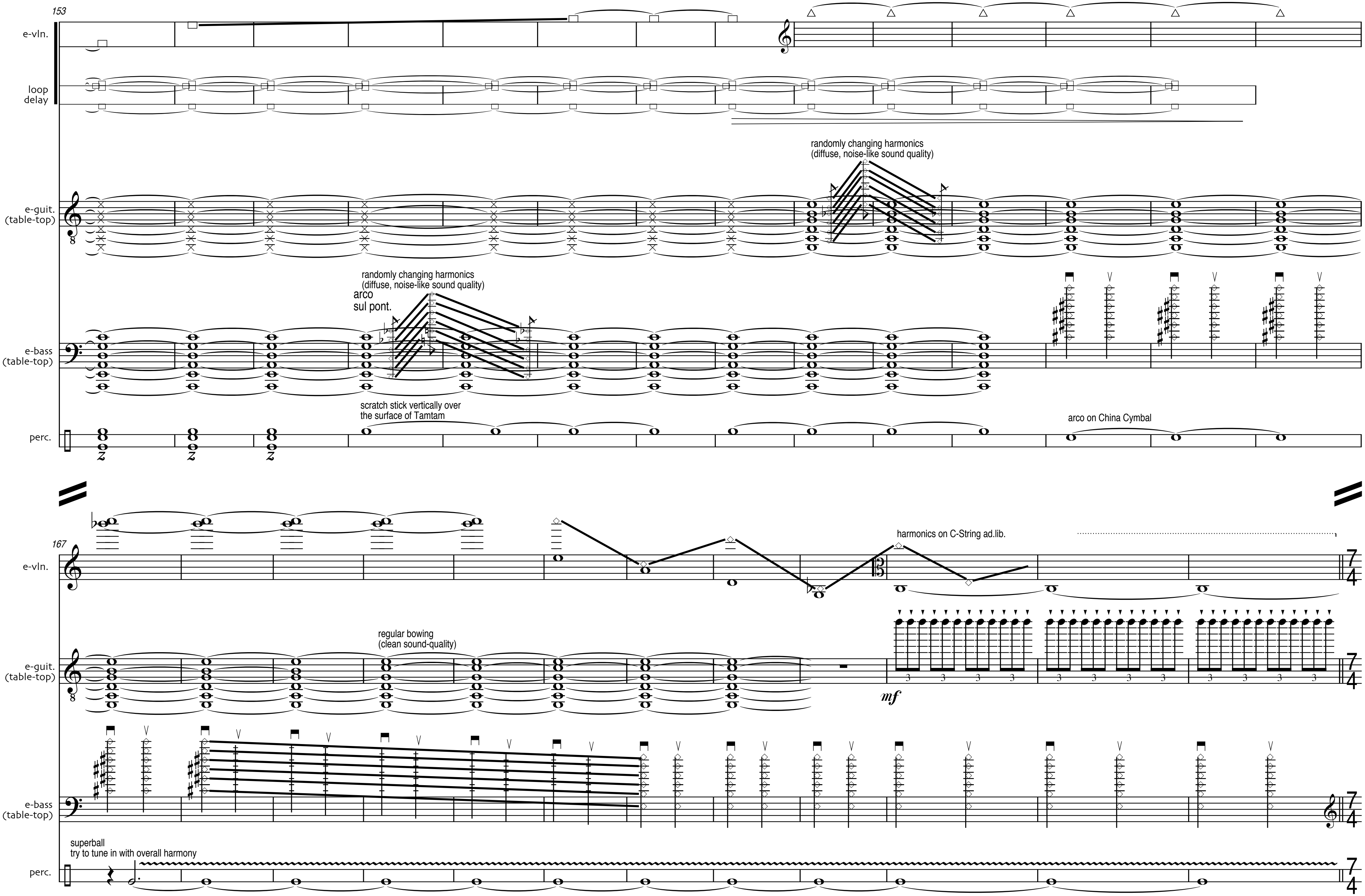

92
I
e-vln.
loop delay
e-guit. (table-top)
e-bass (table-top)
perc.
electr.
mp
p
pp
f
mf
arco
9th fret
crowd chattering
backward sounds of steps
100
spiccato
strong bowpressure
ord.
gradually increase bow pressure as high as possible
col legno battuto
7th fret
9th fret
wipe across strings


ord.
strong bowpressure
ord.
J
105
e-vln.
mf f
mf
col legno battuto
while whammy bar is all the way down
whammy 'tuning':
ad lib.
col legno battuto
while whammy bar is all the way down
ad lib.
e-guit. (table-top)
f
f
arco
col legno battuto
7th fret
9th fret
arco
col legno battuto
5th fret
9th fret
e-bass (table-top)
f
f
f
f
perc.
3
backward sounds of steps
electr.
113
K
end of film I
8va
bottleneck
continuous glissando to highest possible register
e-guit. (table-top)
7th fret
9th fret
e-bass (table-top)
superball
perc.

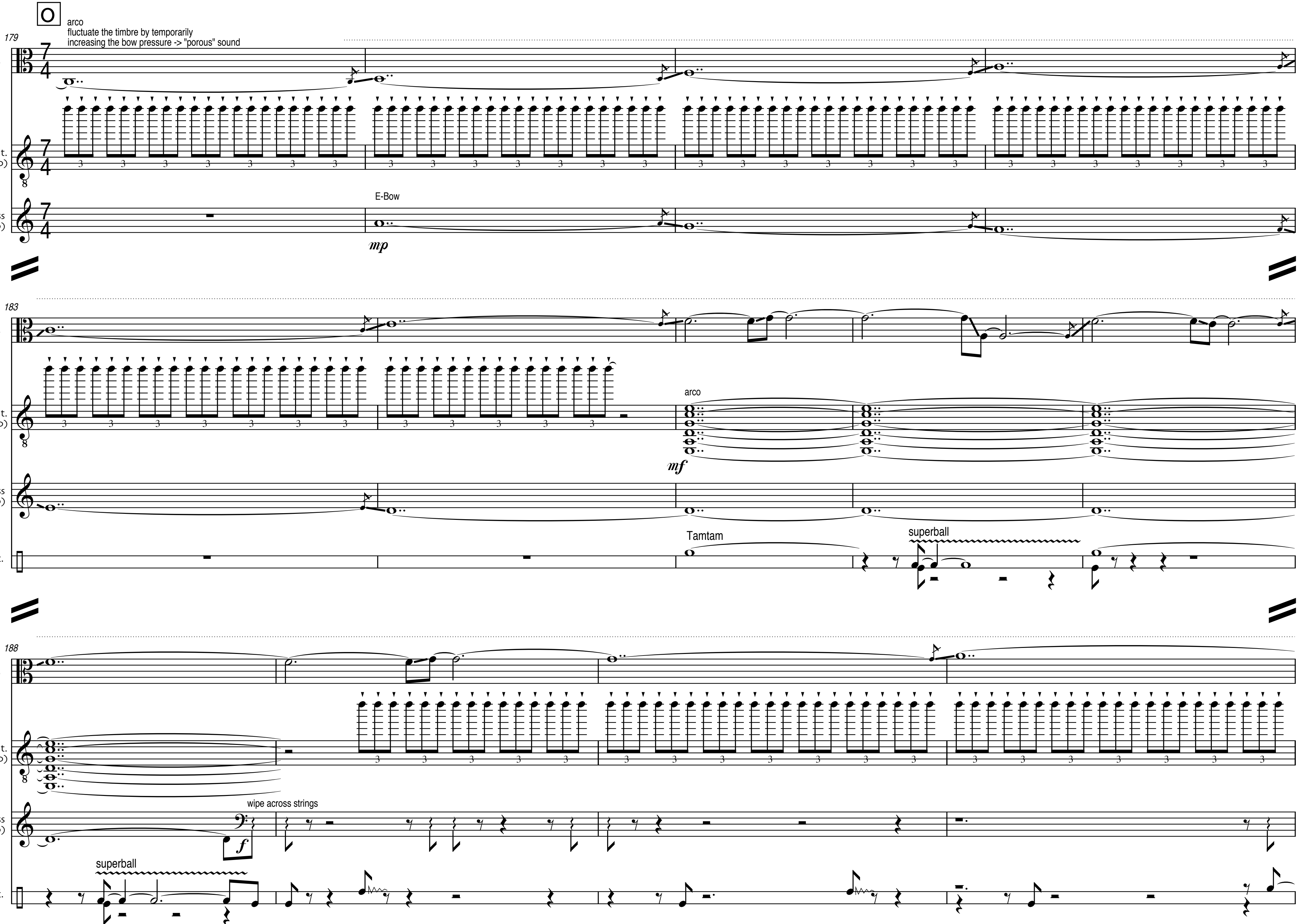


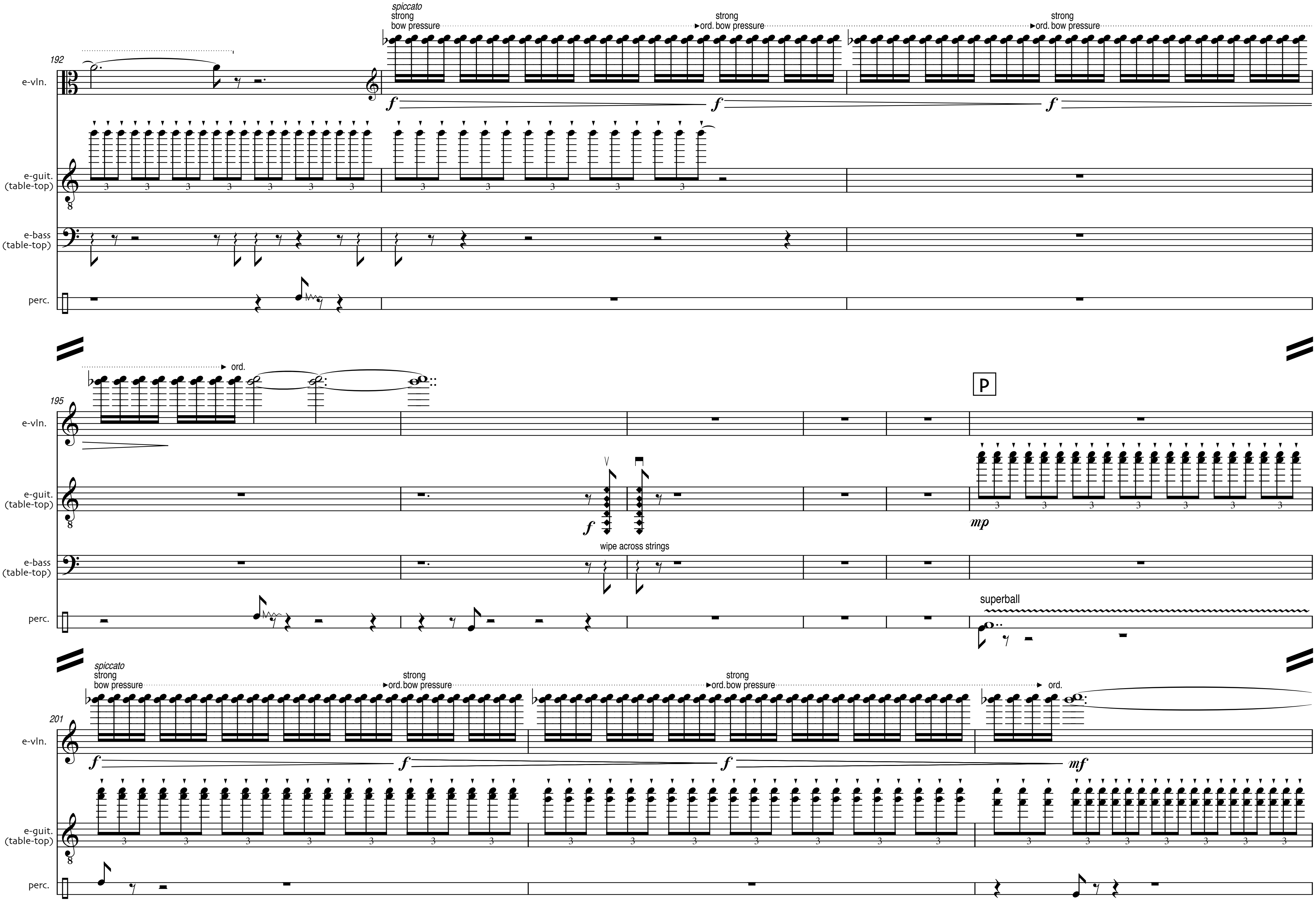
122
e-vln.
pizz.
perform glissando by using the wire of the bow, producing a gnarling sound.
(8va)
produce very high varying pitches by putting a bottle-neck in the pick-up region. Play the string with 'martellato' technique.
e-guit. (table-top)
e-bass (table-top)
wipe across strings
pizz.
perc.
Gran Cassa
L
130
e-vln.
pizz.
IV
perform glissando in combination with the wire of the bow, producing a gnarling sound.
pizz.
loop delay
e-guit. (table-top)
press strings on pickups so that high random pitches emerge
e-bass (table-top)
arco
wipe across strings
arco
pizz.
perc.
scratching sound on cymbal
superball
superball

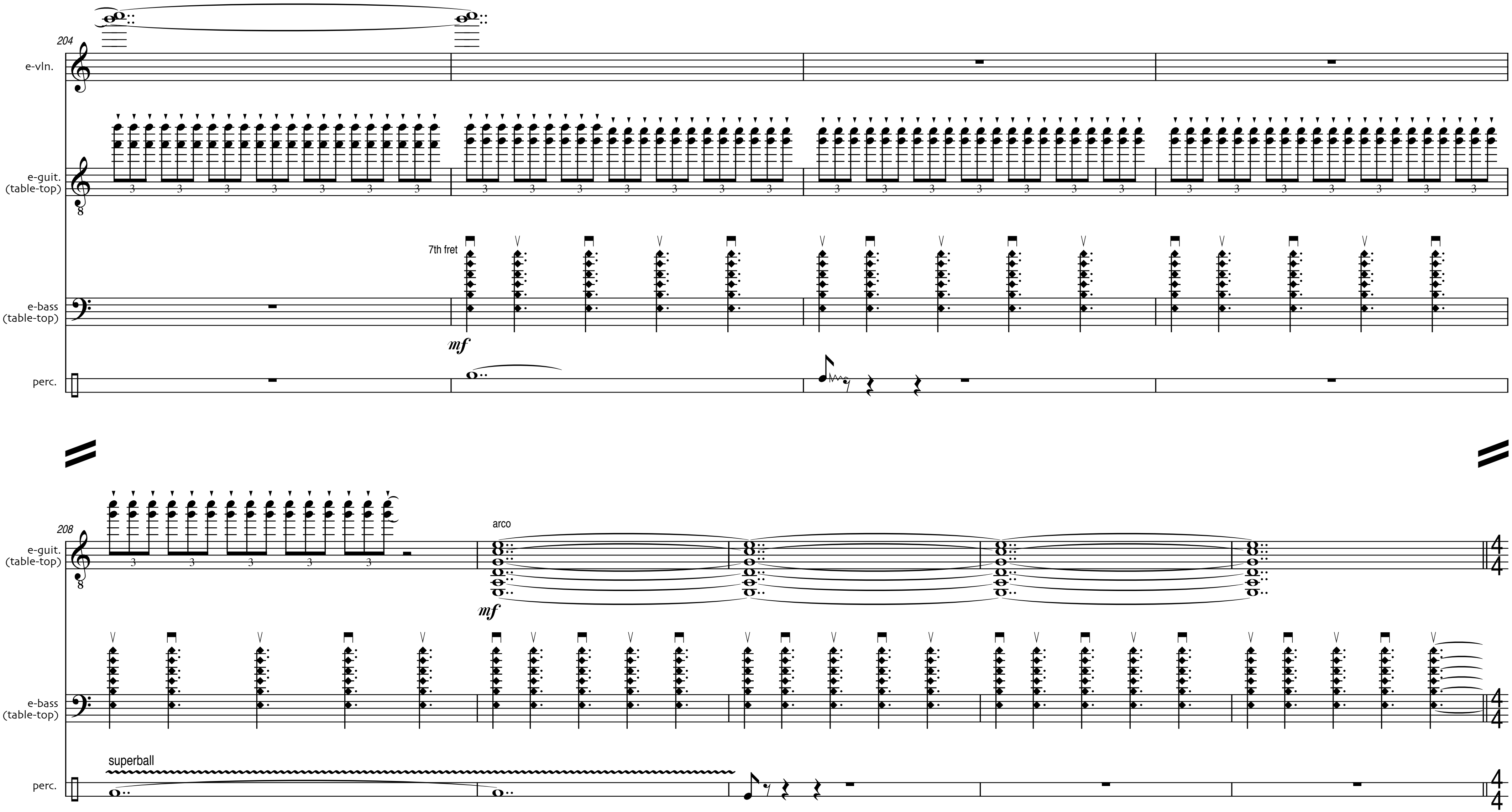

138
perform glissando in combination with the
wire of the bow, producing a gnarling sound.
e-vln.
e-guit.
(table-top)
press strings on pickups so that high random pitches emerge
e-bass
(table-top)
perc.
M
142
loop
delay
pizz.
arco
fluctuate the timbre by temporarily
increasing the bow pressure -> "porous" sound
N
press strings on pickups so that high random pitches emerge
arco
diffused and noisy sound obtained by applying hightened
bow-pressure in combination with changing dampings on the strings.
arco
irregular trem. on: Tamtam
China Cymbal
Gran Cassa



153
e-vln.
loop delay
e-guit. (table-top)
e-bass (table-top)
perc.
randomly changing harmonics (diffuse, noise-like sound quality)
arco sul pont.
scratch stick vertically over the surface of Tamtam
arco on China Cymbal
167
harmonics on C-String ad.lib.
regular bowing (clean sound-quality)
mf
superball
try to tune in with overall harmony


O
arco
fluctuate the timbre by temporarily
increasing the bow pressure -> "porous" sound
179
e-vln.
e-guit.
(table-top)
e-bass
(table-top)
E-Bow
mp
183
arco
mf
Tamtam
superball
perc.
188
wipe across strings
f
superball

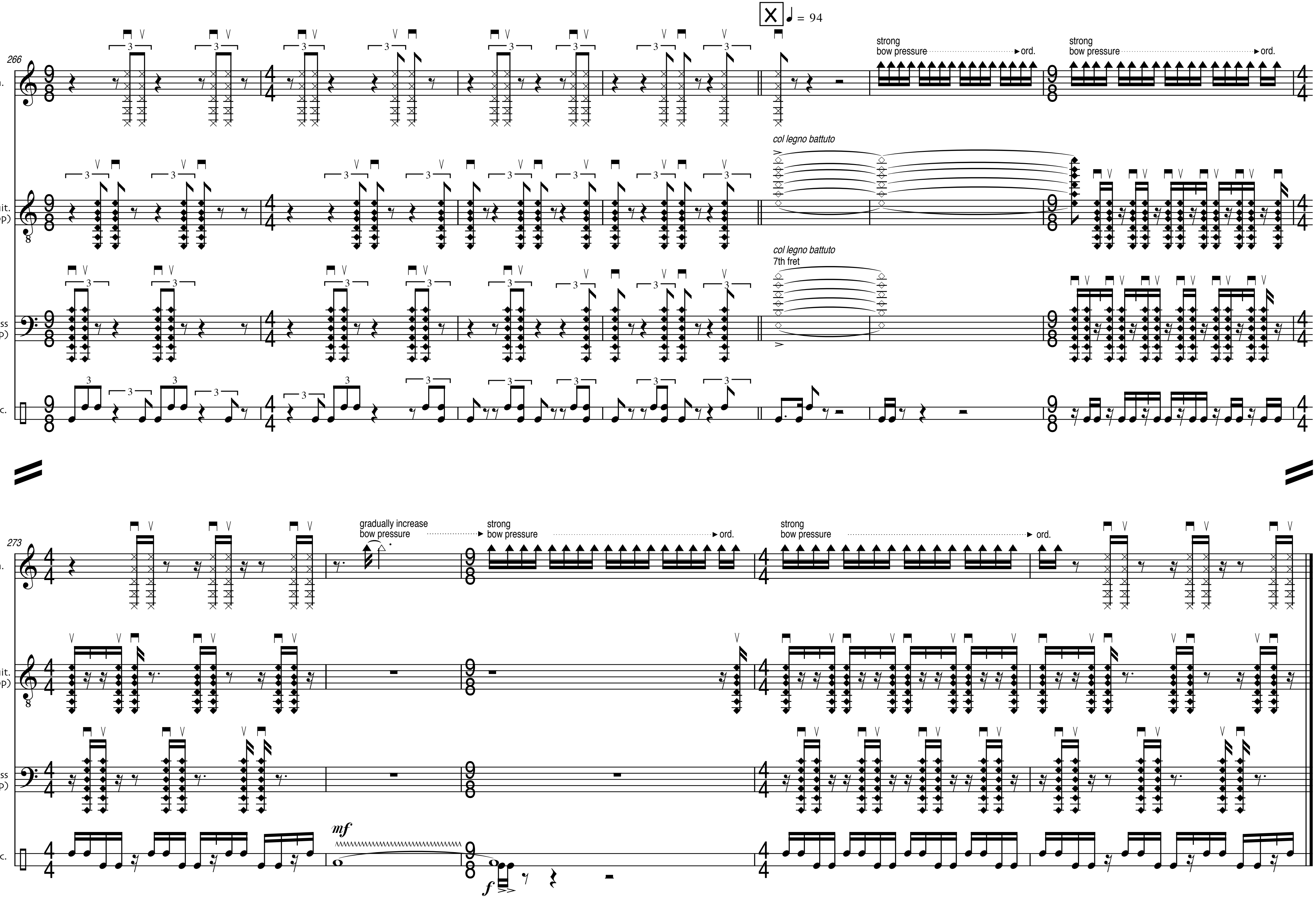

spiccato
strong
bow pressure
strong
ord. bow pressure
strong
ord. bow pressure
192
e-vln.
e-guit.
(table-top)
e-bass
(table-top)
perc.
ord.
P
195
wipe across strings
superball
spiccato
strong
bow pressure
strong
ord. bow pressure
strong
ord. bow pressure
ord.
201


204
e-vln.
e-guit.
(table-top)
7th fret
mf
e-bass
(table-top)
perc.
208
e-guit.
(table-top)
arco
mf
e-bass
(table-top)
superball
perc.


213
Q ♩ = 141
spiccato
strong
bow pressure
ord.
pizz. across muted strings
R ♩ = 94
arco col legno
e-vln.
arco battuto
e-guit.
(table-top)
arco ordinario
arco
arco battuto
9th fret
e-bass
(table-top)
perc.
superball
222
fluctuate the timbre by temporarily
increasing the bow pressure -> "porous" sound
sim.
E
C
arco
arco ordinario
E-bow
ff
mp
f


S
T
U
♩ = 141
232
242
e-vln.
e-guit.
(table-top)
e-bass
(table-top)
perc.
pizz.
IV
with slow vertical vibrato (gnarling)
V sim.
arco battuto
rimshot
III sim.


250
e-vln.
IV
II
sim.
V
♩ = 94
e-guit.
(table-top)
slow, irregular vibrato with whammy bar
col legno battuto
while whammy bar is all the way down
ad lib.
e-bass
(table-top)
col legno battuto
wipe across strings
perc.
259
strong
bow pressure
ord.
strong
bow pressure
ord.
W
♩ = 141
sim.


X ♩ = 94
266
e-vln.
e-guit. (table-top)
e-bass (table-top)
perc.
strong bow pressure ord.
strong bow pressure ord.
col legno battuto
col legno battuto
7th fret
273
gradually increase bow pressure
strong bow pressure ord.
strong bow pressure ord.
mf
f

Nr.4 Vamp

1. Vampire

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
♩ = 94								♩ = 141						♩ = 94			
								A						**B**			
4		9	4		9	4				9	4			9	4		9
4		8	4		8	4				8	4			8	4		8

2. Eroticism

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
♩ = 94								♩ = 141						♩ = 94			
								A						**B**			
4		9	4		9	4				9	4			9	4		9
4		8	4		8	4				8	4			8	4		8

3. Cannibalism (reversed)

277	276	275	274	273	272	271	270	269	268	267	266	265	264	263	262	261	260
♩ = 94								♩ = 141						♩ = 94			
							X						**W**				
4		9	4		9	4					9	4		9	4		9
4		8	4		8	4					8	4		8	4		8

In this section recordings of the previous three sections are exactly superimposed and played back. Section 3 (Cannibalism) is played back backwards. All sections are exactly synched. This notation does not show the music but only the manner how the sections are placed on top of each other.

For musical details, please refer to the scores of the first three sections.

From ±7:30 - 10:30 a film is played back, also in exact synch with the music.

19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
			♩ = 141											♩ = 94					
			C											**D**					
		4/4								9/8	4/4					9/8	4/4	7/8	3/4

19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
			♩ = 141											♩ = 94					
			C											**D**					
		4/4								9/8	4/4					9/8	4/4	7/8	3/4

259	258	257	256	255	254	253	252	251	250	249	248	247	246	245	244	243	242	241	240
			♩ = 141											♩ = 94					
		V											**U**						
		4/4									9/8	4/4				9/8	4/4	7/8	3/4

39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
5 8	4 4	9 8	2 4			4 4	9 8	**E** 4 4	9 8	4 4	9 8	4 4	9 8	4 4	9 8	4 4	9 8

39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
5 8	4 4	9 8	2 4			4 4	9 8	**E** 4 4	9 8	4 4	9 8	4 4	9 8	4 4	9 8	4 4	9 8

239	238	237	236	235	234	233	232	231	230	229	228	227	226	225	224	223	222
T 5 8	4 4	9 8	2 4			4 4	**S** 9 8	4 4	9 8	4 4	9 8	4 4	9 8	4 4	9 8	4 4	9 8

57	58	57	60	61	62	36	64	65	66	67	68	69	70	71
	♩ = 141								♩ = 94					
	F								**G**				**H**	
4				9	4				7					
4				8	4				4					

57	58	59	60	61	62	63	64	65	66	67
	♩ = 141	♩ = 94								
	F								**G**	
4	11	4	7							
4	8	4	4							

221	220	219	218	217	216	215	214	213	212	211	210	209	208	207
	♩ = 141								♩ = 94					
R								**Q**						
4				9	4				7					
4				8	4				4					

72	73	74	75	76	77	78	79	80	81

68	69	70	71	72	73	74	75	76	77

206	205	204	203	202	201	200 **P**	199	198	197

Insertion of instrumental section "Insert #1" (see appendix)

82	83	84	85	86	87	88	89	90	91

78 **H**	79	80	81	82	83	84	85	86 **I**	87

196	195	194	193	192	191	190	189	188	187

92	93	94 **J**	95	96	97	98	99	100 ♩ = 141 **K** 9 8	101 4 4	102 7 8	103 3 4	104 5 8	105 3 4

88	89	90	91	92	93	94	95	96 ♩ = 141 **J** 9 8	97 4 4	98 7 8	99 3 4	100 5 8	101 3 4

186	185	184	183	182	181	180	179 **O**	178 4 4	177	175	174

106	107	108	109	110	111	112	113	114	115		117	118	119	120		122	123	124	125	126	127	128	129	130	131	132
																L										
2	5		3		7		4		9	3	7				2	4										
4	8		4		8		4		8	8	8				4	4										

102	103	104	105	106	107	108	109	110	111	112	113	114	115	116		118	119	120	121	122	123	124	125	126	127	128
																K										
2	5		3		7										4	4										
4	8		4		8										8	4										

#	173	etc...

133	134	135	136 **M**	137	138	139	140	141	142	143	144	145	146	147	148	3 8	150 ♩ = 94 **N** 4 4	151	152	153	154

129	130	131	132	133	134	135	136	137	138 **L**	139	140	141	142	143	144	3 8	146 ♩ = 94 **M** 4 4	147	148	149	150

	149 **N**	148	147	146	145	144

155	156	157 7 4	158	159	160	161	162 3 4	163	164	165	166	167	168 **O**	169

151	152	153 7 4	154	155	156	157	158	159	160	161 **N** 3 4

143	142 **M**	141 7 4	140	139	138	137	136 3 4	135	134	133	132	131	130 **L**	129

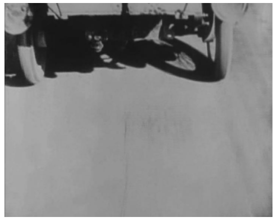
Film starts

Insertion of instrumental section "Insert #2" (see appendix)

170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190
		4 4				**P** 3 4							**Q**							

162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182
		4 4				3 4							**O**							

128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112	111	110
		4 4				3 4						**K**		4 4				



	191	192 **R** 4 4	193	194	195	196	195	198	199	200	201	202 3 4	203	204	205	206 4 4	207

	183	184 **P** 7 4	185	186	187	188	189	 1 4	191 3 4	192	193	194 4 4	195

109 **J**	108	107	106	105	104	103	102	101	100	99	98 **I** 3 4	97	96	95	94 4 4	93

208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
				S					3 4				4 4		

196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212
				Q 7 8						4 8	3 4			4 4		

92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76
			H	3 4			4 4	3 4		**G** 4 4	3 4			4 4		


224	225	226	227 **T** 5 4	228 3 4	229	230	231	232 4 4	233	234	235 ♩ = 106 7 8	236	237	238 ♩ = 94 **U** 4 4	239	240

213	214	215	216 5 4	217 **R** 3 4	218	219	220	221 4 4	222	223	224 ♩ = 106 **S** 7 8	225	226	227 ♩ = 94 4 4	228	229

75	74	73	72 5 4	71 3 4	70	69	68	67 4 4	66	65 **F**	64 ♩ = 106 7 8	63	62	61 ♩ = 94 4 4	60	59

241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	261
	♩ = 116 7 8							♩ = 94 **V** 4 4	7 8		3 4	5 8				3 4		7 8	

230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249
	♩ = 116 **T** 7 8							♩ = 94 **U** 4 4	7 8		3 4	5 8				3 4		7 8	

58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
E	♩ = 116 7 8						**D**	♩ = 94 5 4	4 4							

Film ends

261	262	263	264	265	266			269	270	271	272	273	274	275	276	277	278	279	280		282	283	284	285	286		
	♩ = 141																										
	W																										
4	9	4	7	3	5	2	3	5	7	9	5	3		7		4		9		3	7					2	
4	8	4	8	4	8	4	8	8	8	8	8	4		8		4		8		8	8					4	

250	251	etc…	269	270	271	272	273		
	poco a poco accelerando		♩ = 141						
	V		**W**						
4	3		7					2	
4	4		8					4	

41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
C											**B**					
									3					4		
									4					4		

	290 **X** 4 4	291	292	293	294	295	296	297 ♩ = 94 pause 3 4	298 **Y** 4 4	299	300	301	302	303	304	305 3 4	306 **Z**	307	308

	277 **X** 7 8	278	279	280	281	282	283	284	285 pause 9 8	286 ♩ = 154 **Y** 4 4	etc.	 2 4	298 ♩ = 172 pause 3 4	 5 8	300 **Z** 4 4	etc.

	24	23	22	21	20 **A** 3 4	19 pause	18 4 4	17	16	15 3 4	14	13 4 4	12 3 4	11	10 pause	9 4 4	8

	309	310	311	312	313	314	315
	4 4		3 4				

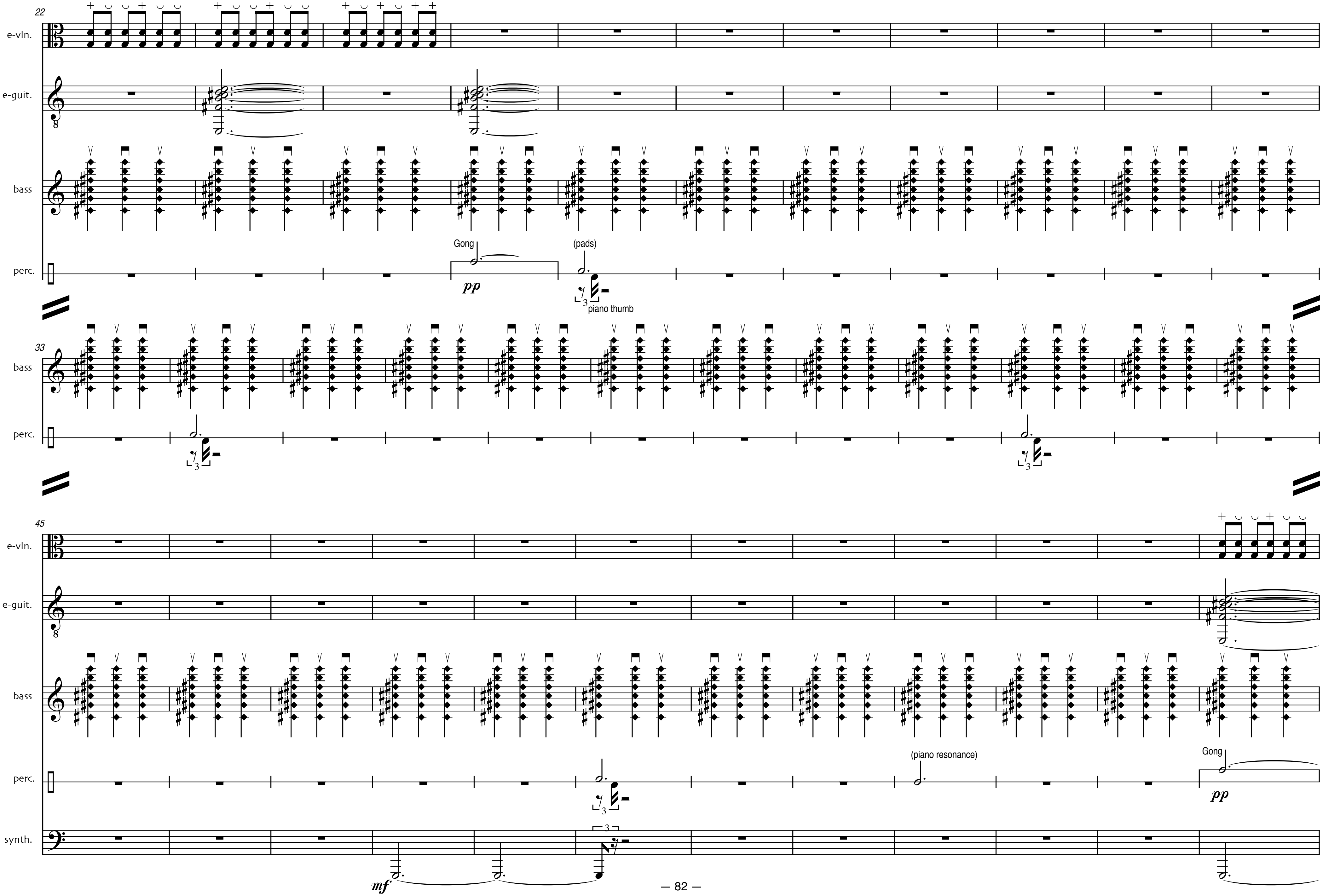
	307	308	309	310	311	312	313	314	315	316	317
	3 4	♩ = 188 pause		**ZZ**							

7	6	5	4	3	2	1
3 4			pause	4 4		

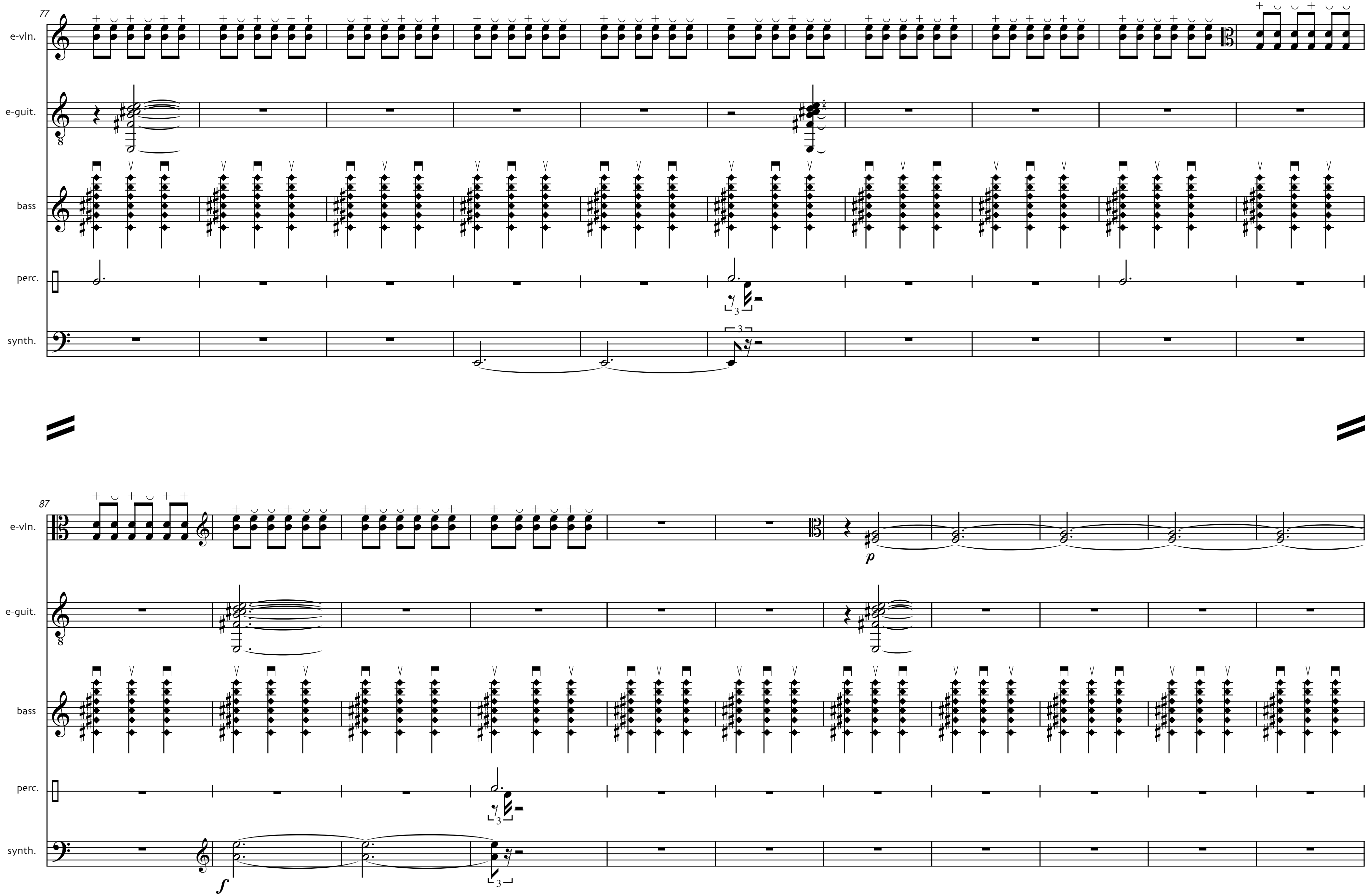
Nr.4 Vamp – Appendix instrumental "Insert" sections and film synchronisation

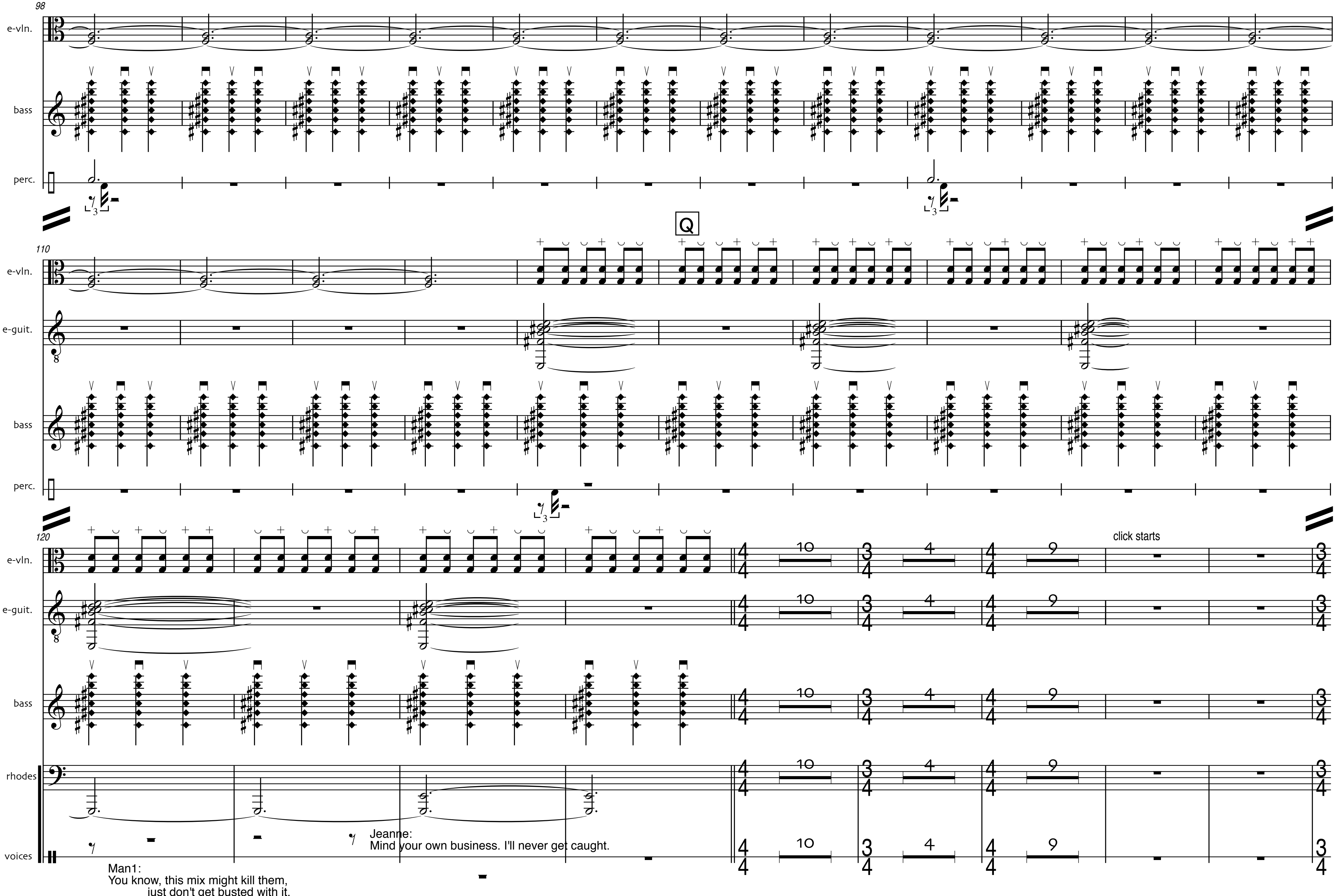
23
e-vln.
e-guit.
bass
perc.
synth.
voices
Gong
mf
sim.
31

Insert #2
= 94
P
e-vln.
mf
e-guit.
mf
9th fret
bass
mf
rhodes
f
12
e-vln.
e-guit.
7th fret
bass
pads
(electronic glitch sound)
perc.
rhodes


22
e-vln.
e-guit.
bass
perc.
Gong
pp
(pads)
piano thumb
33
bass
perc.
45
e-vln.
e-guit.
bass
perc.
(piano resonance)
Gong
pp
synth.
mf


57
e-vln.
e-guit.
bass
perc.
synth.
67
e-vln.
e-guit.
bass
perc.
synth.


77
e-vln.
e-guit.
bass
perc.
synth.
87
e-vln.
e-guit.
bass
perc.
synth.
p
f



98
e-vln.
bass
perc.
Q
110
e-vln.
e-guit.
bass
perc.
120
e-vln.
e-guit.
bass
rhodes
voices
click starts
10
4
9
Jeanne:
Mind your own business. I'll never get caught.
Man1:
You know, this mix might kill them,
just don't get busted with it.


149
perc.
Woman:
Hey! What the hell's gotten into you?! Let me go!
Man2:
Is that you Jeanne?
Jeanne:
Who else would I be?
Man2:
You scared the shit out of me!
Jeanne:
Now would you finally relax,
and do as
I told you?
Man2:
Aha?!
Man2:
Relax?
What do you think!
That I would just
157
sit here and do nothing?
Jeanne:
Now go to the window, give the signal and
drop the bomb!
Man3:
Come on, mate. Do it!
♩ = 106
168
Woman:
Oh my god...
Man4:
What's this smell?
I'm feeling dizzy.
♩ = 94
Man2:
Ok, that's done. See you downstairs.
♩ = 116
Woman:
We're being poisoned!
5
♩ = 94
instrumental doubling of the end
♩ = 141
♩ = 94
Y
e-vln.
e-guit.
arco
bass
Snare/Gran Cassa
301
f


Z
306
e-vln.
e-guit.
bass
arco
perc.
Bells
Kick/Snare (acoustic set)
ZZ
312
= 188
e-vln.
e-guit.
perc.
Gran Cassa
rhodes

Corrosion

for analogue electronics and laser reflections

marko ciciliani 2009

Corrosion

for analogue electronics and laser reflections, duration: 13 minutes, 2009

Laser tends to be a rather dominant medium with a tendency to the spectacular. In 'Corrosion' I am deliberately using it in a simple and low-scale fashion. Scanning is used rather minimally, instead, the visuals are primarily obtained by reflecting a point-shaped beam of laser from four different materials onto a larger projection area or screen. The visible result is a large augmentation of the small surface of the material that is hit by the laser beam. The four different materials used for the reflections in 'Corrosion' are:

- A liquid of a 50/50 water and vinegar mixture,
- a black wax-crayon,
- the reflective surface of a CD and
- a glass cylinder.

The former two are dynamic materials. The water/vinegar mixture is vibrating because it is exposed to some wind coming from the ventilation inside the laser projector. Therefore the projected image is always in a slight motion. Furthermore the liquid entails a constantly alternating texture. This is due to the fact that water and vinegar do not mix, therefore the surface of the liquid is inconsistent and contains bubbles of the vinegar in the water. When the laser hits a vinegar bubble it reflects differently than from water. The black wax-crayon is also a dynamic material as it slowly melts when it is exposed to the laser and therefore also changes its surface structure. The colour black is chosen because it absorbs best the energy of the laser beam and therefore builds up heat. As a result of the increase of temperature the surface of the wax slowly melts and changes the texture. Contrary to the liquid and the wax, the CD and the glass are static. Because of their strong reflective qualities, they are dispersing the laser light over a larger area and are therefore used as expansive materials, while the former two are contractive.

In 'Corrosion' the performer is integrated in the visuals by standing in the centre of the field where the laser projections are reflected. His silhouette can be recognised most of the time and some of the reflections are displayed on the clothes. The effect of the visuals is best when the piece is performed in complete darkness. This means not only that the performer has to play it from memory but that he largely has to play the synthesizer blindly, knowing exactly where which button or switch is located on the synthesizer's control panel and navigating on it by relying on the sense of touch.

In 'Corrosion' I am exploring sound and light textures while searching for 'haptic' qualities. The haptic quality is the impression that different material surfaces give to the skin. Along the visual and aural senses I am therefore including a third one as a frame of reference, namely touch. As both sound and light are immaterial, the haptic reference can only serve as a poetic or metaphoric idea, not as a concrete experience.

Haptic impressions are primarily distinguishing the following three qualities:

- Rough/sharp;
- Soft/smooth;
- Continuous/irregular, spiky.

Translated to the sonic range, this can lead to a multitude of sound textures.

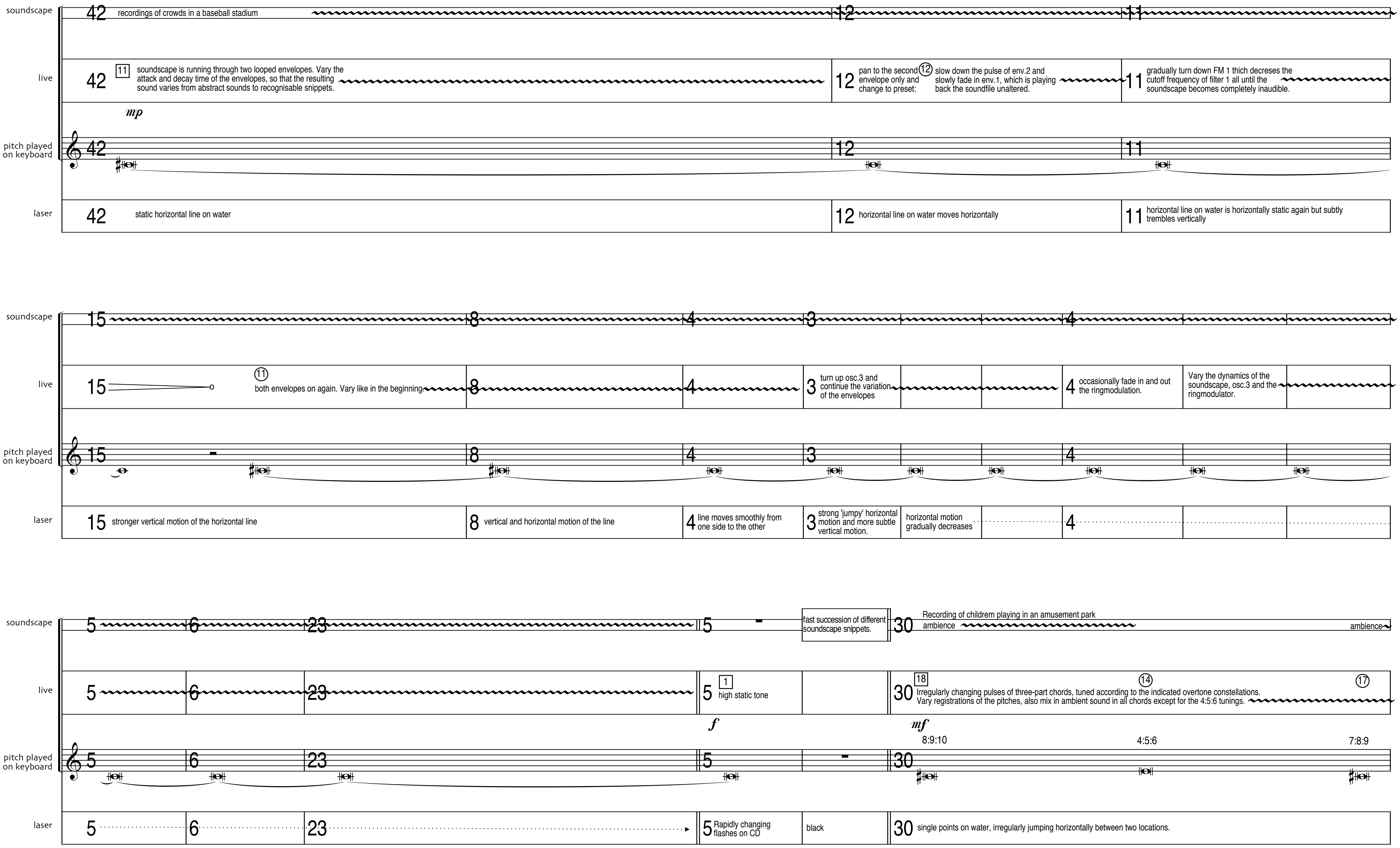
'Corrosion' was commissioned by the NFPK+

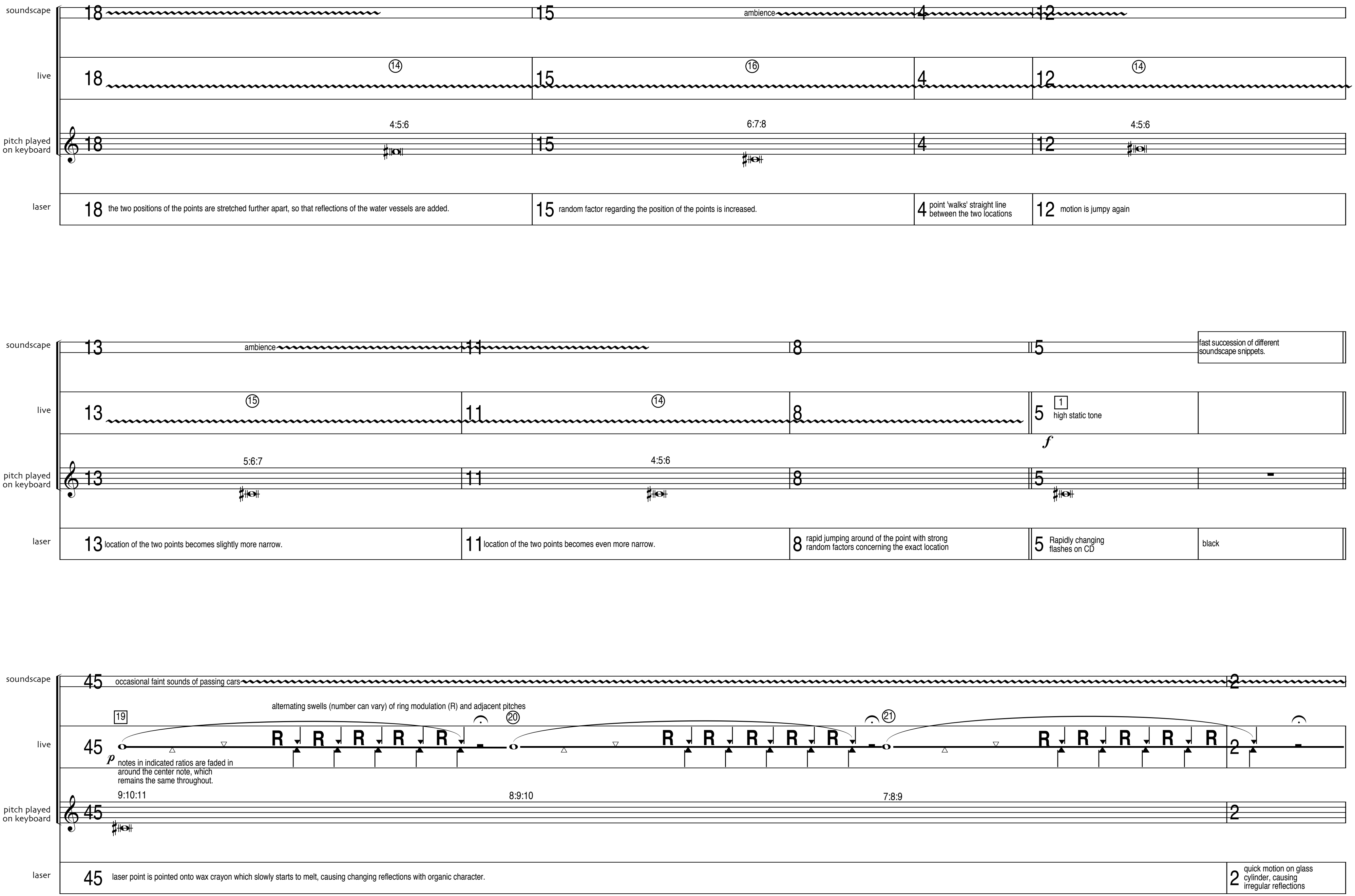
This score has been made as a memory aid and for analytical purposes. It is not meant to provide the complete information neceesary oin order to reproduce the work. This piece has been composed for a setup consisting of a semimodular Cwejman S1MK2 analog synthesizer, which is controlled by a 16 channel OSC to CV converter. The software that is controlling the converter has been written by the composer in SuperCollider. It contains a number of pre-programed presets that are either recalled automatically (indicated by a number in a sqare) or manually via a midi controller (indicated by a number in a circle).

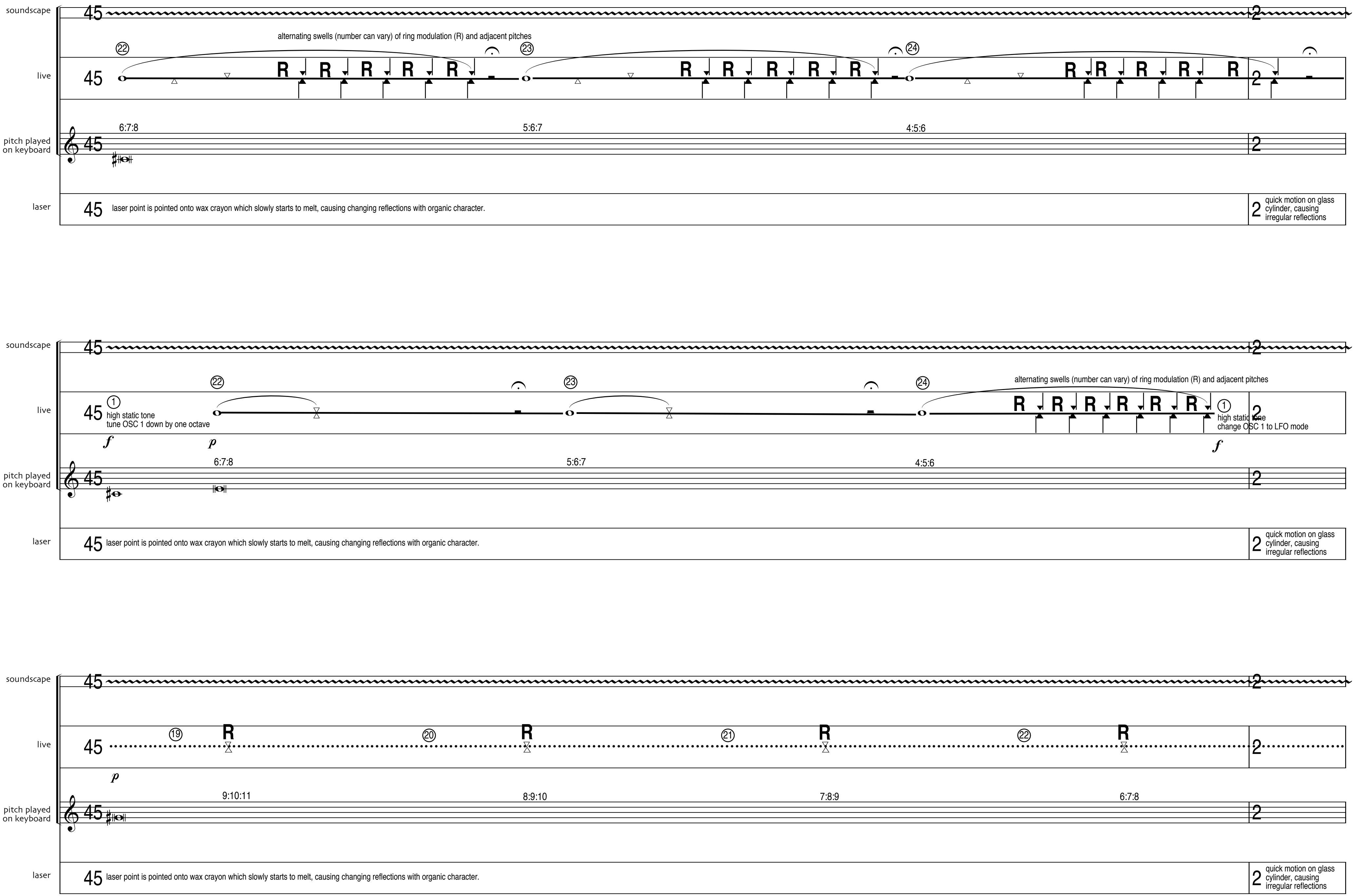
Corrosion

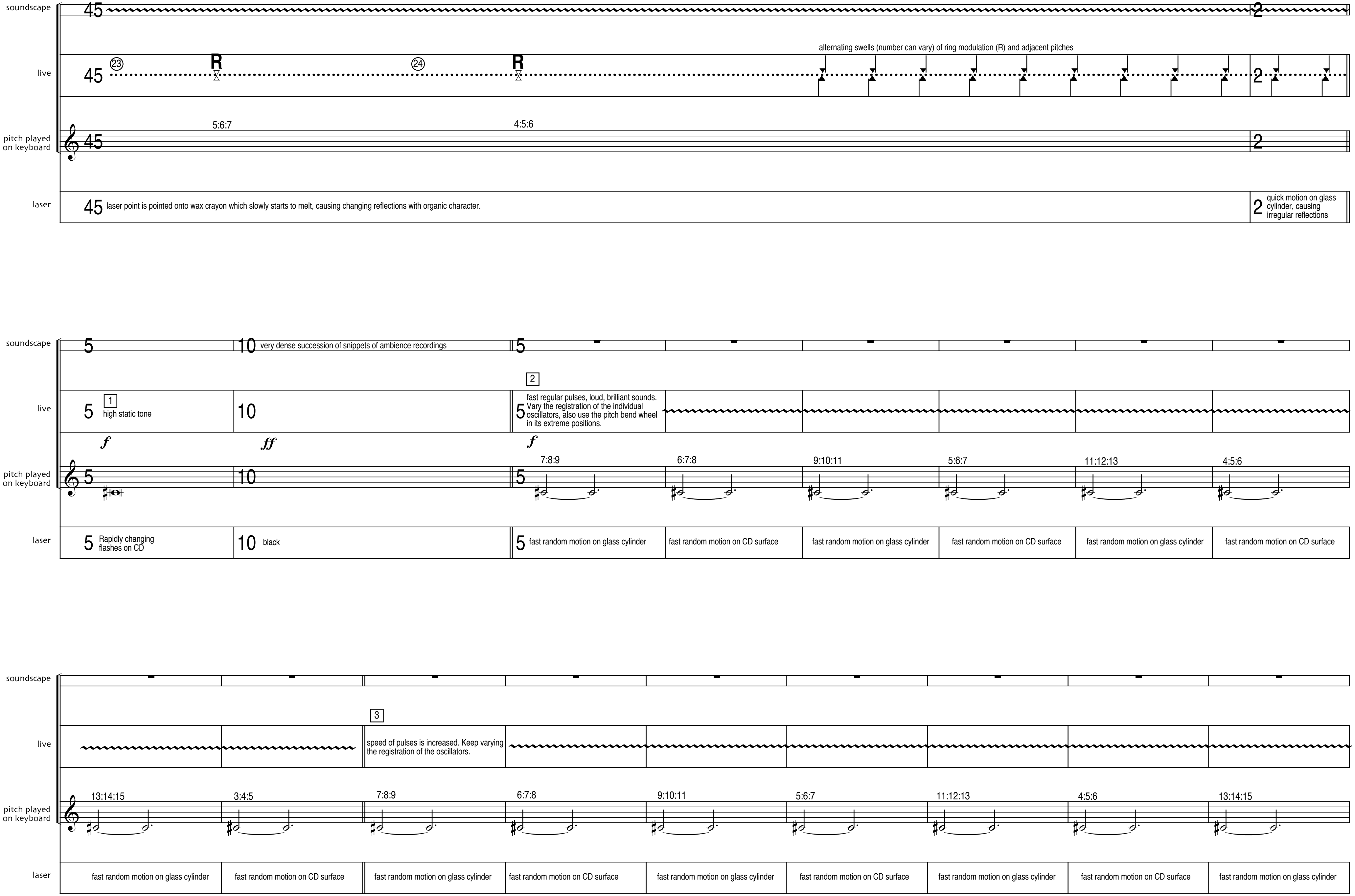
for analogue electronics and laser reflections

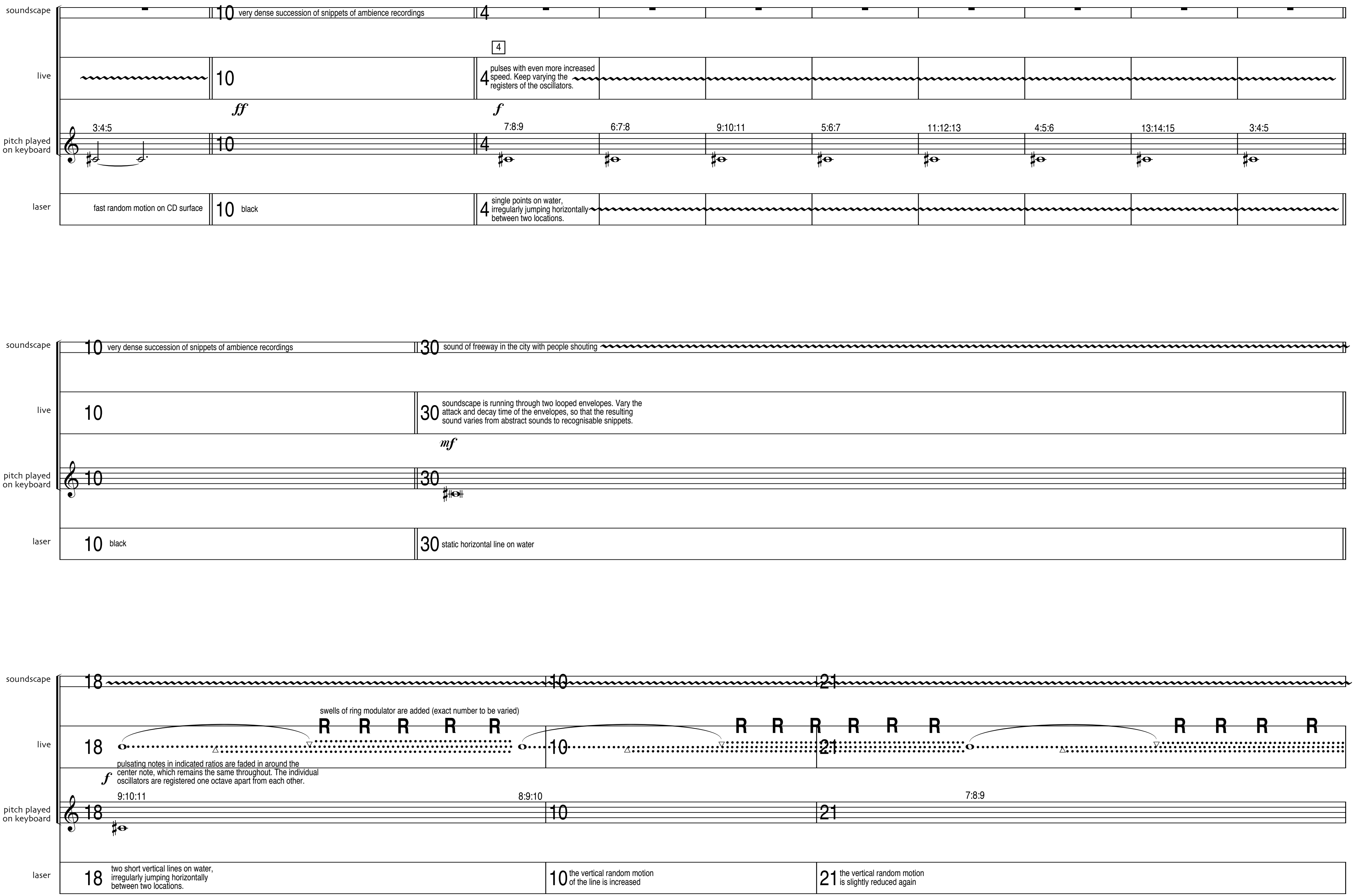
Marko Ciciliani 2009

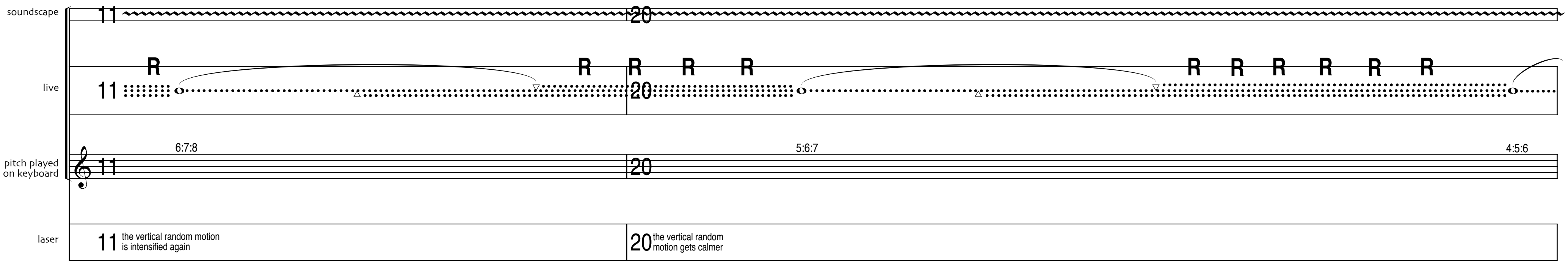


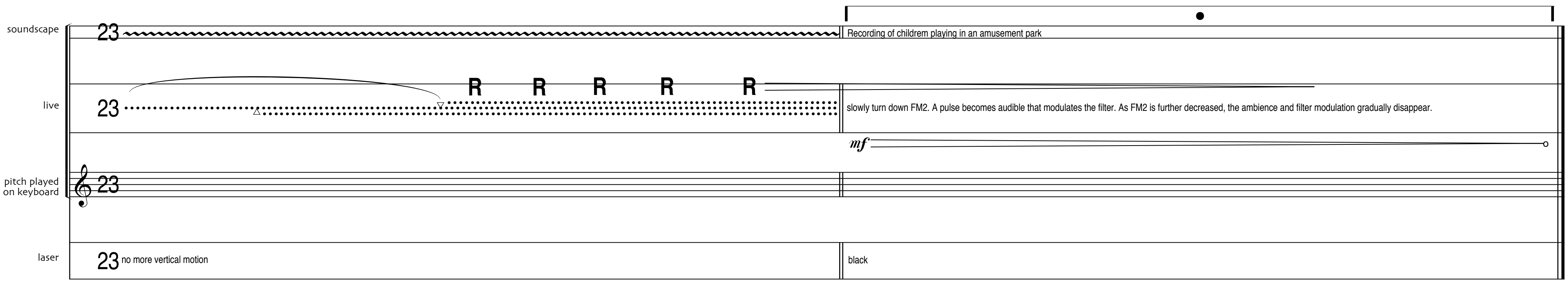

soundscape
live
pitch played on keyboard
laser
18
ambience
4
12
14
16
4:5:6
6:7:8
15
the two positions of the points are stretched further apart, so that reflections of the water vessels are added.
random factor regarding the position of the points is increased.
point 'walks' straight line between the two locations
motion is jumpy again
13
11
8
5
fast succession of different soundscape snippets.
1
high static tone
5:6:7
location of the two points becomes slightly more narrow.
location of the two points becomes even more narrow.
rapid jumping around of the point with strong random factors concerning the exact location
Rapidly changing flashes on CD
black
45
2
occasional faint sounds of passing cars
alternating swells (number can vary) of ring modulation (R) and adjacent pitches
19
20
21
notes in indicated ratios are faded in around the center note, which remains the same throughout.
9:10:11
8:9:10
7:8:9
laser point is pointed onto wax crayon which slowly starts to melt, causing changing reflections with organic character.
quick motion on glass cylinder, causing irregular reflections


soundscape
live
pitch played on keyboard
laser
45
alternating swells (number can vary) of ring modulation (R) and adjacent pitches
6:7:8
5:6:7
4:5:6
laser point is pointed onto wax crayon which slowly starts to melt, causing changing reflections with organic character.
2
quick motion on glass cylinder, causing irregular reflections
high static tone
tune OSC 1 down by one octave
high static tone
change OSC 1 to LFO mode
9:10:11
8:9:10
7:8:9
6:7:8


soundscape
live
pitch played on keyboard
laser
45
23
R
24
R
5:6:7
4:5:6
alternating swells (number can vary) of ring modulation (R) and adjacent pitches
laser point is pointed onto wax crayon which slowly starts to melt, causing changing reflections with organic character.
2
quick motion on glass cylinder, causing irregular reflections
5
10
very dense succession of snippets of ambience recordings
1
high static tone
f
ff
Rapidly changing flashes on CD
black
2
fast regular pulses, loud, brilliant sounds. Vary the registration of the individual oscillators, also use the pitch bend wheel in its extreme positions.
7:8:9
6:7:8
9:10:11
5:6:7
11:12:13
4:5:6
fast random motion on glass cylinder
fast random motion on CD surface
13:14:15
3:4:5
3
speed of pulses is increased. Keep varying the registration of the oscillators.


soundscape
live
pitch played on keyboard
laser
3:4:5
fast random motion on CD surface
10
very dense succession of snippets of ambience recordings
ff
black
4
pulses with even more increased speed. Keep varying the registers of the oscillators.
f
7:8:9
6:7:8
9:10:11
5:6:7
11:12:13
4:5:6
13:14:15
3:4:5
single points on water, irregularly jumping horizontally between two locations.
30
sound of freeway in the city with people shouting
soundscape is running through two looped envelopes. Vary the attack and decay time of the envelopes, so that the resulting sound varies from abstract sounds to recognisable snippets.
mf
static horizontal line on water
18
21
swells of ring modulator are added (exact number to be varied)
R
pulsating notes in indicated ratios are faded in around the center note, which remains the same throughout. The individual oscillators are registered one octave apart from each other.
8:9:10
two short vertical lines on water, irregularly jumping horizontally between two locations.
the vertical random motion of the line is increased
the vertical random motion is slightly reduced again


soundscape
live
pitch played on keyboard
laser
11
20
R
6:7:8
5:6:7
4:5:6
the vertical random motion is intensified again
the vertical random motion gets calmer


soundscape
live
pitch played on keyboard
laser
23
R
Recording of childrem playing in an amusement park
slowly turn down FM2. A pulse becomes audible that modulates the filter. As FM2 is further decreased, the ambience and filter modulation gradually disappear.
mf
no more vertical motion
black

Dromomania

for two pianos, electronics and lighting

marko ciciliani 2009

Dromomania
for two pianos, electronics and lighting

written by Marko Ciciliani in Amsterdam and Los Angeles in 2009 with a commission by the Fonds voor de Scheppende Toonkunst.

Composed for Sonsoles Alonso and Moritz Eggert.

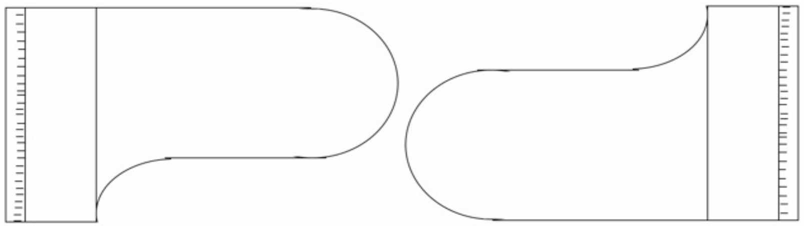
Special thanks to the Nederlands Fonds voor de Podiumkunsten,
the Fonds voor the scheppende Toonkunst
and the Villa Aurora.

Dromomania for two pianos, live-electronics and lighting

Dromomania consists of seven sections. Three of those sections are performed by the pianist. They are framed and connected by a prelude, two interludes and a postlude that are all purely electronic. Dromomania is a musical contemplation on travelling by means of technology. Each of the instrumental sections is dedicated to one means of locomotion: the wheel for moving on land, the wing for moving through the air and the prow for moving on the sea.

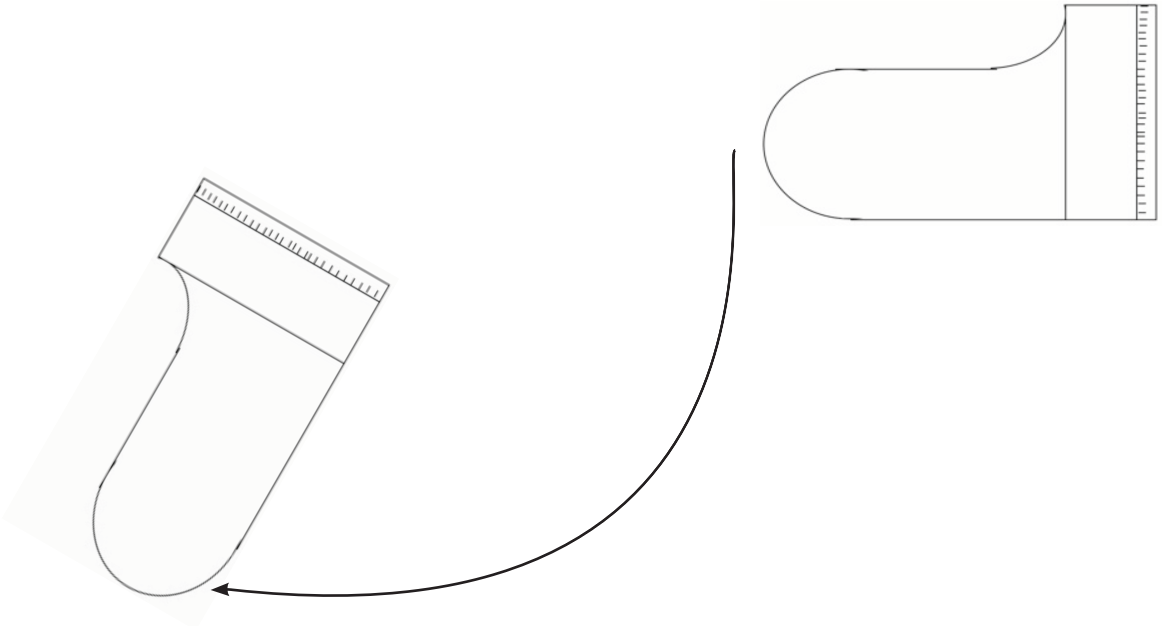
Positioning of the pianos:
The lids have to be removed from both pianos. In an ideal performance situation the grand pianos should be positioned differently for each of those sections. In the first instrumental section following the prelude called “wheel”, the two pianos should be positioned close to each other, so that the two pianists are facing each other (quasi traditional setting):

setting for “Wheel”:

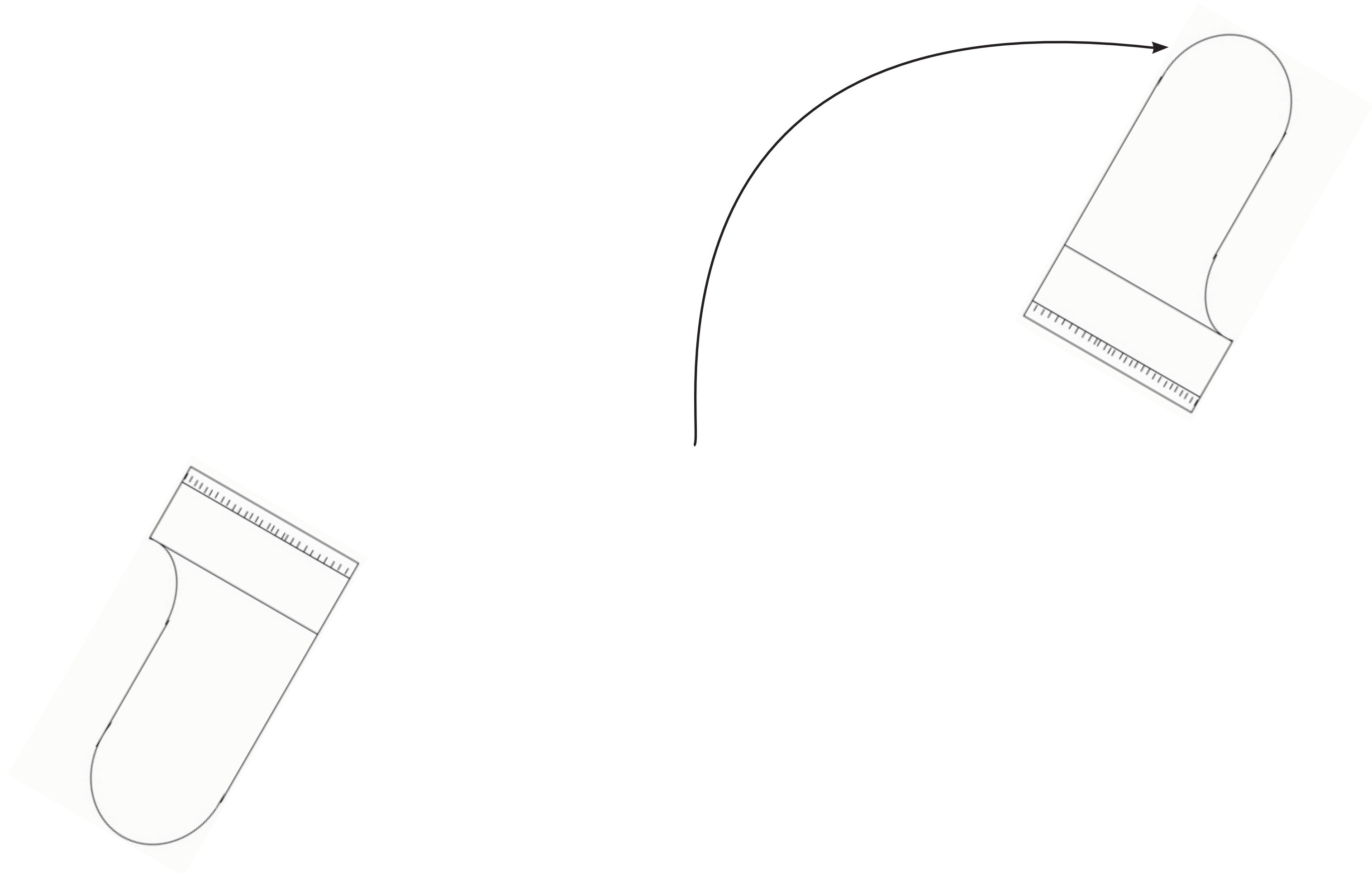


For the second instrumental section “Wing” the left piano (pno I) is turned towards the audience in such a way that the player player of pno. I can not see the player of pno. II but the player of pno. II can still see the back of the player of pno. I. The interlude between the two instrumental sections allows enough time (±3 minutes) to make the changover. Preferably, the two pianists should change the position of the piano themselves. If necessary a technician can come on stage to help them. In either way the changeover must be made in a calm and natural manner. Also it absolutely important not to add any theatricality or contrived solemnity.

setting for “Wing”:



For the third instrumental section, titled “Prow”, the second piano is turned away from the audience. As a result neither piano player can see the other one anymore. Also the distance between the two instruments is the largest. Between “Wing” and “Prow” there is another electronic interlude that allows enough time to make the changeover (again ± 3 minutes).



position of “Prow”:

If the stage area of the venue is not large enough to position the pianos in the described ways, pragmatic variations can be applied. In extreme cases, when the stage is that small that any changement of the positions would cause complications, the pianos can be left in the position of “Wheel” for the entire performance.

The different positions of the pianos have significant consequences for the musical communication between the players. This has been taken into account in the way how the three sections were composed. While very exact synchronization is essential in “Wheel”, only very rough correlations are required for “Prow”. A large part of “Wing” is performed by both players at pno. I. After a certain point the player of pno. II returns to his/her instrument. From that moment on he/she has to pick up cues from the player of pno. I. Very exact synchronisation is also not necessary at that point.

Speaker setup:
Four sound sources are used in Dromomania. Two regular full range speakers should be positioned in extreme left/right positions from the back line of the stage. The speakers should be as far away from the pianos as possible.

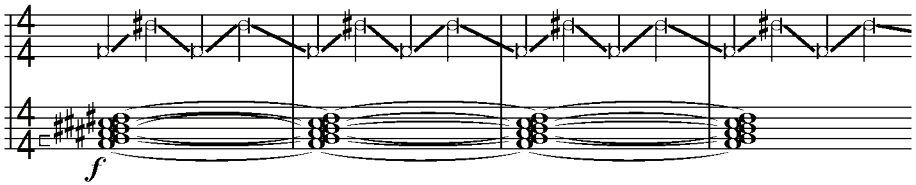
In addition, so-called sound-pads are used on the pianos. They have to be attached to the instrument's resonant board from underneath. Sound pads are cones that do not have a membrane but that are attached to any flat surface which is then used as the vibrating medium. The intention hereby is that each of the pianos is converted into a large loudspeaker. If no sound-pads are available single speakers (without casing) can be placed inside the piano, also on the resonant board.

Amplification:
Generally speaking the pianos are unamplified. For incidental amplification 2 C-ducer microphones per instrument should be used.

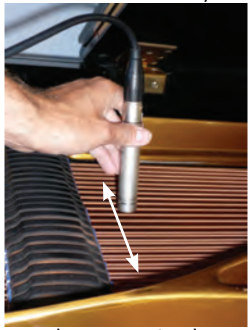
Use of microphones and pickups in "Wing":
The manual use of microphones and guitar pickups are an essential aspect of the section "Wing". The exact notation of these actions in the score is described further below.
For pno. I two condenser microphones with hypercardioid pattern should be used. Because of their size, shotgun microphones are not suitable. Since the microphones are partly used in rougher ways, cheap models are recommended, like for example Behringer C2 microphones.
For pno. II two single coil guitar pickups are used.

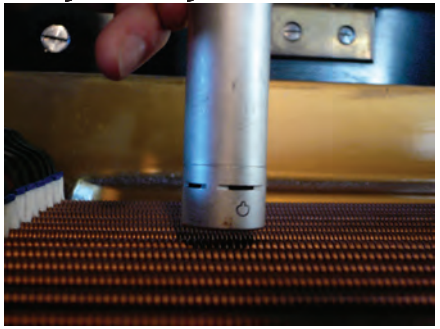
Notation of "Wing":
"Wing" is mainly performed inside the piano. Various resonances of the instrument are thereby picked up and amplified by hand-held microphones that are moved inside the piano by the pianists. At a later point single-coil guitar pickups are used as well at pno. II.
For the various actions a number of unconventional signs have been used in the score. All actions with microphones use the following sign instead of a regular notehead, that is the official electronic symbol for microphones:

One of the basic actions inside the piano is that chords (mostly modal clusters) are played on the keys and that the microphone is thereby swiped with the other hand above the resonating strings. As a result, the individual strings are amplified and through the swiping motion, varying frequency ranges are emphasized. It is important to keep a very close distance between the membrane of the microphone and the strings, without actually touching the strings:



score example #1: m.2-5
photos on the right: sweeping microphone motion/closeup
photo left below: microphone hitting the bridge element



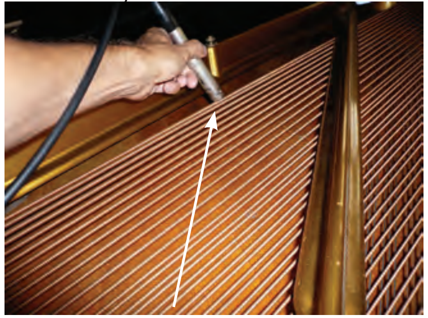


score example #2: m.25-27a

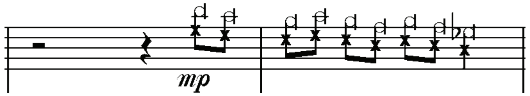
If a note with a microphone notehead has a V-shaped stem, it means that it is used percussively. In the passage m.25-32 the microphone is hit on the bridge element of the piano. Here the intention is to make a silently pressed chord resonate, therefore the part of the bridge that is closest to those strings should be hit by the mic.

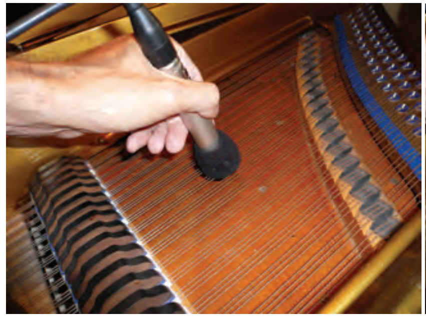
In m. 103-104 (Pno.II) the microphone is tapped against a string (as so-called 'dead strokes', which means that the mic is held against the string after the percussive hit).

score example #3: m. 103-104
photos right: microphone tapping the strings, beginning close to the dampers on higher strings and moving deeper into the instrument as the lower strings are reached.



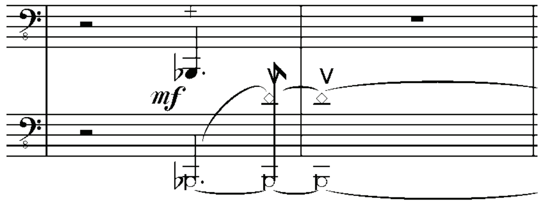
If a note with a microphone notehead has a cross through its stem, the microphone (with a wind screen on) is used to brush over a particular string with a sideward motion:





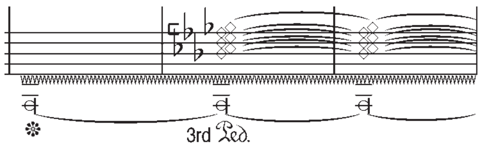
score example #4: m. 51+52
photos on the right: brushing with the mic with a sideward motion

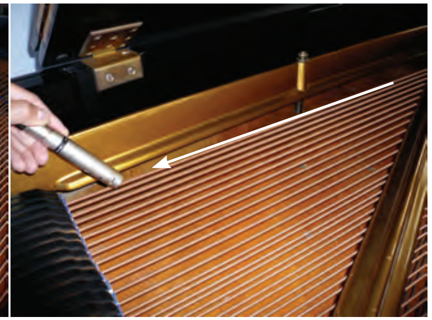
Another microphone action with the windscreen on is used on the low strings in order to dampen a ringing string and thereby to isolate partials of the ringing note. The microphone with the windscreen is thereby pressed against the ringing string.



score example #5: m.74-75
photo: microphone with windshield is pressed against a low string

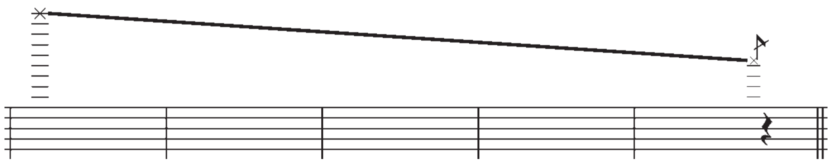
In m. 105-114 the microphone is scratched along the lowest string of the piano, starting deep inside and gradually pulling it towards the keyboard-side of the instrument. Try to achieve a regular rattling sound.

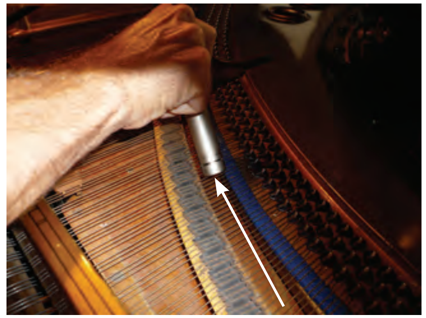




score example #6: m.105-107
photos: microphone scratching along the lowest string.

In m.110-114 the microphone is used to glide across the small portion of the string that is in between the bridge of the piano and the point where the strings are attached.

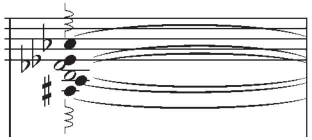




score example #7: m.110-114
photo: microphone gliding across the portion of the string that is in between the bridge and the point where the stings are attached.

On piano II single coil guitar pickups are used instead of microphones in order to obtain a certain number of musical results. All actions with the pickups are marked with the following sign, that is supposed to represent a coil (the working principle of a pickup):

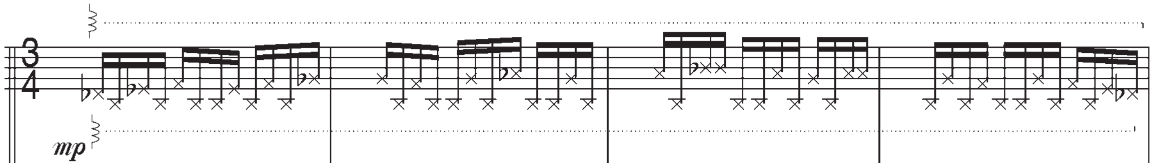
From m.117-172 two pickups are held above specific strings in order to create sustained notes of those pitches. These are obtained by creating controlled feedbacks by sending the signal of the pickups to the speakers inside the piano itself.
Since feedback respond and react in somewhat unpredictable ways – especially when two feedback notes are created at the same time, this whole passage is supposed to be realised in a flexible and semi-improvised fashion. This means that dynamics, timings and colorations should be used in a dynamic way.
A number of notes are displayed. The hollow notes are designating the principle notes. One of them should be sounding throughout. The black notes are designating secondary pitches that are to be combined with the principle notes.



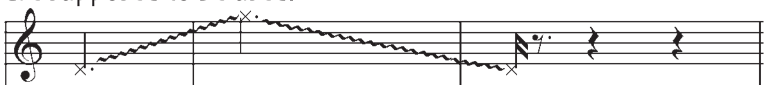
score example #8: m.117
photos: use of single coil pickups in order to create feedbacks.

From m.173-176 and 183-190 the pickups are tapped against specific strings in order to make them resonate (notated with an x-shaped notehead). The non-pitched percussive sound of this action should be approximately as loud as the ringing string. Slight sideward motions while tapping can help to make the sound more homogenious.

score example #9: m.173-176



From. m.177-182 and again at the very end of this section the pickups are held in an 90˚ angle to the strings and are slided from left to right and vice versa. A continuous rattling sound is the desired result. The pitches that are used in the notation are inly indicating the rough register, where the action is supposed to take place. No exact pitches are supposed to be used.



score example #10: m.177-178
photos: pickup in 90˚ angle to the strings being moved afrom left to right and vice versa.

General remark about inside piano actions:
All three instrumental sections use inside piano techniques to some degree. Many of the actions that are spanning a larger range will not be feasible in the exact way how they are notated, because beams in the inside of the piano will be in the way. Since every piano model has the beams in different positions it is not possible to notate one version which will work for all pianos. Therefore, in the notation of this piece, I have consistelty ignored the existence of these beams altogether.
A different solution will have to be found with every instrument.

I would like to say a few remarks about the inside actions in order to give an idea what is of most importance and to thereby minimize the frustration that might be connected with readapting the playing to yet another instrument.

The only inside piano action in “Wing” and “Prow” is the strumming of chords that are silently pressed. Here the exact pitches are important and they should preferably not be transposed. In order to make them playable even if a beam is in the way, the strumming should be performed by two hands instead of one, while the silently pressed chord should be taken into the third pedal. If it demands extra time to put the chord into the third pedal, One hand can already start the strumming while the other one still prepare the chord and joins the strumming later. If it takes extra time to prepare the playing that follows the strumming, the entire strumming section can be shortened – this is probably less relevant for “Wing” but more so for “Prow”.

In “Wing” the swiping of the microphone will often be inhibited by the beams. If the beam disconnects only a single note from the remaining of the chord, it can simply be ignored. If the desired range is however divided, the sweeping motion should be continued while swiftly moving above the beam.

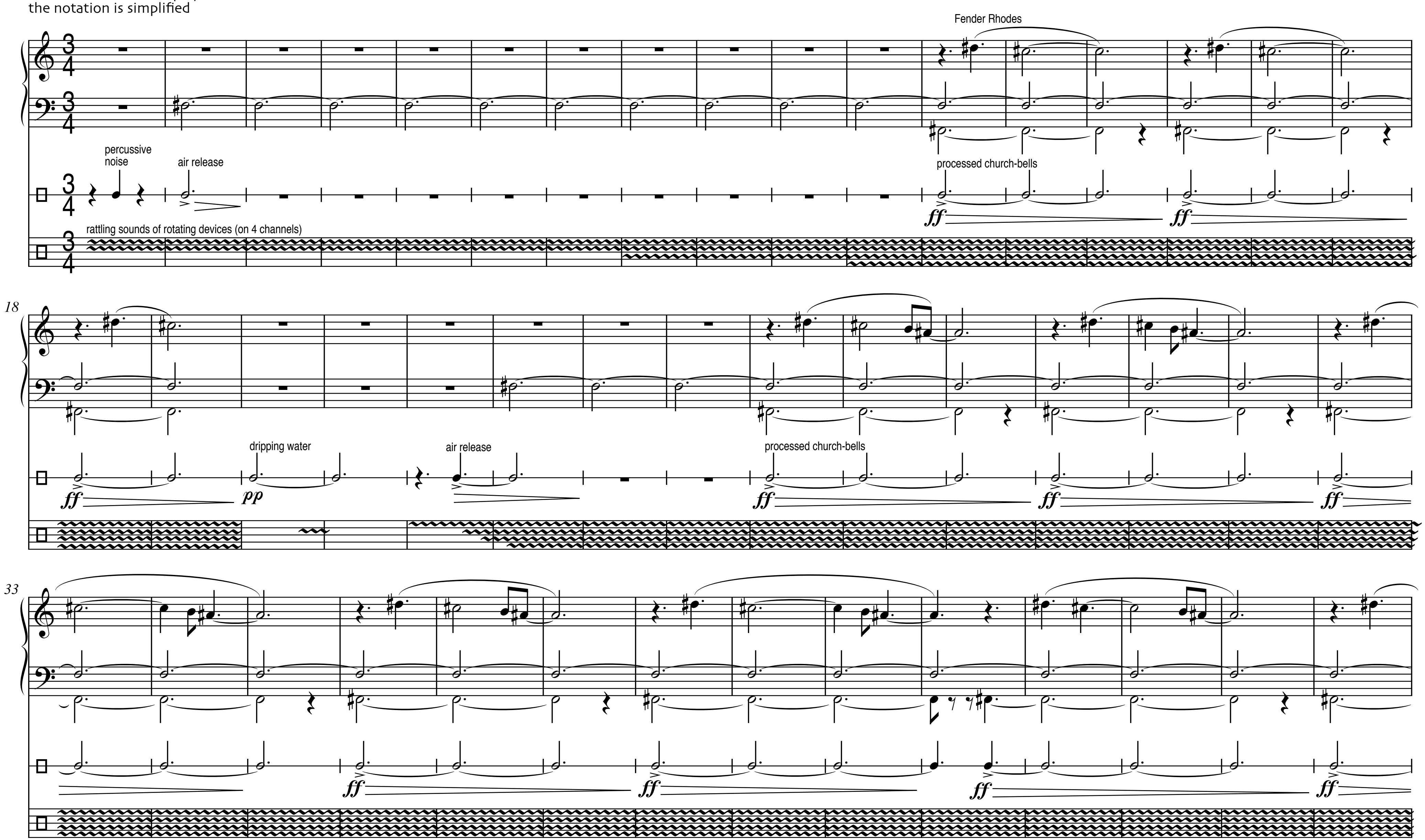
Dromomania

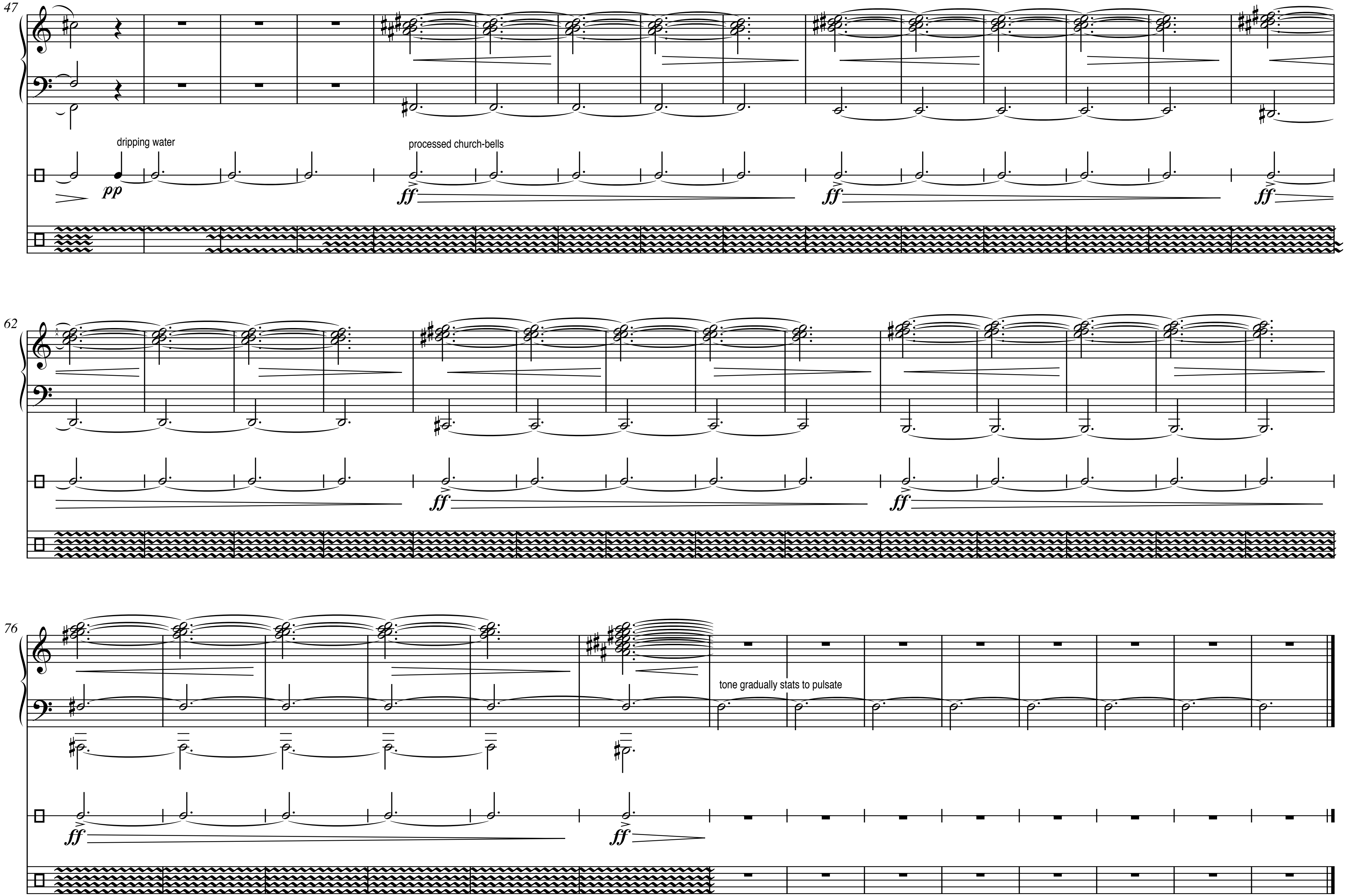
for two pianos, electronics and lighting

Marko Ciciliani 2009

1) Preludium

electronic music from playback
the notation is simplified

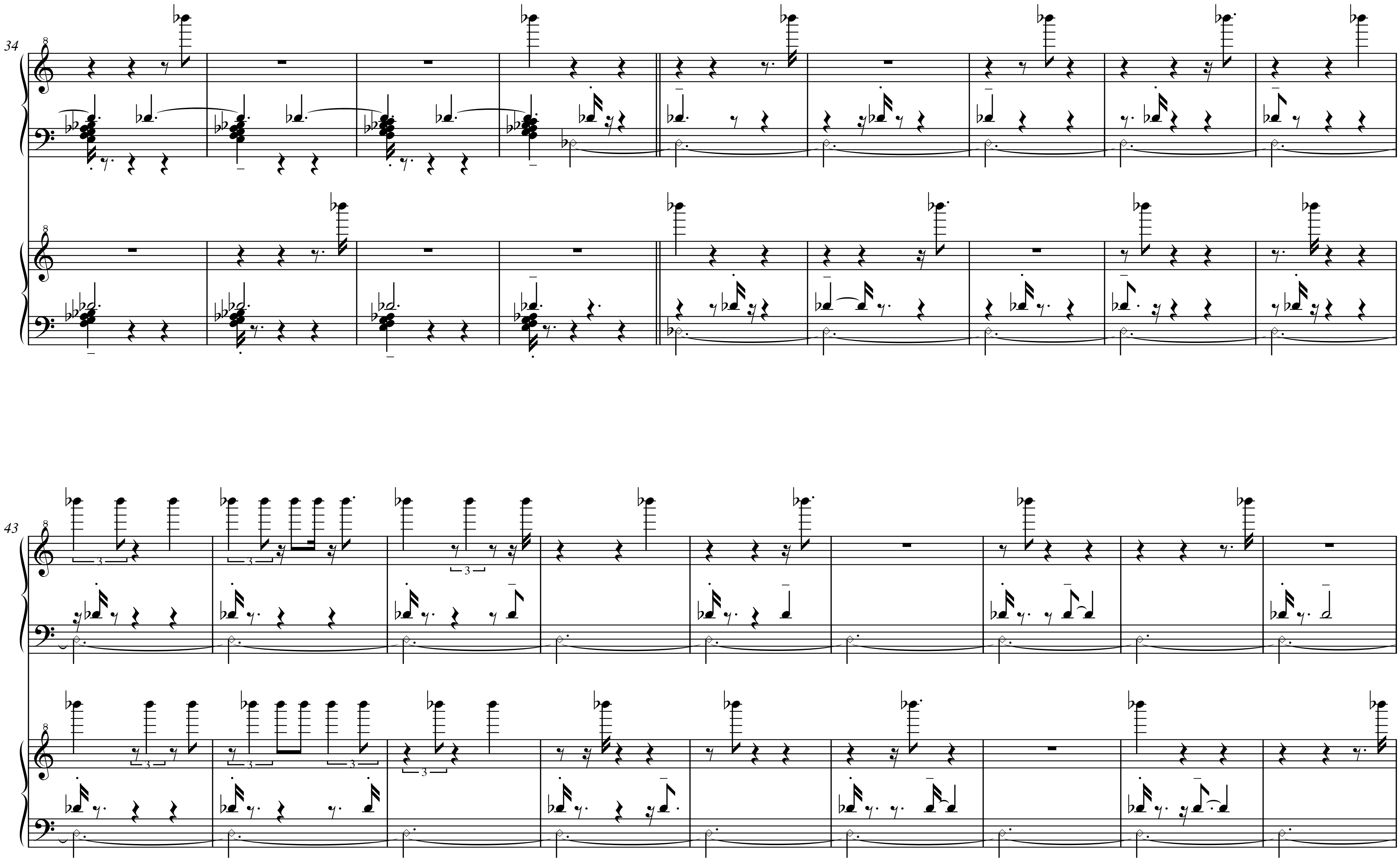



47
dripping water
pp
processed church-bells
ff
ff
ff
62
ff
ff
76
tone gradually stats to pulsate
ff
ff

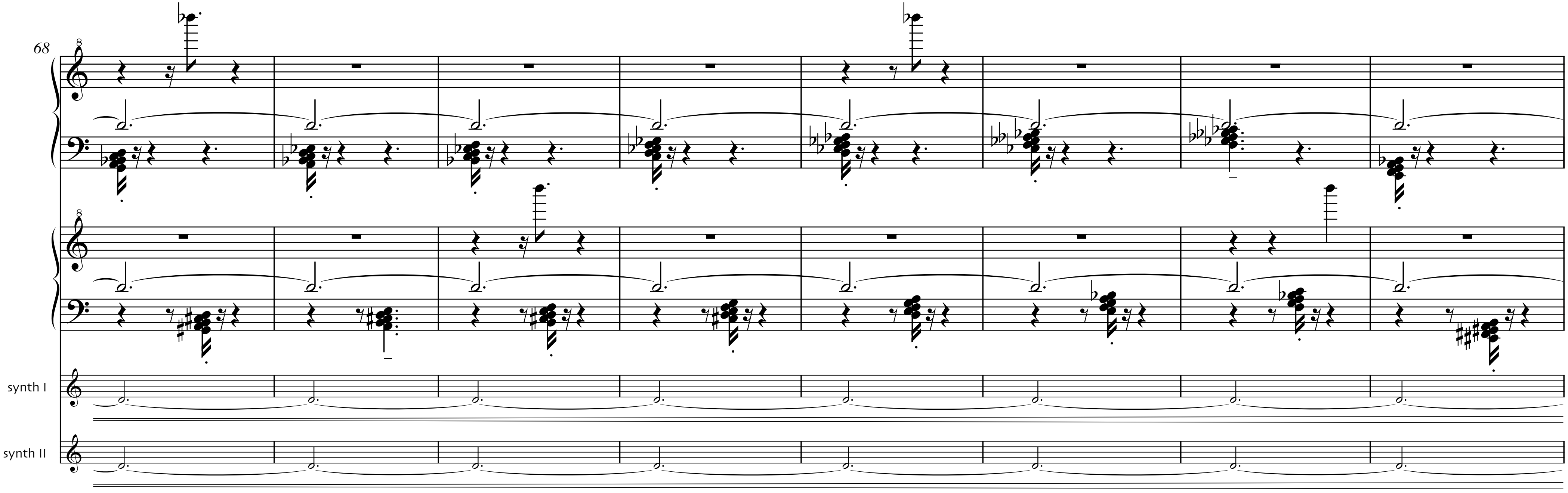
2) "Wheel"


♩ = 146
f
m.1-36: use 3rd pedal in order to sustain the middle c-sharp/d-flat more easily
♩ = 146
f
m.1-36: use 3rd pedal in order to sustain the middle c-sharp/d-flat more easily
9


17
25


34
43


52
synth I
synth II
60
synth I
synth II


68
synth I
synth II


76
synth I
synth II


84
synth I
pp
synth II
pp
93
synth I
synth II


101
synth I
synth II
109


117
f
f
125


131
138


145
154
synth I
synth II

160
synth I
synth II
165
synth I
synth II


171
synth I
synth II
179
p
synth I
synth II


187
strum the notes with a plectrum along with a larger area of
(dampened) strings around and in between the ringing ones
sim.
195
(ord.)
(ord.)
strum the notes with a plectrum along with a larger area of
(dampened) strings around and in between the ringing ones
sim.
synth II


203
come prima
sim.
(ord.)
p
(ord.)
synth I
synth II
p
211
(ord.)
(ord.)
p
come prima
sim.
f
synth I
synth II


219
legato
p
synth I
synth II
227
secco
legato
p
synth I
synth II

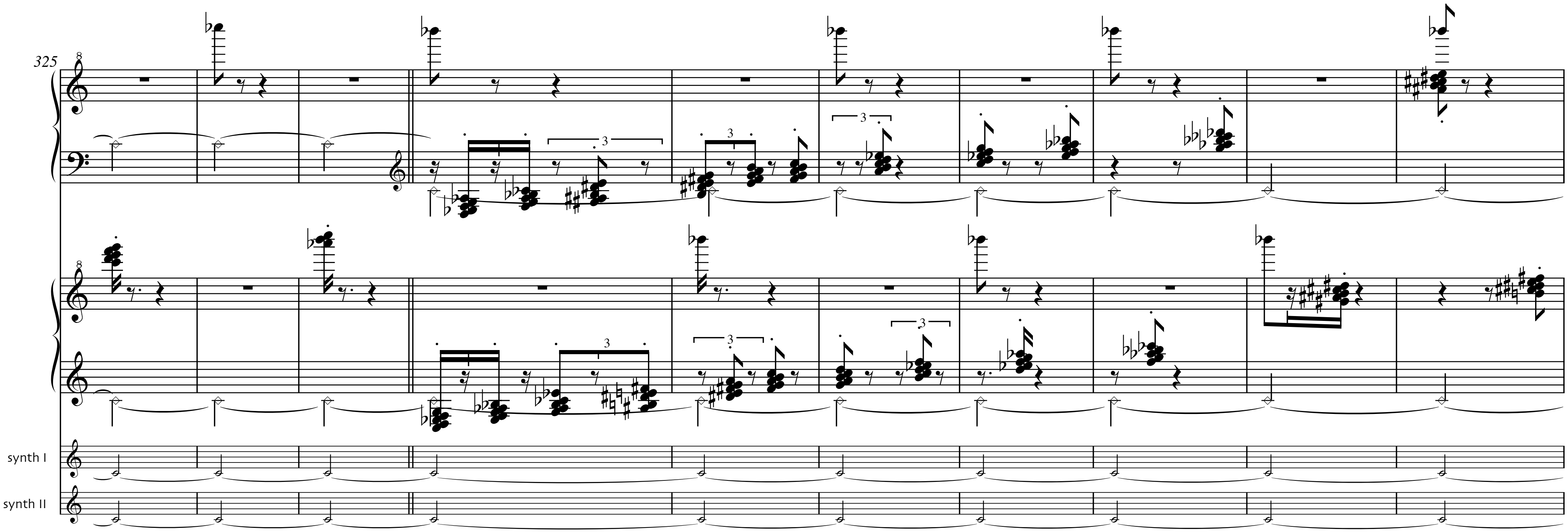

233
8
p
synth I
synth II
239
synth I
synth II

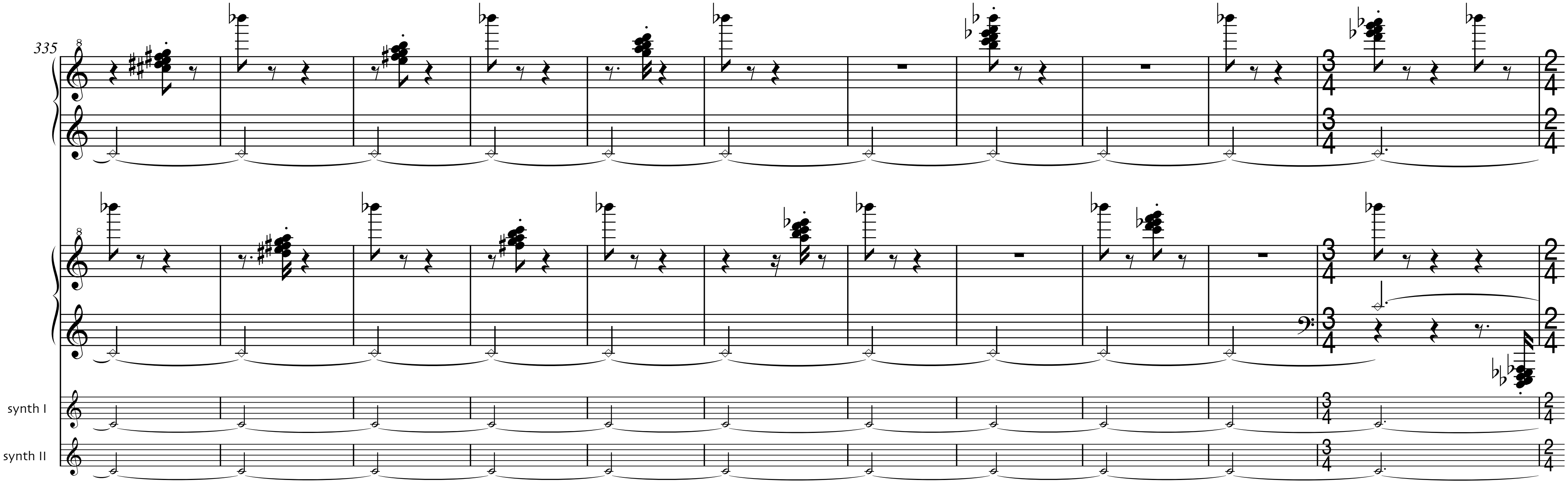
246
synth I
synth II
253
synth I
synth II


261
synth I
synth II
273
synth I
synth II


283
f
f
293


304
synth I
synth II
314
synth I
pp
synth II
pp


325
synth I
synth II

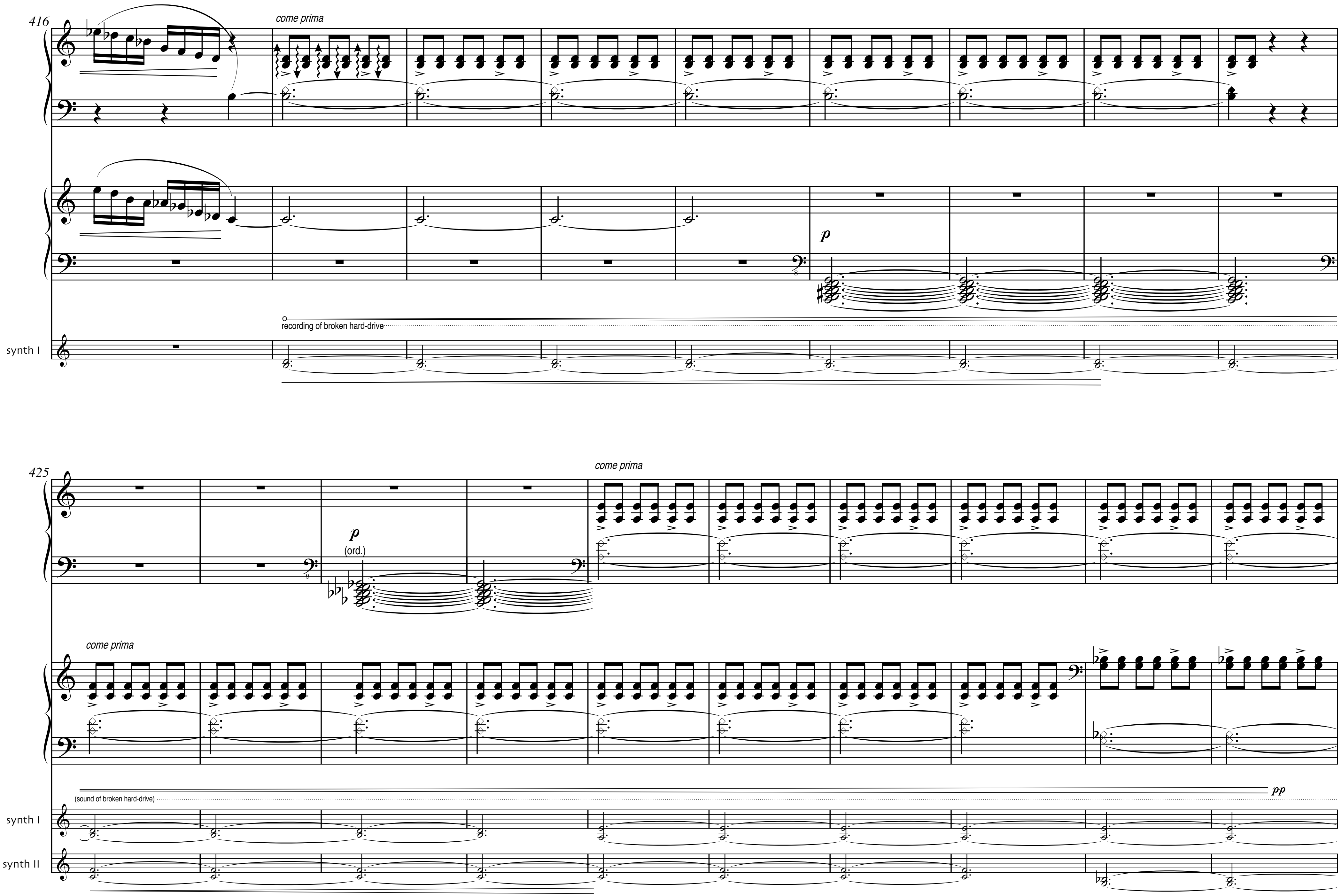

335
synth I
synth II


346
synth I
synth II
355
synth I
synth II


362
synth I
synth II
369
synth I
synth II


379
synth I
synth II
387
p
f
f
p
f
strum the notes with a plectrum along with a larger area of (dampened) strings around and in between the ringing ones
sim.


395
strum the notes with a plectrum along with a larger area of
(dampened) strings around and in between the ringing ones
sim.
406
come prima
(ord.)
come prima
(ord.)


416
come prima
recording of broken hard-drive
synth I
p
425
come prima
p
(ord.)
come prima
(sound of broken hard-drive)
pp
synth I
synth II


435
(ord.)
(ord.)
(sound of broken hard-drive)
synth I
synth II
444
come prima
(sound of broken hard-drive)
synth I
synth II


454
come prima
come prima
(ord.)
p
(sound of broken hard-drive)
synth I
synth II
463
come prima
(ord.)
p
come prima
(ord.)
p
(sound of broken hard-drive)
synth I
synth II


473
come prima
(ord.)
p
(ord.)
p
(sound of broken hard-drive)
synth I
synth II
482
ff
ff
come prima
mf sub.
(sound of broken hard-drive)
synth I
synth II


490
pp
come prima
pp
(sound of broken hard-drive)
synth I
synth II
499
come prima
(sound of broken hard-drive)
synth I
synth II


507
come prima
(sound of broken hard-drive)
synth I
synth II
516
come prima
(sound of broken hard-drive)
synth I
synth II

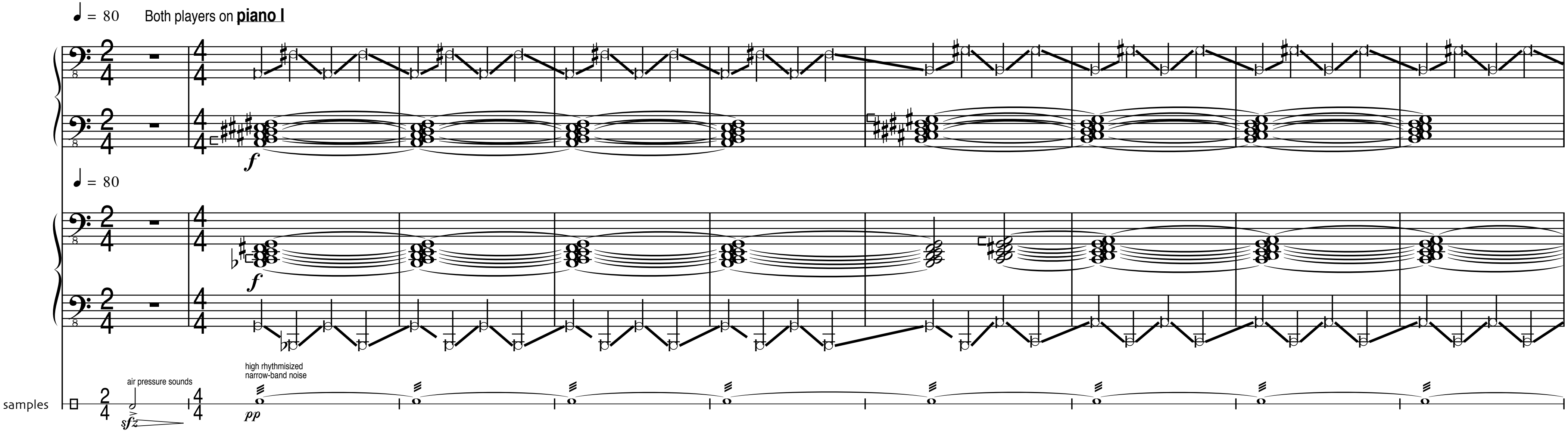

525
come prima
(sound of broken hard-drive)
synth I
synth II
533
come prima
(sound of broken hard-drive)
synth I
synth II

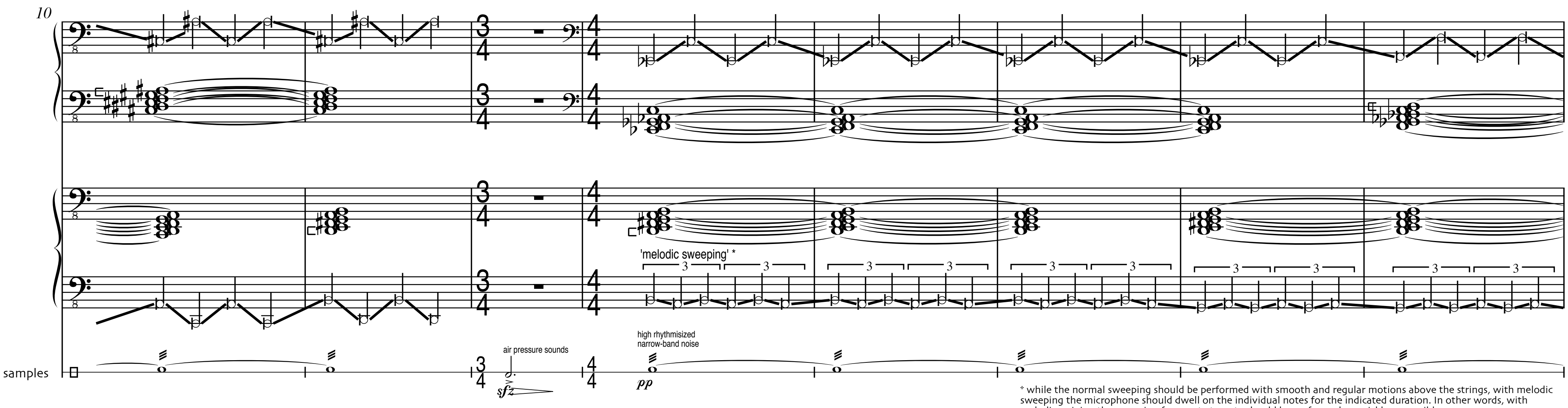
3) Interludium #1

electronic music from playback
the notation is simplified

36
pulsating sound
processed temple-bell
49
62
75

4) "Wing"

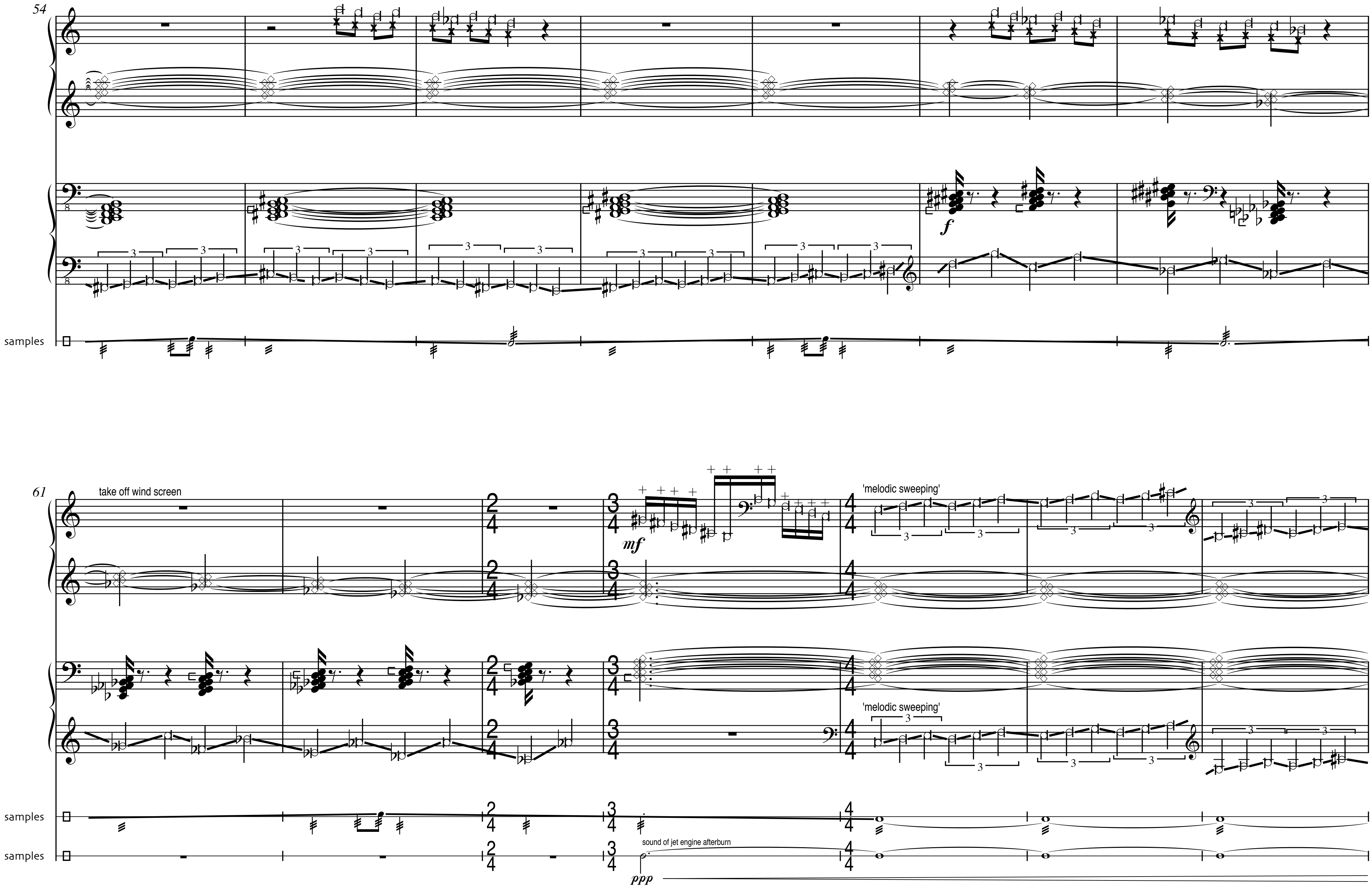




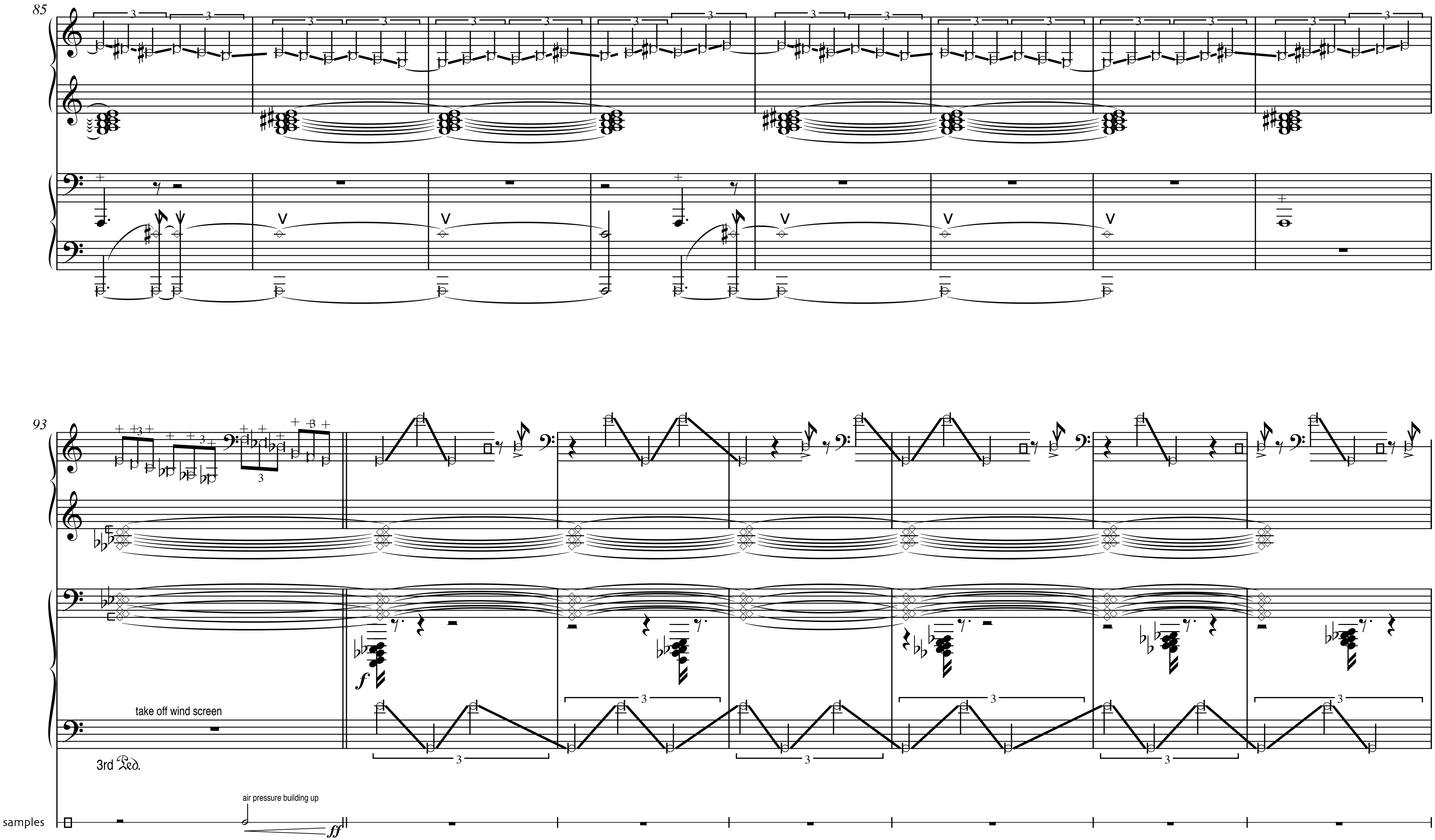
* while the normal sweeping should be performed with smooth and regular motions above the strings, with melodic sweeping the microphone should dwell on the individual notes for the indicated duration. In other words, with melodic swiping the sweeping from note to note should be performed as quickly as possible.


18
hit bridge of the piano with the microphone
making the silently pressed chord resonate
samples
lower air-pressure sound
27
samples
air pressure sounds
sffz psub.
ppsub.

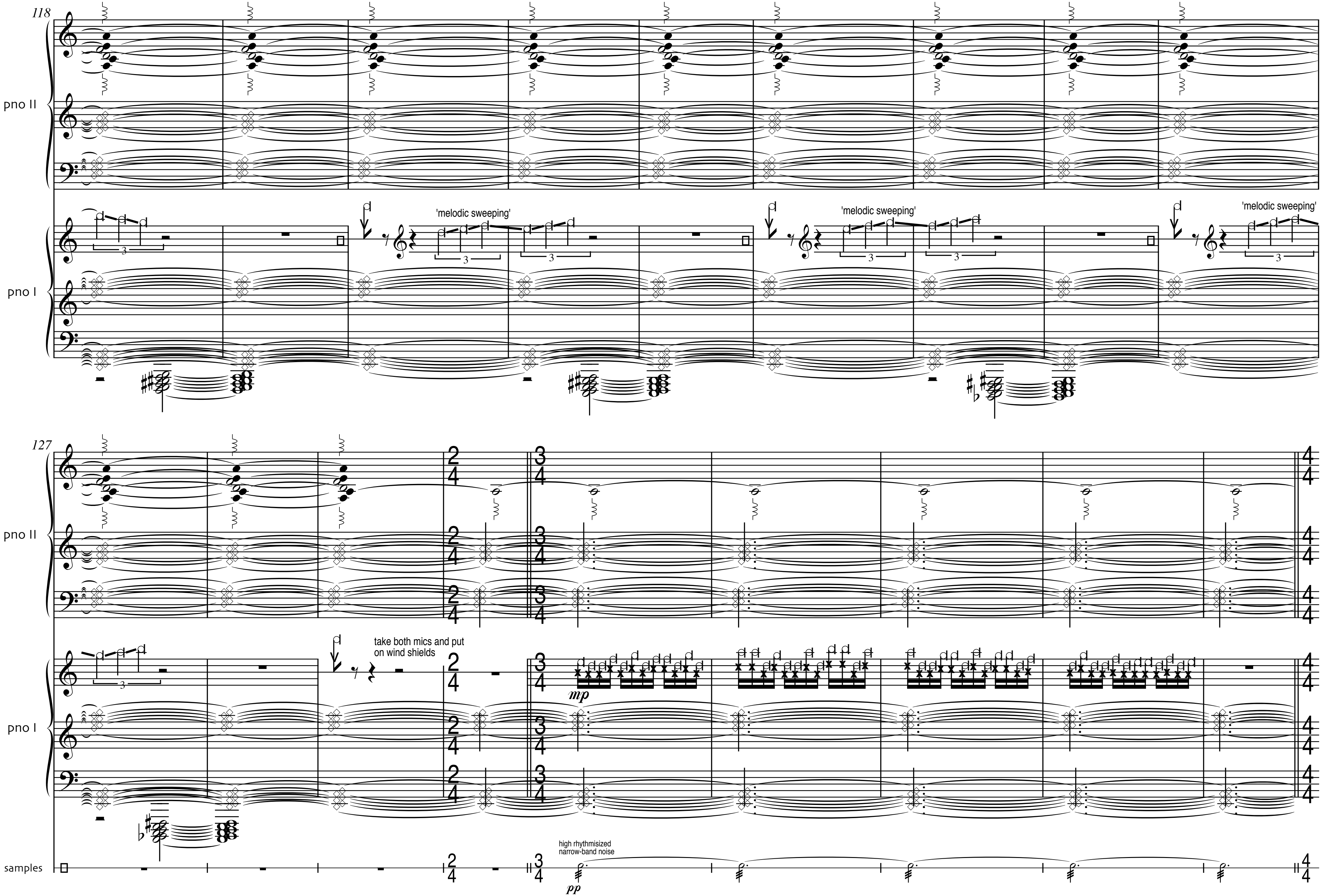
37
samples
46
put wind screen on microphone
strike with a slightly sideward motion the microphone
with the wind-screen on the designated strings
mf
mp
f
'melodic sweeping'
high rhythmisized
narrow-band noise
pp

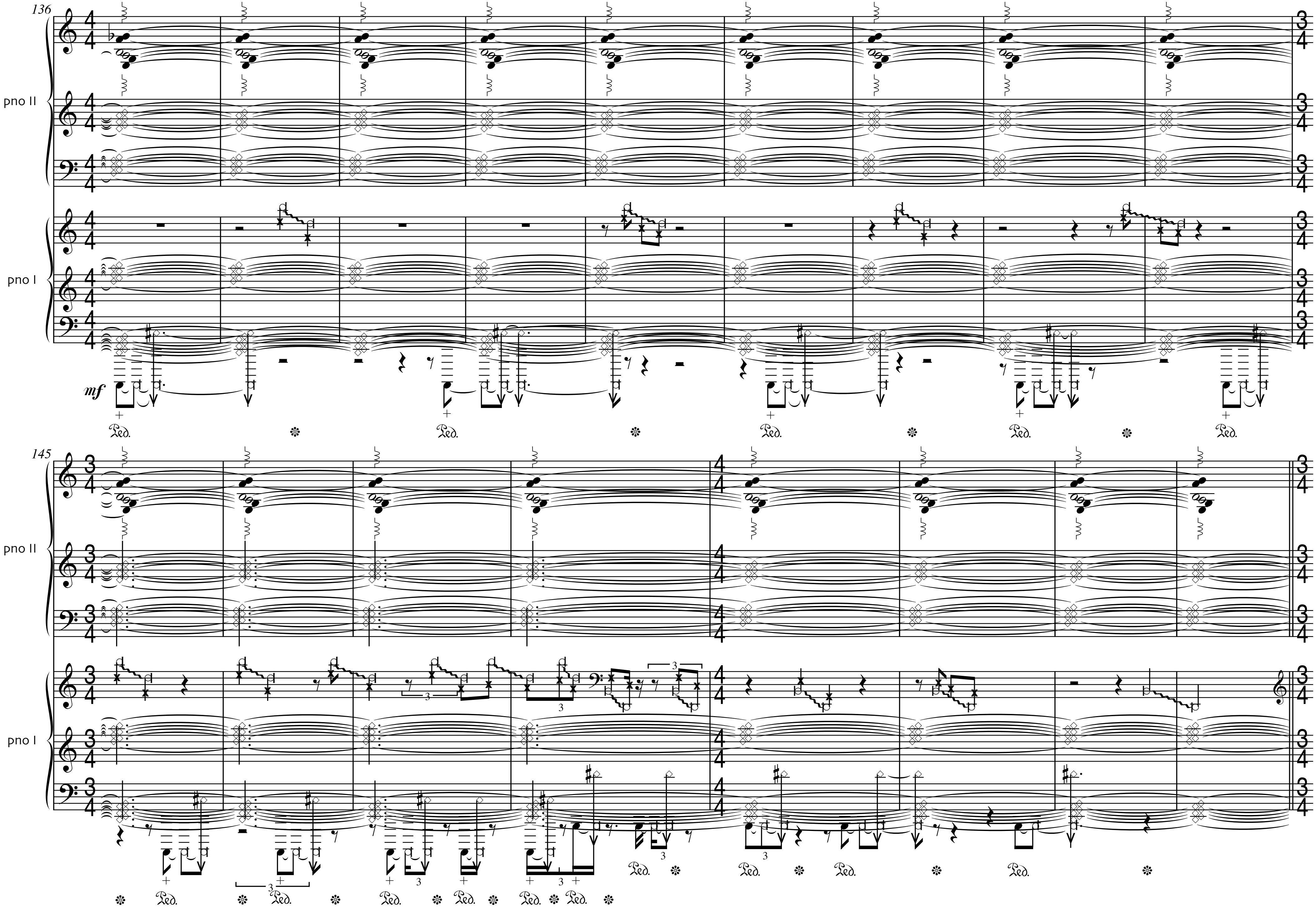

54
samples
61
take off wind screen
'melodic sweeping'
'melodic sweeping'
samples
samples
sound of jet engine afterburn

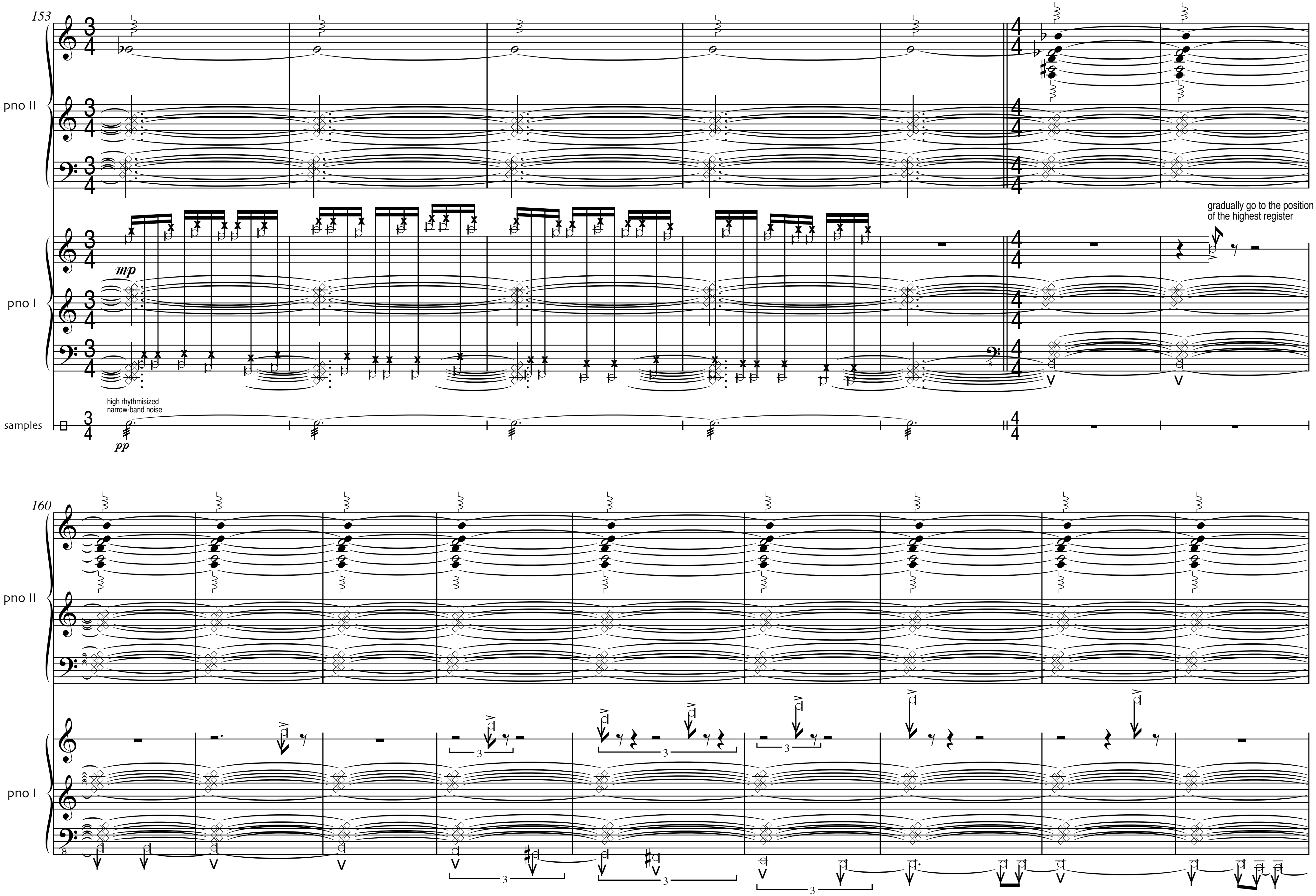
68
'melodic sweeping'
mp
put wind screen on microphone
pluck the string, then dampen it with the microphone so that a harmonic
(preferably – although not necessarily – the designated one) results
mf
samples
air exhaust
mf
samples
ffff
77


85
93
take off wind screen
3rd Ped.
air pressure building up
ff
f
samples


100
gradually go to the position of the highest register
pass the microphone to the other player, set and fix the next chord in the 3rd pedal and walk to **piano II**
dead strokes on the string with the microphone. Start close to the dampers and gradually go deeper into the instrument.
reach as far into the intrument as possible and slowly and regularly scratch with the microphone along the a-string by pulling it towards you. Produce a rattling noise.
3rd Ped.
samples
high rhythmisized narrow-band noise
pp
108
Take one pickup in each hand and hold them above the designated strings so that a feedback results at the corresponding frequency. Pluck the strings with the pickup ad lib. to facilitate the response. The hollow notes are designating the main pitches to be used for the feedbacks, the filled notes are designating secondary notes. Play with the different possible intervalls. Play with dynamics and colorations ad lib..
pno II
elbows
ff
3rd Ped.
r.h.: take mic from other player
scratch with it on the portions of the string between the string-holder and the bridge. Extend the glissando until you reach the first beam of the frame construction.
'melodic sweeping'
l.h.: put down mic.
pno I
ff
samples
low air pressure release
fff


118
pno II
'melodic sweeping'
'melodic sweeping'
'melodic sweeping'
pno I
127
pno II
take both mics and put
on wind shields
mp
pno I
high rhythmisized
narrow-band noise
pp
samples


136
pno II
pno I
mf
Ped.
145
pno II
pno I
Ped.


153
pno II
mp
pno I
gradually go to the position
of the highest register
high rhythmisized
narrow-band noise
samples
pp
160
pno II
pno I

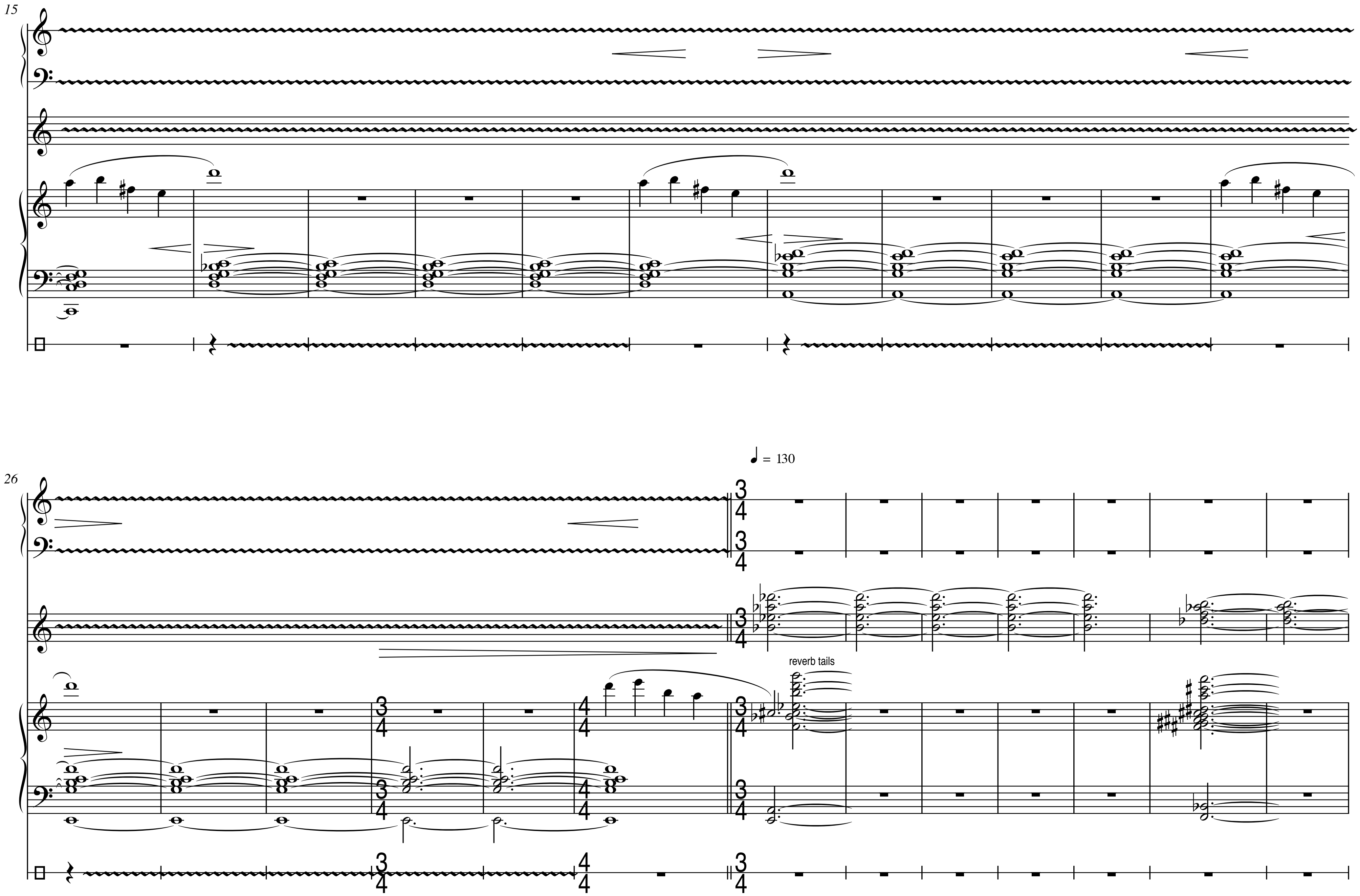

169
pno II
pno I
samples
mp
high rhythmisized
narrow-band noise
reach as far into the intrument as possible and slowly and regularly scratch with
the microphone along the a-string by pulling it towards you. Produce a rattling noise.
pp
turn the pickups so that they are in 90˚ to the strings
and slide them accross. The notation with the different
clefs merely diesignates different registers, not exact pitches.
177
pno II
mp
mp
pno I
samples

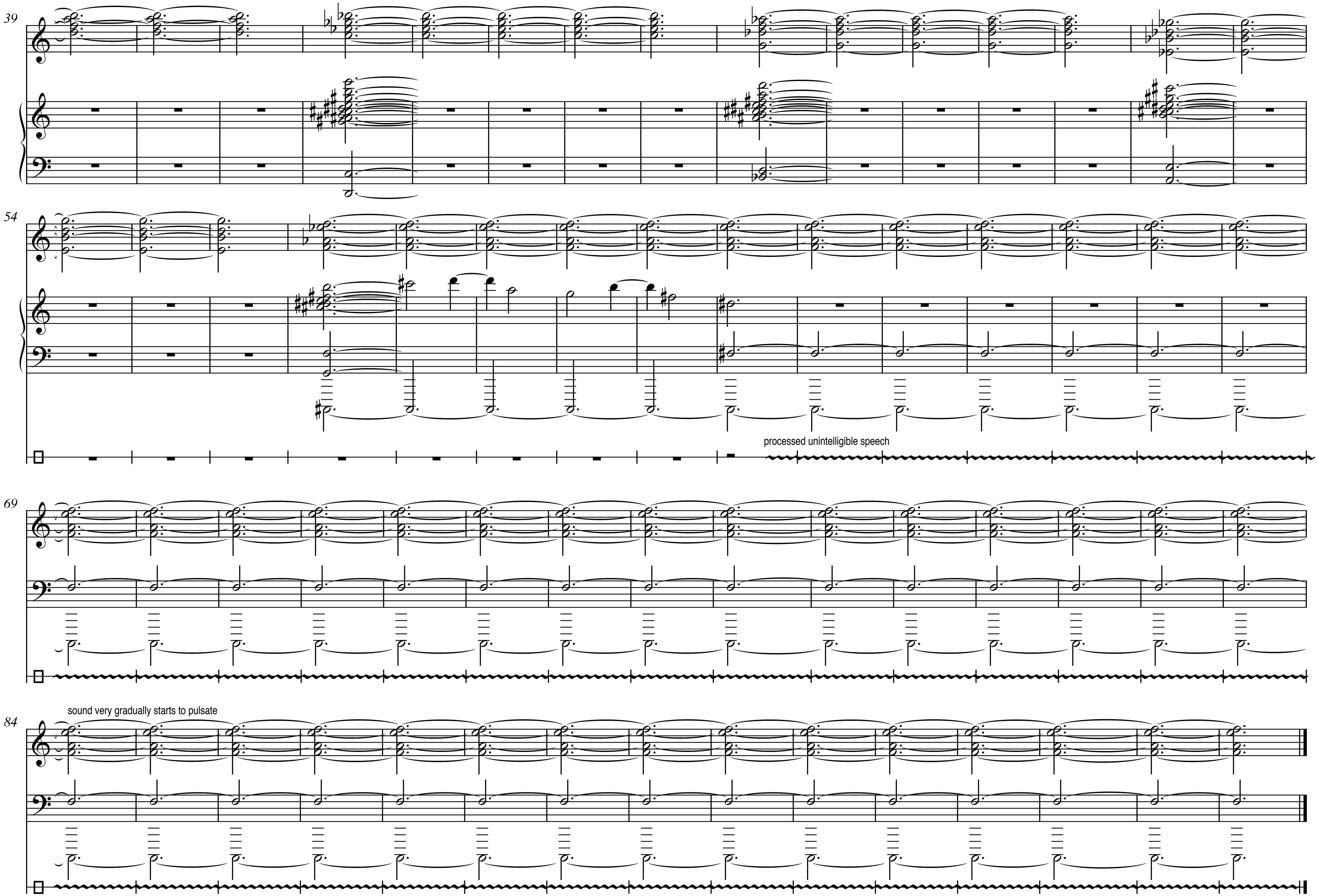

185
pno II
pno I
samples
from m. 192 on pno I and II are only roughly synchronized
192
pno II
pno I


199
pno II
3rd Ped.
f
pno I
synth II
tone gradually stats to pulsate
pp
205
turn the pickups so that they are in 90˚ to the strings and slide them accross.
continue until Interlude #2 starts
scratch with the microphone on the portions of the string between the string-holder and the bridge. Extend the glissando until you reach the first beam of the frame construction.
continue until Interlude #2 starts
samples
sound of jet engine afterburn
ppp
fff

5) Interludium #2

electronic music from playback
the notation is simplified


15
26
♩ = 130
reverb tails

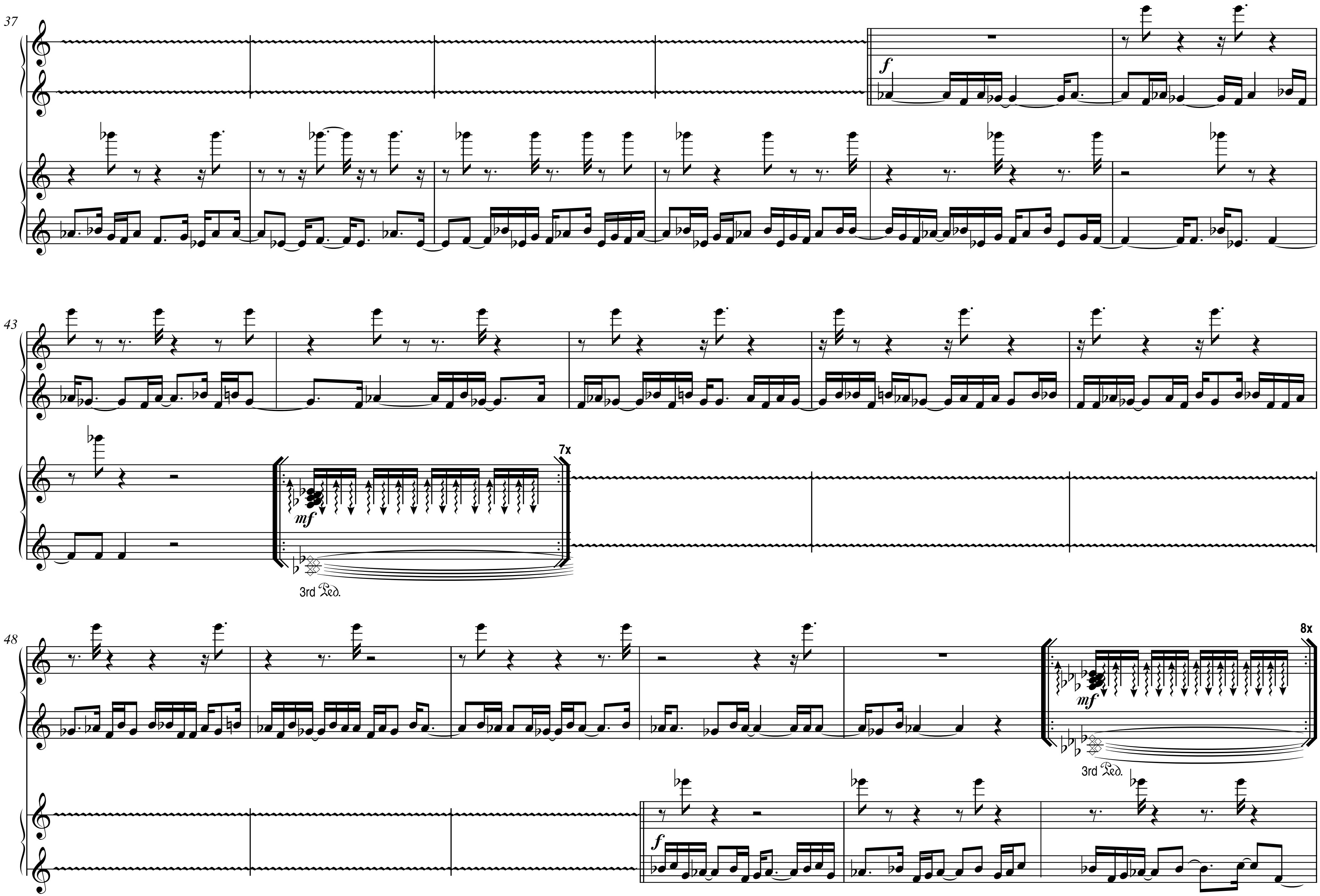

39
54
processed unintelligible speech
69
sound very gradually starts to pulsate
84

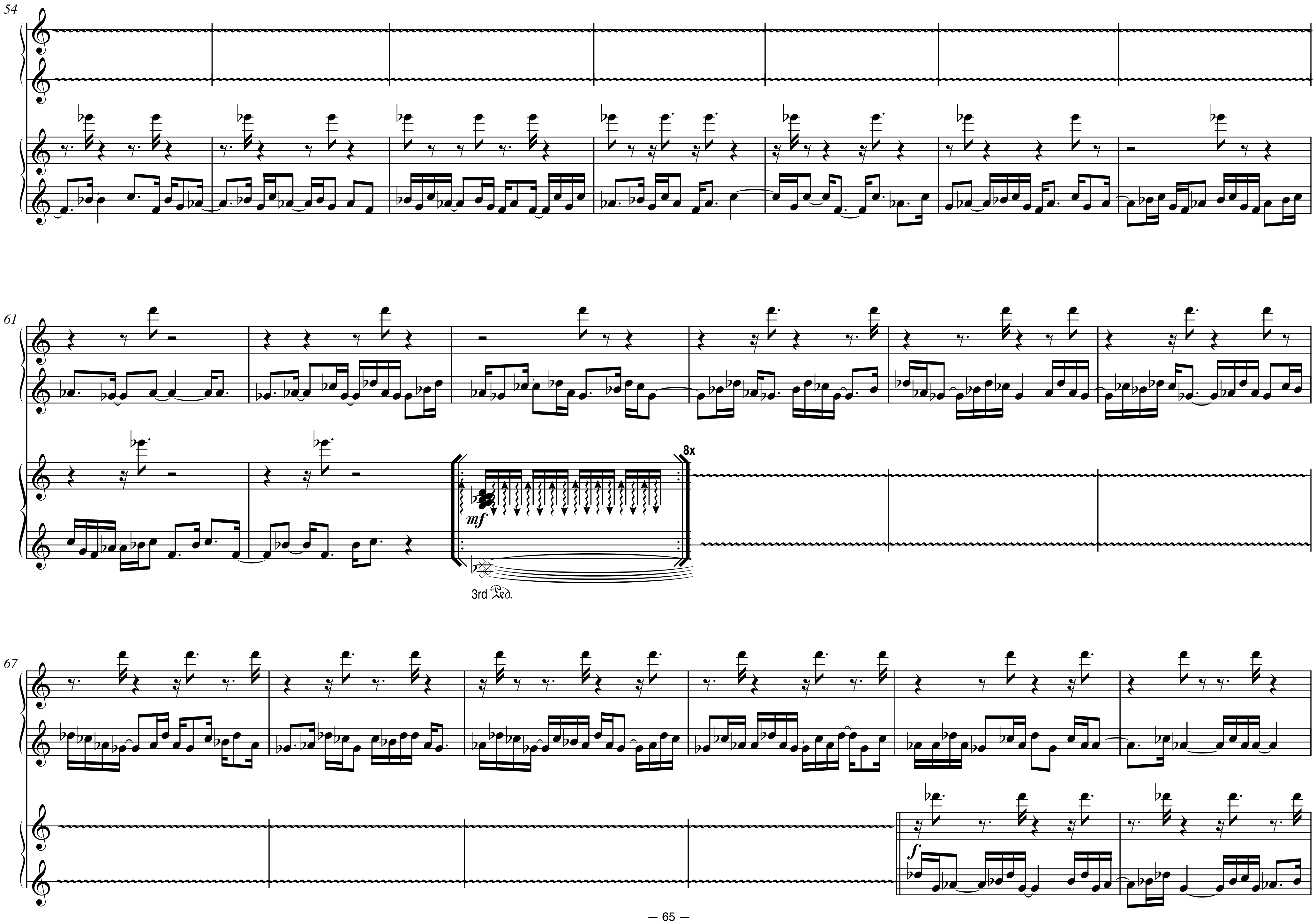
6) "Prow"

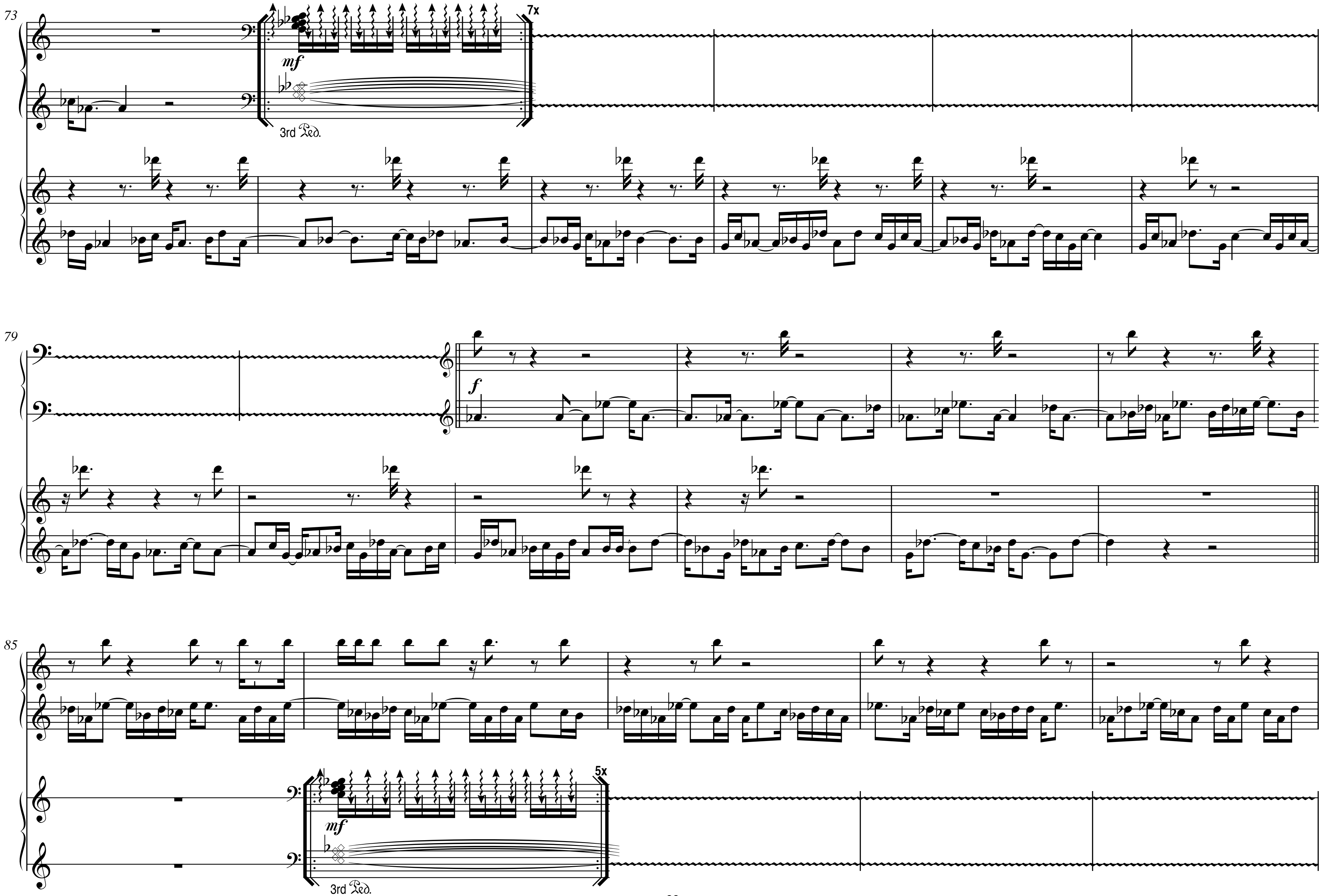
during this entire section, piano 1 and 2 are only roughly synchronized.

Pno. I: dampen the highest c of the instrument with rubber wedges – the kind that is usually used by piano tuners.
The desired sound is a reltively bright, pitchless, percussive sound.


19
9x
3rd Ped.
25
31
lunga
lunga
lunga
lunga
5x
3rd Ped.


37
43
48
7x
8x
3rd Ped.
3rd Ped.


54
61
8x
mf
3rd Ped.
67
f

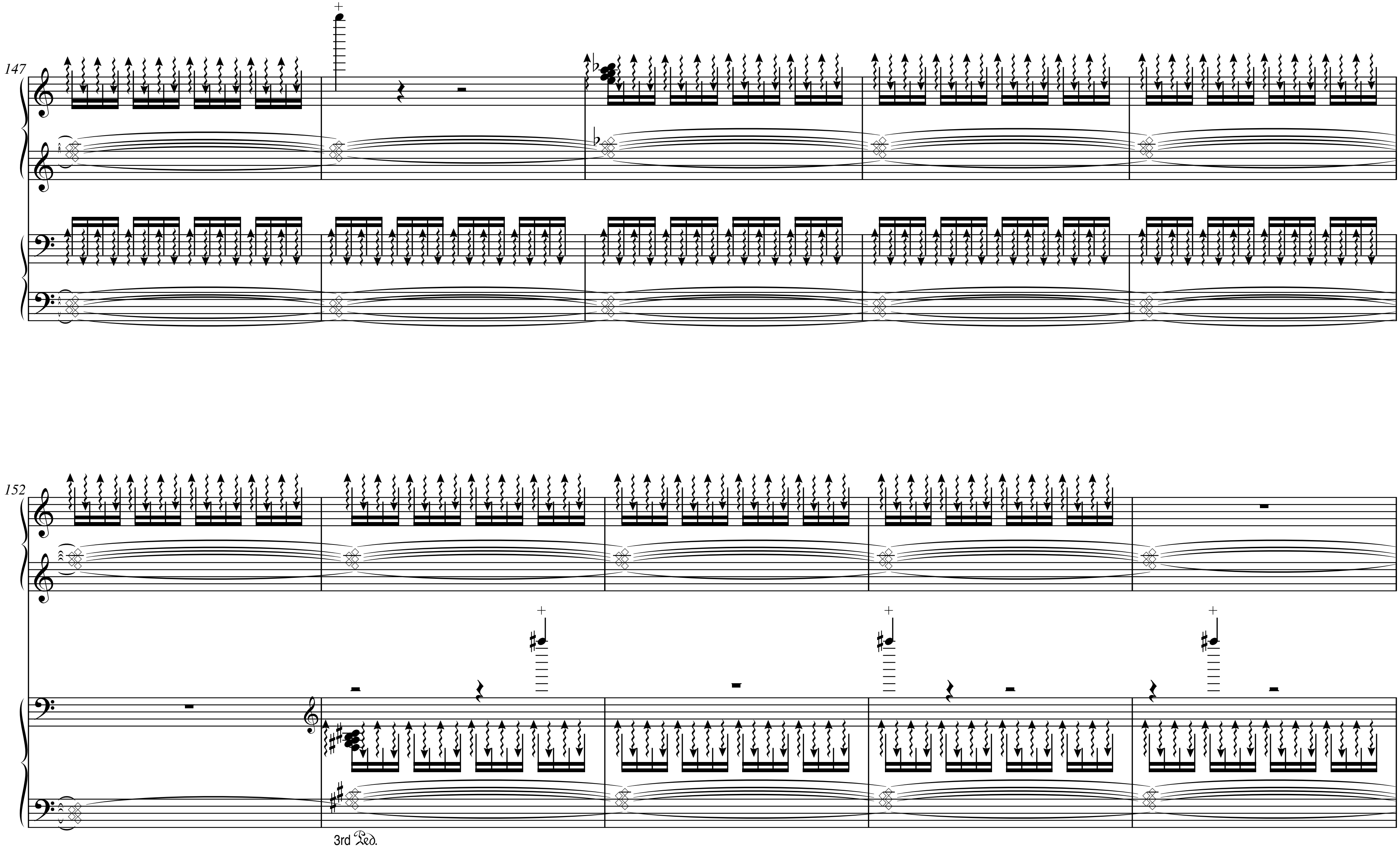


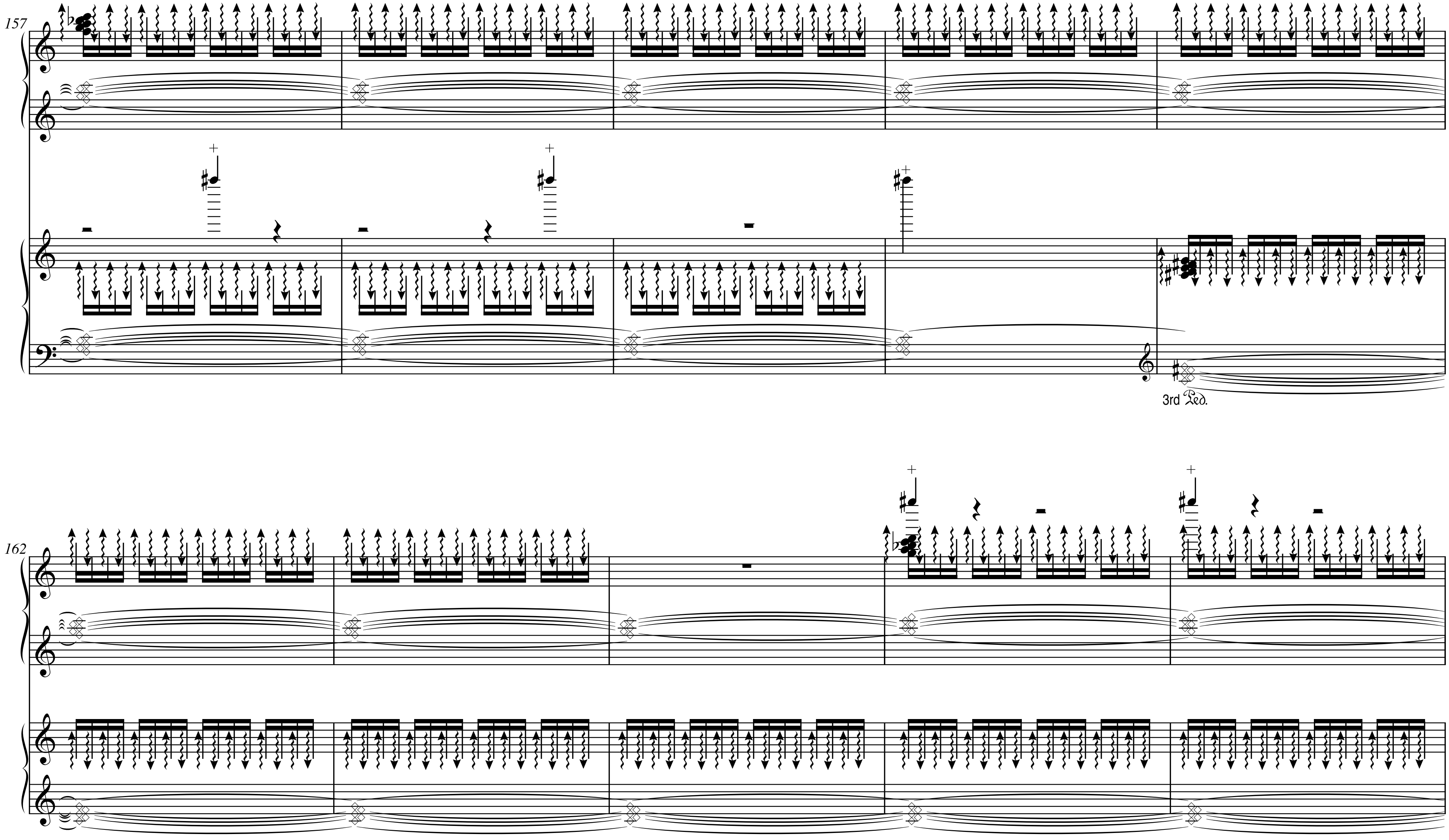
73
7x
mf
3rd Ped.
79
f
85
5x
mf
3rd Ped.

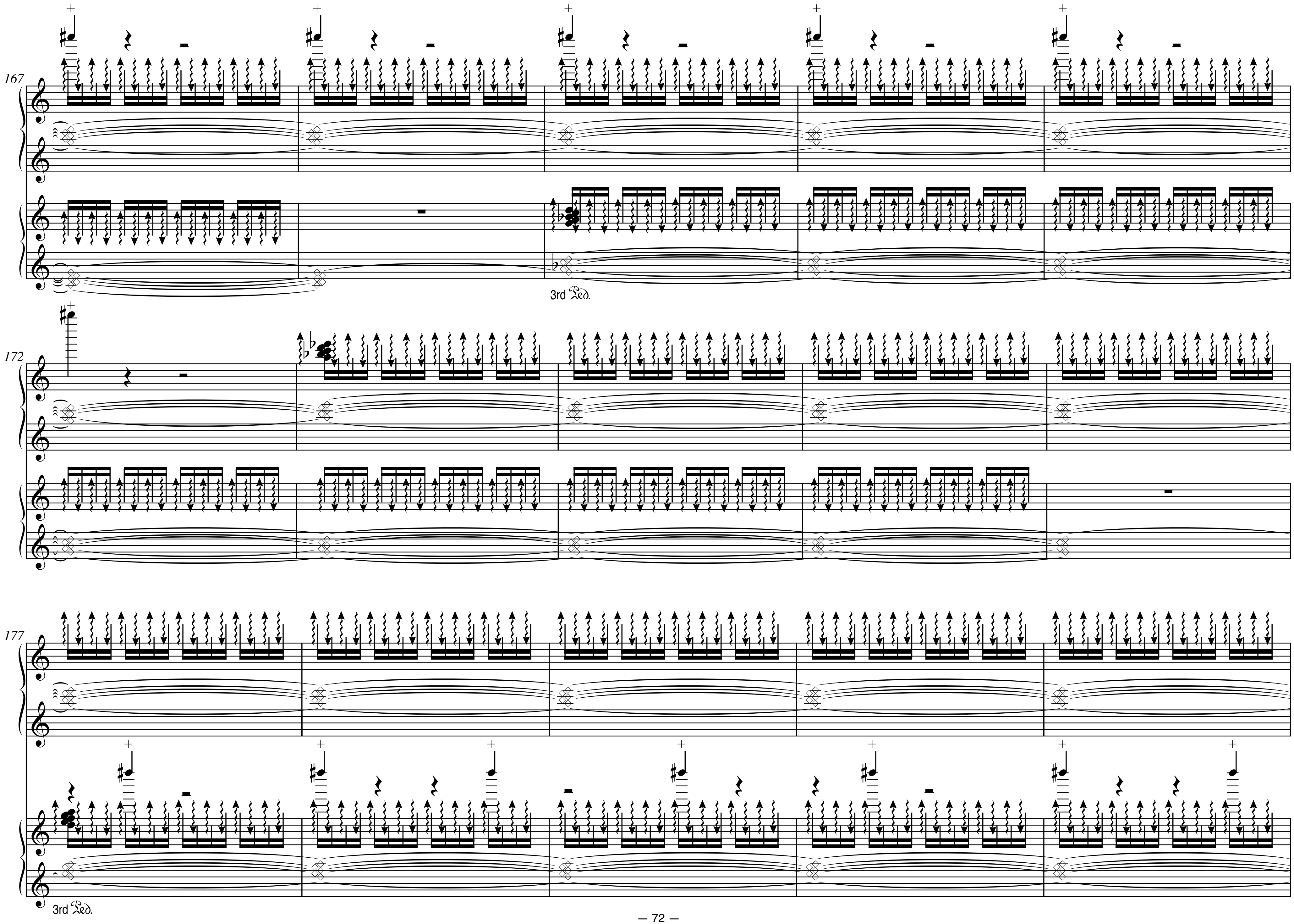

90
96
2x
mf
3rd Ped.
f
102


108
8x
mf
3rd Ped.
114
121
f


127
3x
mf
3rd Ped.
f
133
140
mf
3rd Ped.
mf
3rd Ped.


147
152
3rd Ped.


157
3rd Ped.
162


167
3rd Ped.
172
177
3rd Ped.


182
mp
p
Ped.
187
= 97.5
pp
194
mp
p
pp

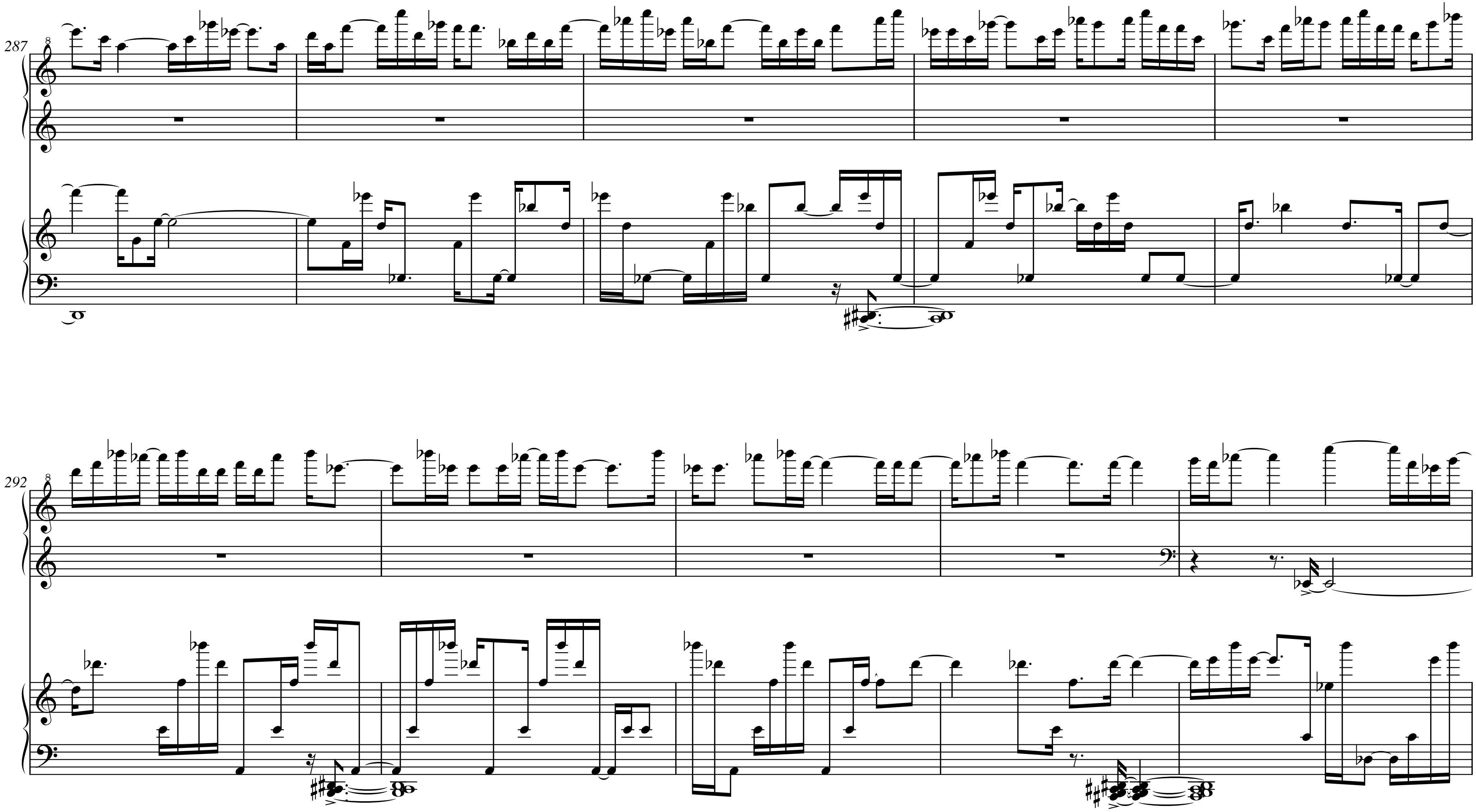

202
pp
210
mp
p
pp
217
pp


223
pp
228
234
p
mp


241
247
252
lunga
= 130
mf
f


259
264
lunga
lunga
lunga
lunga
270
f
f


275
280
lunga
lunga
lunga
lunga

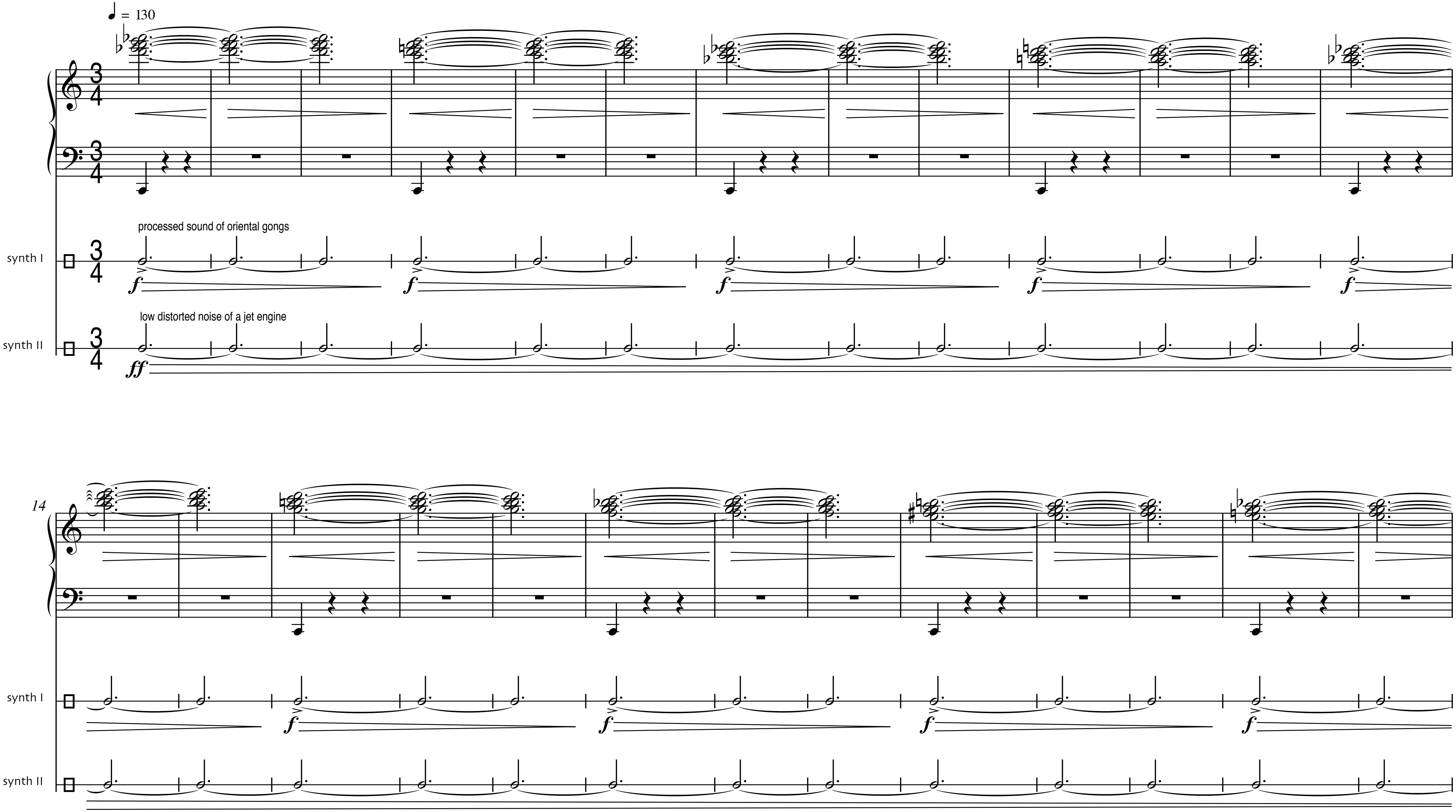

287
292


297
302
8va
8va
8va
8va


307
8va
8va
8va
312
lunga
lunga
lunga
lunga

7) Postludium

electronic music from playback
the notation is simplified



Amsterdam/Los Angeles 2009

Planetary Runway

Audiovisual installation for 8 loudspeakers and 8 diodes, placed along a straight line of at least 25 meters

A pulse sound is played through 8 loudspeakers that are placed on a straight line of at least 25 meters (longer distances are preferred). Next to each loudspeaker is an LED diode. The distance between the individual speakers/ diodes is:

speaker/ diode	1 to 2:	4.25	meters
speaker/ diode	2 to 3:	2.13	meters
speaker/ diode	3 to 4:	3.72	meters
speaker/ diode	4 to 5:	3.19	meters
speaker/ diode	5 to 6:	4.79	meters
speaker/ diode	6 to 7:	4.26	meters
speaker/ diode	7 to 8:	2.66	meters

If more space is available for the installation, the distances can be multiplied by the same factor.

The pulse sound has to be delayed to the speakers 1 to 7 so that the sound arrives precisely at the same time at the position of speaker 1. The delays are necessary in order to compensate for the times that the sound takes to travel the distances. At a room temperature of 20°C, the delay times for the individual speakers have to be:

speaker/ diode	1:	85.8	ms
speaker/ diode	2:	71.2	ms
speaker/ diode	3:	63.8	ms
speaker/ diode	4:	51.1	ms
speaker/ diode	5:	40.1	ms
speaker/ diode	6:	23.7	ms
speaker/ diode	7:	9.1	ms
speaker/ diode	8:	0.0	ms

The diodes are flashing at exactly the same times when the pulse arrives at the corresponding speaker.
If bigger distances are used between the speakers/flashlights, the delay times have to be adjusted accordingly.

The desired effect is that when somebody is standing at the position of the first speaker, all pulses are heard in perfect synchronization. Since the diodes are flashing up exactly in synch with the emission of the pulses at the individual speakers, the visual impulses will not correspond with the aural impression. When the person moves in between the speakers, the impulses get out of synch and start to form microrhythmic patters, that change with the position of the person. At the same time, it becomes evident that each speaker is in fact synchronised with the corresponding diode. However, the lights will always run in slightly irregular intervals from the first to the eighth lamp, while the perception of the pulses keeps changing.

Marko Ciciliani, December 25, 2009
Pforzheim/Germany