

Composing Spinoza's *Ethics*: Charting a Migration of Spirit Through Sound

Dániel Péter Biró and Peter Van Kranenburg

Abstract. Since 2017, Dániel Péter Biró has been working on a series of works based on philosophical texts by Baruch Spinoza (1632–1677). This series of works explores historical dichotomies of religion and philosophy from perspectives of modern-day globalized existence, looking into historical and contemporary concepts of spirit and mind. In this paper, the authors discuss how this compositional work has been informed by research in the field of computational ethnomusicology.

In the fall of 2011, Dániel Péter Biró was Visiting Professor in the Department of Computing and Information Sciences of Utrecht University, Netherlands where he worked with Peter van Kranenburg on the Tunes and Tales Project, supported by the Government of the Netherlands, which focused on the study and transcription of various Dutch oral traditions. During this time, the authors worked with a group of musicologists and computer scientists at the University of Utrecht and Meertens Institute in Amsterdam, recording and transcribing examples of Jewish and Islamic chant as practiced in the Netherlands. Using advanced computer technologies for musical analysis and transcription, the team set out to chart historical developments of these chant traditions within these communities and beyond. This computational ethnomusicology research is ongoing.

Living in The Hague, Dániel Péter Biró found an apartment just down the street from the burial site of Baruch (Benedict) Spinoza. Spinoza, while one of the greatest philosophers in the seventeenth century, was banned from the Portuguese Synagogue in Amsterdam because of his views, which proved to be too radical for his time. In his philosophical treatise *Ethics*, Spinoza attempted to present a new type of theology, one that was autonomous from organized religion, such as that of his own Portuguese Jewish community and of the dominant Calvinist doctrine of the Netherlands.

The current composition cycle of Dániel Péter Biró, initiated with a Guggenheim Fellowship, explores Spinoza's philosophy of the mind while considering the historical dilemma of a 17th century Jewish immigrant in the Netherlands from a modern-day perspective. Following this historical trajectory, the composition cycle integrates phonetic aspects of Spinoza's text with melodic material derived from Portuguese plainchant from the time of the Jewish expulsion, Torah trope from the Portuguese synagogue in Amsterdam, and Indonesian Qur'an recitation. Integrating elements of these chant traditions from Dutch immigrant communities of the past and present into the composition cycle, the composer explores the continuing relevancy and complexity of Spinoza's Enlightenment project and its relationship to chant practices in the Netherlands of yesterday and today. While Spinoza dealt with problems of persecution, immigration, assimilation, and tradition in a society dominated by Calvinist thought, these very issues become creatively engaged in his *Ethics*, as the work transgresses the boundaries of contemporary religious doctrine. The authors discuss how the composition cycle deals with these issues, touching on present-day issues of migration and the changing recitation traditions within the context of the globalized Netherlands of today.

Since 2017, Dániel Péter Biró has been working on a series of compositions based on philosophical texts by Baruch Spinoza (1632–1677). These works explore historical dichotomies of religion and philosophy from perspectives of modern-day globalized existence, looking into historical and contemporary concepts of spirit and mind. In the following paper, we will discuss how this compositional work has been informed by research in the field of computational ethnomusicology and how this research was integrated into the composition cycle.

Background

In the fall of 2011, Dániel Péter Biró was Visiting Professor in the Department of Computing and Information Sciences of Utrecht University, Netherlands where he worked on the *Tunes and Tales* Project, supported by the Government of the Netherlands.¹ This project focused on the study and transcription of various Dutch oral traditions. During this time, he recorded and transcribed examples of Jewish and Islamic chant as practiced in the Netherlands, working with Peter Van Kranenburg as well as a group of musicologists and computer scientists at the Utrecht University, the Meertens Institute in Amsterdam, and the University of Victoria. Using advanced computer technologies for musical analysis and transcription, the team set out to chart historical developments of these chant traditions within these communities and beyond. This computational ethnomusicology research is ongoing.²

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The current composition cycle, which was initiated with Dániel Péter Biró receiving a Guggenheim Fellowship,⁵ explores Spinoza's philosophy of the mind from a contemporary vantage point, while considering the historical dilemma of a seventeenth-century Jewish immigrant in the Netherlands. Following this historical trajectory, Dániel Péter Biró's composition cycle inte-

1. See project description on <https://www.ehumanities.nl/computational-humanities/tunes-tales/>.

2. This research was conducted with a team consisting of Dániel Péter Biró, Peter van Kranenburg, George Tzane-takis, Anja Volk, Frans Wiering, and Steven Ness at the University of Victoria, Meertens Institute, and Utrecht University. We are grateful to Nurul Ummah, Nahshon Rodrigues Periera, and Miguel Cohen for their participation and sharing their expertise in the current study.

3. Steven Nadler, *Spinoza: A Life*. Cambridge: Cambridge University Press, 1999.

4. Yitzhak Melamed, *The Metaphysics of Substance and the Metaphysics of Thought in Spinoza*. Dissertation Yale University, 2005.

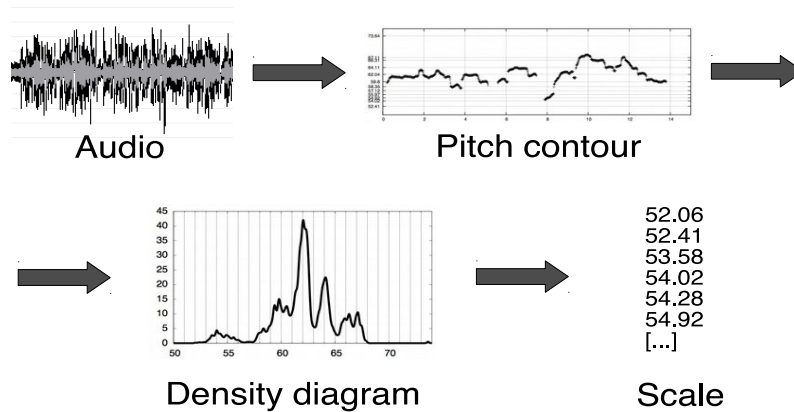
5. See <https://www.gf.org/fellows/all-fellows/daniel-peter-biro/>.

grates phonetic aspects of Spinoza's text with melodic material derived from Portuguese plainchant from the time of the Jewish expulsion, Torah trope from the Portuguese Synagogue in Amsterdam, and Indonesian Qur'an recitation. Integrating elements of these chant traditions from Dutch immigrant communities of the past and present into the composition cycle, the composer explores the continuing relevance and complexity of Spinoza's Enlightenment project and its relationship to chant practices in the Netherlands of yesterday and today. While Spinoza dealt with problems of persecution, immigration, assimilation, and tradition in a society dominated by Calvinist thought, these very issues become creatively engaged in his *Ethics*, as the work transgresses the boundaries of contemporary religious doctrine. Here we discuss how the composition cycle deals with these issues, touching on present-day issues of migration and the changing recitation traditions within the context of the globalized Netherlands of today.

Fieldwork

Within the framework of the *Tunes and Tales* research project, we recorded and analyzed examples of Qur'an Recitation and Torah Trope in the Netherlands. The recordings were put into a database and studied according to a variety of criteria including tuning, melodic contour, melodic range, and scale employment (**Example 1**).⁶ This research was also accompanied by interviews with the reciters about their background, including family history, their religious education, and general questions about their ritual practice.

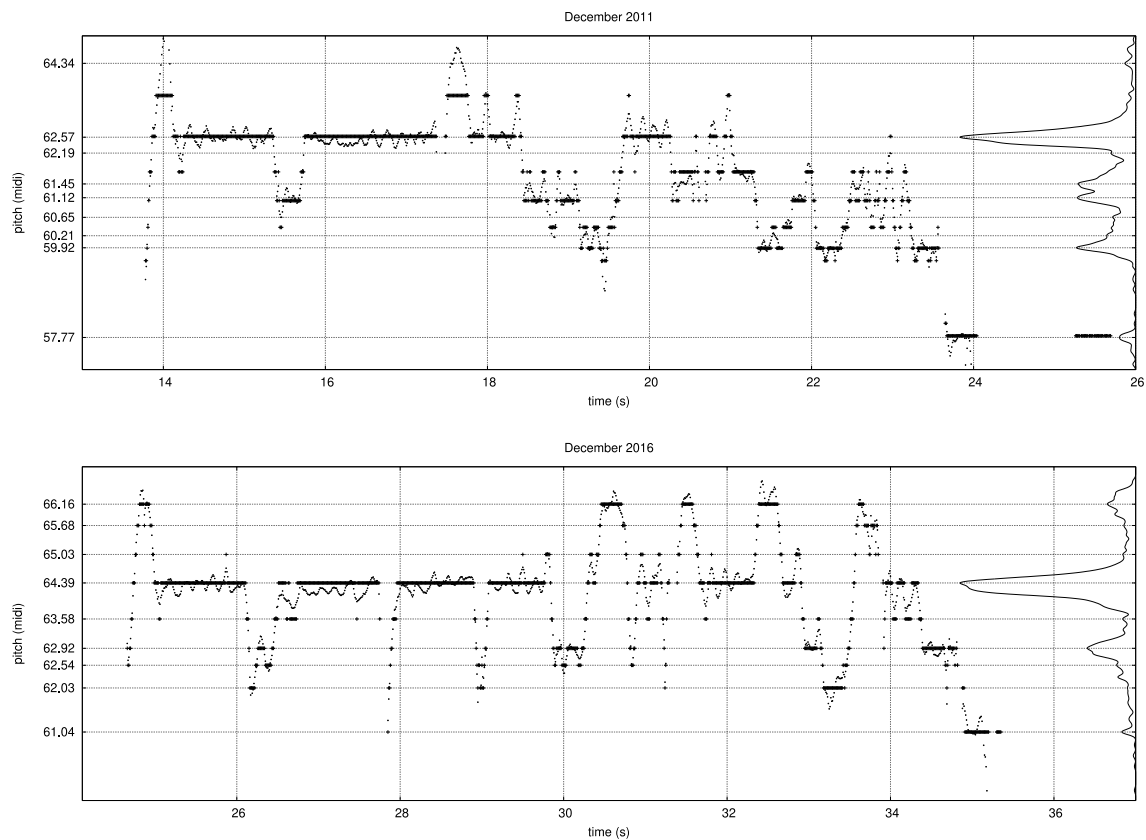
6. Each recording has been segmented in terms of syntactical units (phrases) and analysis has also been based on audio segments corresponding to individual words of a given Qur'an *sura* or Torah *parasha*. Each recording has been converted to a sequence of frequency values using the YIN pitch extraction algorithm (Alain de Cheveigné and Hideki Kawahara, "YIN, a fundamental frequency estimator for speech and music." *The Journal of the Acoustical Society of America* 111/4 [2002]:1917-1930, <https://doi.org/10.1121/1.1458024>) by estimating the fundamental frequency in a series of overlapping time-windows of 40ms, with a hopsize of 10ms. The frequency sequences have been converted to sequences of real-valued MIDI pitches with a precision of approximately 1 cent (which is 1/100 of an equally tempered semitone, corresponding to a frequency difference of about 0.06%). A MIDI-value of 60 corresponds with the c', 61 with equal tempered c#, 62 with d', and so on. A value of e.g., 60.23 would correspond to a pitch that is 23 cents higher than c'.



Example 1. Computational analysis methods allow one to analyze the scales, tuning and melodic contours of given recitation performance.

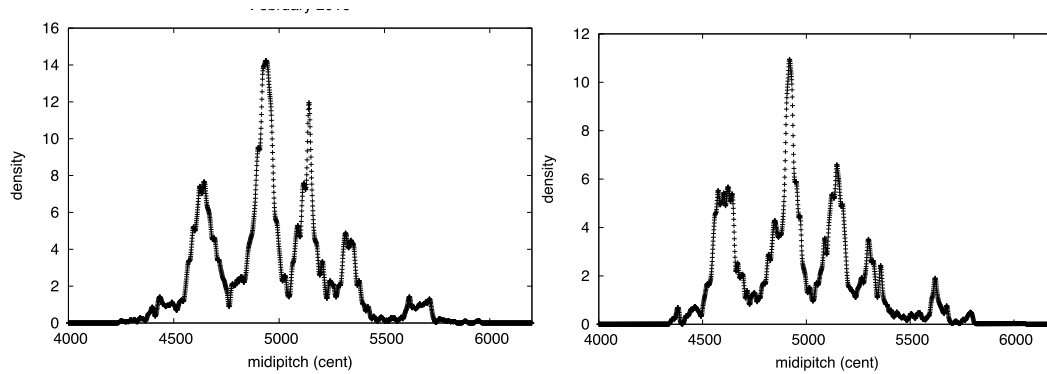
Computational audio analysis of the recordings was undertaken to find the most prevalent pitches in a given recitation. In so doing, we were able to investigate the practice of *maqamat* (a set of pitches for melodic performance found in Qur'an recitation) in terms of phrase analysis showing the most prevalent pitches within a given performance in terms of foreground, middle-ground, and background frequency analysis. These pitches relate roughly to *maqamat* traditions of instrumental music, although the melodic entities within Qur'an recitation do not adhere directly to *maqam* traditions within instrumental music. Often, we recorded a given reciter reciting the same recitation over a series of years in order to test how memory plays a role in terms of melodic stability.

In our analysis, we have compared renderings of the same reading of the same passage, done several years apart by a given reciter. Comparing the details of these readings reveals patterns of stability and – to a lesser extend – variation over time. **Example 2** shows the pitch analysis of two readings of a one ayah of Surah Al-Qadr as recited by the same Dutch reciter, more than four years apart. We observe that the contour of the phrase shows stability, while the actual pitches, and consequently the scales, show different characteristics.



Example 2. Pitch Analysis of recordings of recitation Surat Al Qadr performed in 2011 (top) and 2016 (bottom) by Nurul Ummah in The Hague, Netherlands.

As another example (**Example 3**), we show the estimated pitch densities in a reading by Amir Naamani of the first chapter of *Bereshit*, the first book of the Torah. The first diagram reflects the reading as recorded in 2011, and the second diagram a recording of the same passage from 2015. The comparison shows that the reader uses almost exactly the same scale.

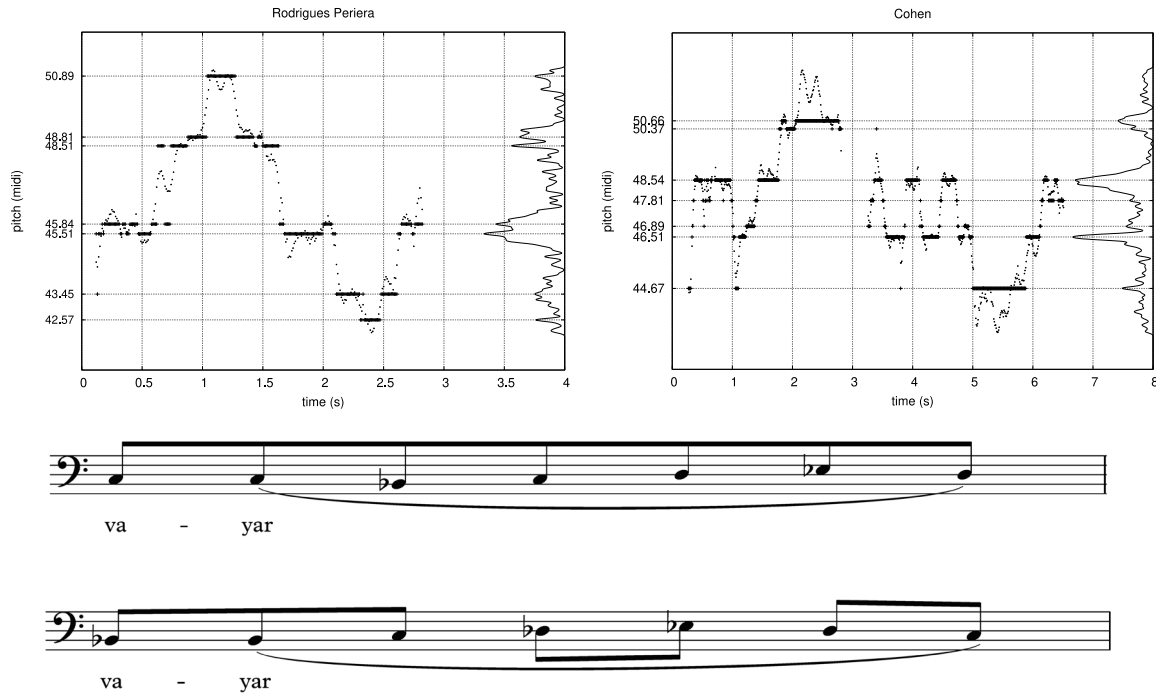


Example 3: Pitch density diagrams for two readings of the first chapter of *Bereshit* by Amir Naamani. Left: from a reading done in 2011. Right: from a reading done in 2016. The horizontal axis shows the midi-pitch in cents. 6000 is middle c.

Furthermore, we set out to compare such analysis of the performance practice of Torah trope recitation, as it is practiced in the Portuguese Synagogue in Amsterdam. This computational method delineates the main pitches of a given scale from secondary “ornamental” pitches. By doing so, we presented a hierarchy of scale degrees, thereby showing how surrounding “ornamental” pitches structurally interact with the main “skeletal” notes of the scale.

In addition, we investigated how such scale structures function in the context of the rules of Qur’an recitation (*tajwīd* and *tartīl*) as well as in the rules of Sephardic Torah trope. In being able to show how parameters of textual recitation, pronunciation, and interpretation interact with melodic contour and scale structures within these two traditions, we were able to fruitfully combine computer-based scale analysis and traditional practices of transcription, in which cultural knowledge and various ethnomusicological methodologies become incorporated.

In terms of analyzing Sephardic Torah trope associated with the Portuguese Synagogue in Amsterdam, we were able to analyze how the recitation melodies (*Ta’amei Hamikra*) transformed over the course of the twentieth and twenty-first centuries. Dániel Péter Biró met with Miguel Cohen who learned the tradition of Torah trope from his grandfather who fled the Netherlands to Argentina during the Holocaust. Miguel Cohen grew up in Buenos Aires but came back to the Netherlands in the 1970s and had only a very tenuous relationship to the community of the Portuguese Synagogue in Amsterdam. As illustrated in **Example 4**, his recitation practice was then compared to Nahshon Rodrigues Periera, a reciter of Torah trope at the Amsterdam Portuguese synagogue, who learned recitation in the classes at the synagogue. We could see that, while both reciters employ a similar modal scale for their recitation, which is the normative framework for Torah recitation, the melodic gestures vary.



Example 4. Analysis of Sephardic Torah trope as performed by Nahshon Rodrigues Periera, current reciter of Torah trope at the Amsterdam Portuguese synagogue and Miguel Cohen, who learned the practice of Torah trope in Buenos Aires, Argentina from his grandfather, who was a rabbi at the Amsterdam Portuguese synagogue before the Second World War.

Moreover, the historical situation of the community in Amsterdam is important to consider. The Jews coming from Catholic Portugal to the Netherlands were escaping the Spanish inquisition, with a large part of the community forced to become *conversos*, *marranos* or crypto-Jews.⁷ So the possibility that melodies from Catholic liturgy might have become the basis for Portuguese Torah trope in Amsterdam is an important consideration within the context of understanding melodic transmission within this tradition of Torah recitation.

Sounding philosophy

This ethnomusicological research in the Netherlands profoundly affected and informed the composing for voice within the *Ethica* composition cycle. Starting in 2017, Dániel Péter Biró began to write a series of pieces based on *Ethics* by Baruch Spinoza (1677). The initial idea was to write a “historicized” composition cycle, one that would integrate aspects of Spinoza’s “sound world” while transporting and transposing this world into a conceptual framework of the present era.

7. Steven Nadler, *Spinoza: A Life*. Cambridge: Cambridge University Press, 1999.

In 2017 Dániel Péter Biró wrote the composition *Nulla Res Singularis*, the first piece to employ philosophical text from Spinoza's *Ethics*.⁸ This first composition of the cycle dealt explicitly with Spinoza's inner exile, as it set the text "*Nulla res singularis in rerum natura datur, qua potentior et fortior non detur alia. Sed quacumque data datur alia potentior, a qua illa data potest destrui*" (Translation: "There is no individual thing in nature, than which there is not another more powerful and strong. Whatsoever thing be given, there is something stronger whereby it can be destroyed").⁹ A film of the New York premiere can be seen here:

https://www.youtube.com/watch?v=z_NelSpxN18&feature=youtu.be

In 2018, Dániel Péter Biró was commissioned by the Swiss Philosophical Society for their conference "Was ist Geist?" The new composition *Scholium II*, which integrated texts that dealt with Spinoza's view of the nature of the mind, was performed by the Schola Heidelberg and the ensemble aesthesis with Walter Nußbaum conducting.¹⁰

In 2019, the composition cycle was continued in the context of the project *Sounding Philosophy*.¹¹ Together with the Neue Vocalsolisten, members of the Norwegian Youth Chamber Music Ensemble, choreographer Hagit Yakira and painter Kjell Pahr-Iversen, an interdisciplinary work was created, wherein Spinoza's ideas about the various levels of cognition became translated into sound, movement, and color. A film about the *Sounding Philosophy* project can be seen here: https://www.youtube.com/watch?v=2yu5Tg4LagE&feature=emb_logo

The movements for this work are based on a text from the second book of his *Ethics*, which deals with the nature of cognition, intuition, nature, and God (Example 5).

8. *Nulla Res Singularis* for five singers and string quintet was performed by the Schola Heidelberg and ensemble aesthesis, Walter Nußbaum, conductor on October 29, 2017, at the Stadthalle in Heidelberg, Germany. This composition, commissioned by the Klangforum Heidelberg, with support from the Canada Council for the Arts was part of the project *Diktaturen*. This composition was also performed in a portrait concert of his works, presented at the Americas Society in New York on May 4, 2018. The composition is published by Edition Gravis (2018).

9. *The Collected Works of Spinoza*, ed. and translated by Edwin Curley. Princeton: Princeton University Press: 1985.

10. This composition was performed in the main hall of the Basel Music Academy in Basel, Switzerland on September 6, 2018. The work is dedicated to Gunnar Hindrichs. We are thankful to Walter Nußbaum, Dominique Mayr, and the members of the Schola Heidelberg and ensemble aesthesis for their inspirational involvement with this project.

11. Performed on November 6, 2019, at the Norwegian Youth Chamber Music Festival in the Atelier of Kjell Pahr-Iversen, Stavanger by the Neue Vocalsolisten and Norwegian Youth Chamber Music Festival Ensemble with Dániel Péter Biró conducting. Composition by Dániel Péter Biró, Grieg Academy, University of Bergen, Choreography by Hagit Yakira, University of Stavanger, Paintings of Kjell Pahr-Iversen, Stavanger with an introductory lecture by Elhanan Yakira, Hebrew University, Jerusalem, Israel. The composers is grateful to Christine Fischer, Jakob Berger, Ingrid Catharina Geuens, Hagit Yakira, Kjell Pahr-Iversen, the Neue Vocalsolisten and Norwegian Youth Chamber Music Festival Ensemble for their assistance in making this project come to life.

From all that has been said above it is clear, that we, in many cases, perceive and form our general notions:

- 1) From particular things represented to our intellect fragmentarily, confusedly, and without order through our senses: I have settled to call such perceptions by the name of knowledge from the mere suggestions of experience.
- 2) From symbols, e.g., from the fact of having read or heard certain words we remember things and form certain ideas concerning them, similar to those through which we imagine things. I shall call both these ways of regarding things knowledge of the first kind, opinion, or imagination.
- 3) From the fact that we have notions common to all human beings, and adequate ideas of the properties of things this I call reason and knowledge of the second kind. Besides these two kinds of knowledge, there is, as I will hereafter show, a third kind of knowledge, which we will call intuition. This kind of knowledge proceeds from an adequate idea of the absolute essence of certain attributes of God to the adequate knowledge of the essence of things.

Example 5. Baruch Spinoza *Ethica* (1677), excerpt from Book 2: “On the Origin and Nature of the Mind.”¹²

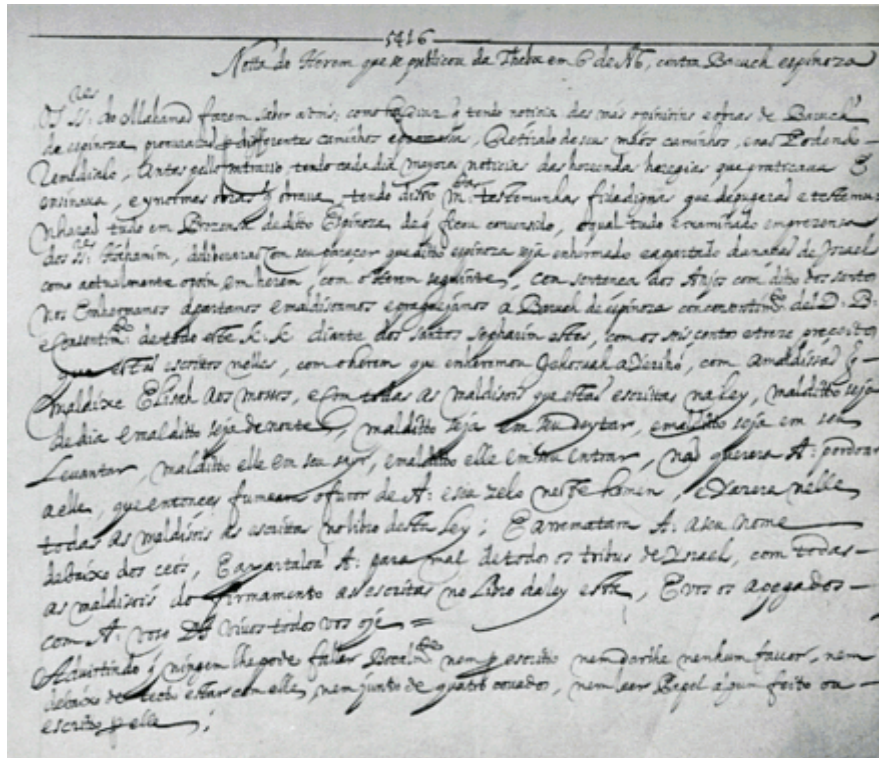
In this context, the composition exists as a reflection on Spinoza’s situation as a philosopher in the Netherlands of his time as well as on his ideas about perception, nature, and transcendence. Within the dominant Calvinist culture of seventeenth-century Netherlands, Jews were tolerated partly because of their belief in the immortality of the soul. Spinoza, a product of the Portuguese Jewish community, came to believe that the soul is not immortal in any personal sense, but is endowed only with a certain kind of eternity. For Spinoza the soul is related to God’s attribute of thought.¹³ This was a most radical idea for the time, and the one that probably result-

12. Benedict de Spinoza, *Ethics*, introduction by Stuart Hampshire, translated by Edwin Curley. London/New York: Penguin Books, 1996, p. 296.

13. Yitzhak Melamed discusses the difference between Descartes’ and Spinoza’s concepts of the eternal and its relation to nature: “For Descartes, attributes are properties which constitute the essences of things; each thing has one, and only one, (principal) attribute, which constitutes its essence. Hence, extension is the essential attribute of all extended substances, or bodies, and thought is the essential attribute of all thinking substances, or minds. In Spinoza, we get a different picture. God, the only substance, is identified with nature; extension and thought are two attributes of this one substance (or of Nature). Unlike Descartes, Spinoza has no problem with one substance (i.e., God) having a multiplicity of essential attributes. God’s attributes, according to Spinoza, are the fundamental and irreducible aspects of God, which are adequately discerned and conceived by any intellect. We can conceive God under the attribute of extension. In this way, God is the one and only extended substance, which is the subject in which all extended things (bodies) inhere. We can also conceive God under the attribute of thought. In this way, God is the one and only thinking substance, which is the subject in which all thoughts inhere. God, in fact, may be conceived in infinitely many ways; however, our minds can conceive God only under the two attributes of Thought and Extension (even though we know that God has infinitely many other attributes). Since all things are modes of God’s attributes, the attributes are also the basic ways of adequately conceiving any existing thing.” Yitzhak Y. Melamed, “Spinoza’s Metaphysics of Thought: Parallelisms and the Multifaceted Structure of Ideas.” *Philosophy and Phenomenological Research* 86/3 (2013):636, <https://doi.org/10.1111/j.1933-1592.2011.00549.x>.

ed in Spinoza's excommunication from the Jewish community: that the soul dies with the body.

Example 6 shows the document of expulsion from the community (in Hebrew **חרם**).¹⁴



Example 6. Document of Expulsion (Hebrew 3rx) of Baruch Spinoza, written by the Council of the Portuguese Jewish Synagogue in Amsterdam.

14. "The *Senhores* of the *ma'amad* [the congregation's lay governing board] having long known of the evil opinions and acts of Baruch de Spinoza, have endeavored by various means and promises to turn him from his evil ways. However, having failed to make him mend his wicked ways, and, on the contrary, daily receiving more and more serious information about the abominable heresies which he practiced and taught and about his monstrous deeds, and having for this numerous trustworthy witnesses who have deposed and borne witness to this effect in the presence of the said Espinoza, they became convinced of the truth of this matter. After all of this has been investigated in the presence of the honorable *hakhamim* ["wise men," or rabbis], they have decided, with the [rabbis'] consent, that the said Espinoza should be excommunicated and expelled from the people of Israel. By decree of the angels and by the command of the holy men, we excommunicate, expel, curse and damn Baruch de Espinoza, with the consent of God, Blessed be He, and with the consent of the entire holy congregation, and in front of these holy scrolls with the 613 precepts which are written therein; cursing him with the excommunication with which Joshua banned Jericho and with the curse which Elisha cursed the boys and with all the castigations which are written in the Book of the Law. Cursed be he by day and cursed be he by night; cursed be he when he lies down and cursed be he when he rises up. Cursed be he when he goes out and cursed be he when he comes in. The Lord will not spare him, but the anger of the Lord and his jealousy shall smoke against that man, and all the curses that are written in this book shall lie upon him, and the Lord shall blot out his name from under heaven. And the Lord shall separate him unto evil out of all the tribes of Israel, according to all the curses of the covenant that are written in this book of the law. But you that cleave unto the Lord your God are alive every one of you this day." Asa Kasher and Shlomo Biderman, "Why Was Baruch De Spinoza Excommunicated?", <https://www.tau.ac.il/~kasher/pspin.htm> (accessed on August 20, 2020).

In order to emphasize Spinoza's preoccupation with nature, a tuning scheme is employed based on the natural harmonics of five overtone series (**Example 7**). While this tuning does not strictly follow the tuning of the scales used in the Torah recitation practice of the Portuguese Synagogue in Amsterdam, the chants gestural qualities infuse the melodic content of each movement, and these become expressed through the harmonic series that governs the composition cycle.¹⁵

Instrument	IV	III	II	I
Violin 1	9 (+4)	7 (-31)	5 (-14)	
Violin 2	7 (-31)	5 (-14)		3 (+2)
Viola	7 (-31)	11 (+51)		3 (+2)
Violoncello 1	11 (+51)		3 (+2)	9 (+4)
Violoncello 2		3 (+2)	9 (+4)	27 (+6)

Example 7. Scordatura tuning of string instruments based on an overtone series of the second cello's open string C (Violoncello 1= C, Violoncello = G + 2 cents, Viola =D + 4 cents, Violin 2=A + 6 cents, Violin 1=E + 8 cents)

For the entire cycle two chants are, in some way, continuously present either in the structural background or in the perceptual foreground of the piece. These two chants relate to Spinoza's sound world and to the question of intuitive perception, as described in the passage above (**Example 5**). The first chant is derived from the book of Exodus of the Hebrew Bible.¹⁶ The melodic

15. For more on relationships between melodic contour and melodic identity in various Torah trope traditions see *Reading the Song: On the Development of Musical Syntax, Notation and Compositional Autonomy: A Comparative Study of Hungarian Siratók, Hebrew Bible Cantillation and Ninth Century Plainchant from St. Gallen*, Princeton: Princeton University 2004.

16. *Etz Haim, Torah and Commentary*, ed. David L. Lieber and Jules Harlow. New York: Rabbinical Assembly, 2001; and *Tanakh, The Holy Scriptures*. Philadelphia/Jerusalem: Jewish Publication Society, 1985, p. 330.

contours and pitches are based on Torah trope formulae, as practiced at the Portuguese Synagogue in Amsterdam (**Example 8**).

14 וַיֹּאמֶר אֱלֹהִים אֶל-מֹשֶׁה אֶהְיֶה אֲשֶׁר אֶהְיֶה
וַיֹּאמֶר כֹּה תֹאמַר לְבְנֵי יִשְׂרָאֵל אֶהְיֶה שְׁלַחְנִי אֵלֵיכֶם:

Example 8. Exodus 3:14. English translation: “And God said to Moses ‘Ehyeh-Asher-Ehyeh.’ He continued: ‘Thus shall you say to the Israelites, ‘Ehyeh sent me to you.’”

The second chant is taken from a fifteenth-century Portuguese plainchant (**Example 9**), serving to represent the sound world of the dominating power from where the Jews were expelled by the Inquisition and forced to flee to the Netherlands.

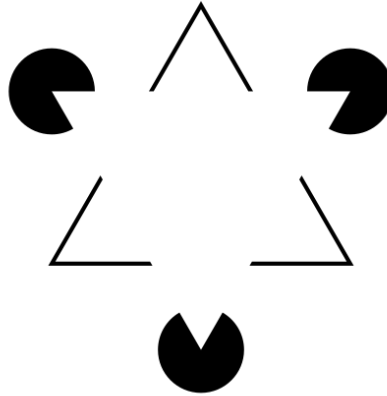


Example 9. Fifteenth-century Portuguese plainchant from P-BRs (Prague), Arquivo da Sé, Ms 032. Latin text: “Ego sum qui sum et consilium meum non est cum impiis sed in lege domini voluntas mea est alleluia.” English translation: “I am who I am and my counsel is not with the wicked, but in the law of my Lord.”¹⁷

These chants are presented as composed citations in two separate movements (Examples 10 and 11).

17. <http://pemdb.eu/domains/pemdb.eu/musical-item/9994> (accessed January 31, 2021).

sition as composed absence, forming relationships derived from Gestalt theory.¹⁸ In Gestalt theory, elements of negation are able to create a form, as displayed in the illustration below (Example 12).



Example 12: Gestalt theory image employing negative space (Kanizsa Triangle).¹⁹

In terms of the composition, the two historical chant melodies exist as ever-present *cantus firmi* within the work. **Example 13** presents the structure of the melodic background, based on the fifteenth-century Portuguese plainchant melody (**Example 9**) in the movement “Ex Signis” (**Example 14**). The text for this movement is the following:

From symbols, e.g., from the fact of having read or heard certain words we remember things and form certain ideas concerning them, similar to those through which we imagine things. I shall call both these ways of regarding things knowledge of the first kind, opinion, or imagination.²⁰

Here, the melody derived from the fifteenth-century Portuguese plainchant forms the basis of the melodic structure of the movement. In the course of this movement, the melody eventually comes to the perceptual foreground (Examples 13 and 14).²¹

18. For more on Gestalt theory see Alfred North Whitehead, *Science and the Modern World*. New York: Mentor, 1948.

19. New World Encyclopedia contributors, “Kanizsa Triangle.” *New World Encyclopedia*, https://www.newworldencyclopedia.org/p/index.php?title=Kanizsa_triangle&oldid=941902 (accessed January 31, 2021).

20. Benedict de Spinoza, *Ethics*, introduction by Stuart Hampshire, transl. by Edwin Curley. London/New York: Penguin Books, 1996, p. 296.

21. Archive: P-BRs (Braga) Arquivo da Sé Ms. 032 (<http://pemdatabase.eu/source/2902>), ff. 1r-51v In tempore Adventus, ff. 51v-90v In tempore Nativitatis, ff. 90v-135r In tempore Epiphaniae, ff. 135v-187r In tempore Quadragesimae, ff. 187r-204r In Triduum, ff. 204r-241r In tempore Paschae, ff. 241r-270v In tempore Pentecostes, ff. 270v-299v Dominicae proximae kalendis Augusti, Septembris, Octobris et Novembris, ff. 299v-306v Dominicae post Pentecostes, ff. 307r-314r Officium Angeli Custodiis, ff. 314r-315v Officia solitaria.

C.F. Soprano

C.F. Mezzo

C.F. Alto

Alto

Viola

7 (-31) *ppp* *pp* *ppp* 3 (+2) *ppp* *p* *ppp*

eks sig nis

IV 7 (-31) flaut. nat. 1/2 on bridge III 3 (+2) pont. II 1/2 on bridge

ppp *pp* *ppp* *p* *ppp*

Examples 13. Melodic background structure of “Ex Signis”, based on the plainchant melody of fifteenth-century Portuguese chant *Ego sum qui sum*.

Example 14. Final measure of movement “Ex Signis”: The plainchant melody is filtered through the pitches of five harmonic series; the pitches of each series are presented by a given voice and string instrument pairing.

Also here, Spinoza's ideas about perception are translated within the semiological framework of the composition. The word "imaginamur" in Spinoza's text on the "knowledge of the first kind" (see citation above), translated via Latin gematria²² into the number 96, gets translated into beat structures (9+6 eighth notes in the tenor and viola lines) and sound types (6 repeated notes and a tremolo after 9 eighth note beats in the other voices).

In this way, the Jewish and Christian chant citations, which tie into Spinoza's theological and cultural background, become integrated into the structural framework of the composition, thereby presenting musical sound types that, in the course of the work, act as the very "symbols," which Spinoza, in his *Ethics*, relates to "opinion, or imagination."²³

Sound, spirit, and emergence

The artistic research project *Sounding Philosophy*, supported by the Norwegian Artistic Research Program, builds on these investigations as well as research-creation carried out at the Grieg Academy Composition Research Group in 2018-2022.²⁴ A central question of the research group has been to investigate concepts of reason and the mind in the fields of art, philosophy, and science.

22. In the context of the present composition, Gematria was employed in terms of creating musical structures from both the Hebrew and Latin texts (using *Latin Qabalah Simplex*). The Latin gematria is based on premises of Hebrew Gematria: "The substitution of numbers for letters of the Hebrew alphabet, a favorite method of exegesis used by medieval Cabbalists to derive mystical insights into sacred writings or obtain new interpretations of the texts. Some condemned its use as mere toying with numbers, but others considered it a useful tool, especially when difficult or ambiguous texts otherwise failed to yield satisfactory analysis. Genesis 28:12, for example, relates that in a dream Jacob saw a ladder (Hebrew *sullam*) stretching from earth to heaven. Since the numerical value of the word *sullam* is 130 (60 + 30 + 40)—the same numerical value of Sinai (60 + 10 + 50 + 10)—exegetes concluded that the Law revealed to Moses on Mount Sinai is man's means of reaching heaven. Of the 22 letters in the Hebrew alphabet, the first ten are given number values consecutively from one to ten, the next eight from 20 to 90 in intervals of ten, while the final four letters equal 100, 200, 300, and 400, respectively. More complicated methods have been used, such as employing the squares of numbers or making a letter equivalent to its basic value plus all numbers preceding it." "Gematria." *Encyclopædia Britannica Online*, <https://www.britannica.com/topic/gematria> (accessed August 20, 2020).

23. Benedict de Spinoza, *Ethics*, introduction by Stuart Hampshire, transl. by Edwin Curley. London/New York: Penguin Books, 1996, p. 296.

24. See <https://kmd.uib.no/en/Calendar/seminar/sounding-philosophy-conference> and <https://www.researchcatalogue.net/view/634973/634974>. The research project, supported by the Norwegian Artistic Research Program, had its first conference, entitled "Dimensions" in February 2022 and will continue until 2025. The extended version of the *Ethica* composition cycle had its premiere at the Heidelberg Synagogue on Feb. 20, 2022, with the Swiss premiere following at the Musik Akademie Basel on Feb. 21, 2022 and the Norwegian premiere being on Feb. 25, 2022 at the Johanneskirken in Bergen with the Schola Heidelberg and ensemble aesthesis performing and Walter Nußbaum, conducting. A score of the resulting works *Nulla Res Singularis and Scholium II* have been published by Edition Gravis. A recording of these works will be available in 2023 and published by Genuin Classics. The composer is grateful for support from the Department of Art Music and Design, University of Bergen, nyMusikk Bergen, Bergen Kommune, Musikkfondene, the Goethe Institute, the Barr Ferree Fund of Princeton University, Global Challenges Program, University of Bergen, Meltzerfondet, the Canada Council for the Arts and the Norsk Komponistforening.

The research team has investigated contemporary theories of emergence, e.g. by the Nobel-Price Winner in Physics Robert Laughlin. Emergence can be described as the condition of an entity having properties distinct from the properties of the parts of the system from which it emerges, an important concept within the theoretical framework of complex systems.²⁵ While philosophers have described thinking, doing, and perception as different “states of mind,” scientists have not only concerned themselves with the question of how intelligence in the universe is possible, but also with the question of how intelligence plays a role in the evolution and emergence of nature.²⁶ Spinoza regarded both philosophy and art not merely as rational modes of explanation but as expressions of spirit (*spiritus*) and intelligence (*Geist*). Such questions of spirit also relate to these new developments in emergence theories in physics and philosophy.²⁷

Sounding Philosophy aims to build on both these historical concepts and contemporary research, seeking to investigate how creative, metaphysical, and scientific studies can serve to inform a more holistic understanding of emergence as a complex, multivalent phenomenon. Here, musical creation becomes informed by computational ethnomusicology, philosophy, and science, thereby allowing for reflection on interconnecting creative, scholarly, and scientific processes. Just as these concepts continue to serve and guide the project, Spinoza’s writings about consciousness act as the point of departure for ongoing creative investigations into the nature of intellect, the universe, and the perception thereof.

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25. See Sophia Kivelson and Steven A Kivelson, “Defining Emergence in Physics.” *npj Quant Materials* 1, 16024 (2016), <https://doi.org/10.1038/npjquantmats.2016.24>; and Sebastian De Haro, “Towards a Theory of Emergence for the Physical Sciences” *Euro Jnl Phil Sci* 9/38 (2019), <https://doi.org/10.1007/s13194-019-0261-9>.

26. See Achim Stephan, “Theories of Emergence” in A.L.C. Runehov and L. Oviedo (eds), *Encyclopedia of Sciences and Religions*. Dordrecht: Springer, 2013, https://doi.org/10.1007/978-1-4020-8265-8_1123; and Philip Clayton, *Mind and Emergence: From Quantum to Consciousness*. Oxford: Oxford University Press 2004.

27. See Grit Schwarzkopf, “Was ist Teleologie?” *Schweizerische Zeitschrift für Philosophie* Band 78:38-45, <https://doi.org/10.24894/StPh-de.2019.78006>: “My argument is structured by three core problems, which illustrate that the question of Geist is based on the foundational question of telos, and that neither question can be answered without the other. This correlation pertains to the theory of emergence in physics. Thus, the discussion of these two philosophical questions can be important for the field of physics” (extract from the abstract).

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