

***Vidi in caelo*—Ten Years of Melody Generation for the Mozarabic Rite**

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Introduction

On the 17th of June in 2025 *Gregoriana Amsterdam* gave a concert in Bergen, Norway.¹ One of the performed chants was a computationally generated melody for the Mozarabic sacrifice *Vidi in caelo* for the Sunday between Ascension and Pentecost. This was the 25th sacrifice for which I generated melodies, often in collaboration with Darrell Conklin. Besides *Vidi in caelo*, several other pieces are available online as videos.² We omitted the second part in the concert. The video shows the original tenth-century notation of the other two parts synchronic with the chant. The full score follows at the end of this article.

The sacrifice *Vidi in caelo* (see Figure 1) is one of the 102 sacrifices in the León antiphony.³ The León antiphony (E-L 8) dates from the early tenth century and is the most important witness to the Mozarabic rite, which was dominant on the Iberian Peninsula from the seventh to the eleventh century.⁴ At the Council of Burgos (1080), the rite was officially abolished and replaced by the Roman Rite with its Gregorian chant.⁵ Sacrifices are the longest and most complex chants of the Mozarabic rite. Their function is similar to that of the Roman offertories. The León antiphony contains approximately 3,000 chants for Mass and Office of the Mozarabic rite. Some forty manuscripts and fragments of the rite, totaling approximately 5,000 chants, have been preserved.⁶

Unfortunately, the vast majority of these chants have been preserved only in so-called a-diastematic neumes. In this notation intervals cannot be read. Only the number of notes per syllable of text is clear, and usually also whether the melody goes up or down. Around the time that diastematic notation became common, the rite was abolished. As a result, the melody of only two dozen relatively simple chants is known.

Yet, scholars have shown that some of the lost melodies must have been related to Gregorian, Ambrosian, and Old Roman chants on the same text.⁷ Based on this fact I

¹ St. Paul's, Nygårdsgate 3, in the context of *The Intellect of Chant Conference*, 16-18 June, 2025, Grieg Academy, University of Bergen (Norway): <https://kmd.uib.no/en/Calendar/seminar/the-intellect-of-chant>. This article is an English translation of the Dutch text published on the *Gregoriaans Platform* on August 15, 2025: https://www.gregoriaans-platform.nl/wp-content/uploads/2025/08/Maessen_Vidi-in-caelo.pdf.

² See: <http://www.gregoriana.nl/videos.htm>.

³ Geert Maessen, Peter van Kranenburg & Darrell Conklin. "Het Mozarabisch melos en andere tradities", in: Geert Maessen. *Heimwee naar wat nooit is geweest - Bespiegelingen over het Gregoriaans, Gregoriana Amsterdam* (2023), p. 86-108 & 224-245.

⁴ Facsimile: <https://musmed.eu/source/11647>; black and white facsimile: Instituto Español de Musicología. *Antifonario visigótico mozárabe de la catedral de León. Edición Facsimil*. San Isidoro, Madrid (1953). See also: Rebecca Maloy, *Songs of Sacrifice. Chant, Identity, and Christian Formation in Early Medieval Iberia*. Oxford University Press (2020), p. 14-15 & 189-190. Emma Hornby, Kati Ihnat, Rebecca Maloy en Raquel Rojo Carrillo, *Understanding the Old Hispanic Office. Texts, Melodies, and Devotion in Early Medieval Iberia*. Cambridge University Press (2022), p. 23-24, etc. The terms "Mozarabic" and "Old Hispanic" in this article both refer to the tradition that was abolished at the end of the eleventh century.

⁵ Don Randel & Nils Nadeau. "Mozarabic Chant", *The New Grove Dictionary of Music and Musicians (second edition)*, (2001). <http://www.oxfordmusiconline.com>.

⁶ Don Randel, *An Index to the Chant of the Mozarabic Rite*. Princeton University Press (1973).

⁷ Kenneth Levy. *Gregorian Chant and the Carolingians*. Princeton University Press (1998), p. 31-81.

published a book in 2015 containing fifty computationally generated melodies for chants in the León antiphony.⁸ My research has continued since. With Peter van Kranenburg, I have

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Omnis ge nēs plūde ē mūnibz labili ē de o In

Alle luia Firmetur manus aui domine cāculat aui dōcū aui nōpūm

Vidi in caelo aui quū dīnūm te nō pōtūm cōlumūnū uocūm mūm

sūlū dō nōtū cāculat nōtū cāculat nōtū cāculat nōtū cāculat

cāculat nōtū cāculat nōtū cāculat nōtū cāculat nōtū cāculat

Alle luia A uoi bi aui quū aui

loquūm mōcū cāculat nōtū cāculat nōtū cāculat nōtū cāculat

fīcū pōtū cāculat nōtū cāculat nōtū cāculat nōtū cāculat

fīcū pōtū cāculat nōtū cāculat nōtū cāculat nōtū cāculat

fīcū pōtū cāculat nōtū cāculat nōtū cāculat nōtū cāculat

De se de uas nōtū cāculat nōtū cāculat nōtū cāculat

cāculat nōtū cāculat nōtū cāculat nōtū cāculat nōtū cāculat

eodem die ad R Q uis in nūbi bus equi bīa do mīno aui quū

in caelo cāculat nōtū cāculat nōtū cāculat nōtū cāculat

pōtū cāculat nōtū cāculat nōtū cāculat nōtū cāculat

Dominus in caelo nōtū cāculat nōtū cāculat nōtū cāculat

Exaltat se domine in nūbi bus aui cāculat

Fig 1. The León antiphony (E-L 8), fol. 203r; *Vidi in caelo* on lines 3 to 12 and right margin.

⁸ Geert Maessen (ed.). *Calculus et Cantemus, Towards a Reconstruction of Mozarabic Chant*. Gregoriana Amsterdam (2015).

improved the method.⁹ Also, Darrell Conklin has presented a new method and demonstrated that recurring patterns in the neumes can be automatically detected.¹⁰ Conklin has even shown that it is possible to generate complex new melodies based on the few preserved authentic Mozarabic melodies.¹¹ I will return to both methods later in this article.

It is clear that our melodies most likely did not exist in the tenth century. The various variables of both methods make countless different melodies possible, and it remains unclear how we could choose the "right" melodies from these. Therefore, we don't claim to have recovered the lost melodies. I never made that claim either. Some musicologists see it differently. This confusion I have partly fueled myself. Some experts of the Mozarabic rite therefore ignore our work or even present it in an extremely negative way. In this article, I will attempt to understand this negative attitude. To this end, I will outline the last ten years of our research. Based on this, I will argue that this negative attitude is unjustified.

My main source is the book *Songs of Sacrifice* published by Rebecca Maloy in 2020.¹² This book is the result of an extensive literature study and a thorough comparison of the surviving manuscripts. The bibliography includes 29 pages. The book begins with an outline of the Mozarabic rite in its seventh-century Visigothic context. This is followed by reflections on liturgy, theology, and the conversion of biblical texts into chant texts. The book also maps patterns in the neumes and how these patterns differ across the sources. Finally, the book outlines connections with other liturgical traditions. In short, a fascinating and worthwhile book. However, it pays no attention to our melody generation, which I don't understand. I don't think you can maintain that our work is irrelevant. In this article I try to understand how this negative attitude arose. I also offer arguments for a more positive approach.

The Beginning

Since 2011 I've been seriously engaged with the Mozarabic Rite. I've been in email contact with Maloy since 2012, initially in connection with articles that formed the basis for the book she published with Emma Hornby in 2013.¹³ From 2013 to 2018, Maloy and Hornby collaborated in the *Old Hispanic Office* project.¹⁴ Three other researchers also participated in this project: Elsa de Luca, Raquel Rojo Carrillo, and Kati Ihnat.

On March 9, 2014, I announced at *Musicologie Médiévale* that my group, *Gregoriana Amsterdam*, would be performing the first computationally generated Mozarabic chant ever on Saturday, March 15.¹⁵ I admit that announcement was rather grandiose, and I certainly wanted to move in the direction of "reconstructions." However, I never claimed to have rediscovered a lost melody. What I did claim was:

⁹ Geert Maessen & Peter van Kranenburg. "[A Semi-Automatic Method to Produce Singable Melodies for the Lost Chant of the Mozarabic Rite](#)." *Proceedings of the 7th International Workshop on Folk Music Analysis*, Málaga, Spain (2017), p. 60-65.

¹⁰ Darrell Conklin & Geert Maessen. "[Generation of melodies for the lost chant of the Mozarabic rite](#)." *Applied Sciences* 9(20), (2019) <https://www.mdpi.com/2076-3417/9/20/4285>; Darrell Conklin & Geert Maessen. "[Aspects of pattern discovery for Mozarabic chant realization](#)." *Joint Conference on AI Music Creativity*, Stockholm (2020).

¹¹ Maessen, Van Kranenburg & Conklin, o.c. (2023), see note 3 above (p. 1).

¹² Maloy, o.c. (2020), see note 4 above (p. 1).

¹³ Emma Hornby & Rebecca Maloy. *Music and Meaning in Old Hispanic Lenten Chants. Psalmi, Threni and Easter Vigil Canticles*. Boydell & Brewer (2013).

¹⁴ See: <https://cordis.europa.eu/project/id/313133/results/es>.

¹⁵ See: <https://gregorian-chant.ning.com/group/chantwisigothiquemozarabe/>.

[...] given the data I entered, given specified premises and given specific algorithms and the software I developed, it is the best possible match with the early notation, it is produced in a completely formalized process, and [...] amazingly ... it can be sung!

Rojo Carrillo and De Luca responded. Rojo Carrillo wondered which chant it was, whether we were recording, and she was interested in details about the software.¹⁶ De Luca also asked for clarification, adding:

Modern music palaeographers currently engaged with that notation have probably something to say about the interpretation of those neumes.

In response, I referred to my presentation for *Cantus Planus* in Venice later that year.¹⁷ De Luca said he was looking forward to it: "There will be plenty to talk about." Manuel Pedro Ferreira and Oliver Gerlach also responded to my post. Ferreira wrote:

It's always good to experiment with melodic reconstruction. But what I have learnt from the process of reconstructing the first part of the Resp. "Conclisit vias meas" [...] is that the number of variables is immense, even when one has a melodic model to follow; I fear that automated, indirect subjectivity fares no better than plain subjectivity. Anyway, discussion is welcome - I'm looking forward to [...] Venice.

In Venice, Maloy and Hornby were critical. But I had positive conversations with Ferreira, Roman Hankeln, and Jean-François Goudesenne. I also received positive feedback from others, but some of that was undoubtedly small talk. I didn't speak to De Luca. Back in Amsterdam, I sang new pieces with *Gregoriana* every month. I eventually published fifty of them in my 2015 book.

In retrospect, those melodies are generally not very good. The sequence of intervals is often atypical; not only for Gregorian chant, but also for other monodic traditions. Because I wanted to minimize interpretation, I also ignored recurring patterns smaller than a full sentence. Patterns of three or four notes don't always have the same intervals. However, there is consensus that patterns of twenty or more notes do indeed have the same intervals.¹⁸ The border lies somewhere in between (say, ten or twelve), but that border also depends on the context. In my later publications, the melodies are more natural and the patterns are more fully realized.

In December 2015, Hornby sent me a review of my book (with a cc to Maloy). In it, she responds positively to the contributions of Ismael Fernández de la Cuesta and Laura Albiero. She also says that I explain my method clearly. She was also pleased with the chapter *Truth or Dare*, in which I attempt to understand the criticism of my transcriptions. However, she reiterates the criticism she expressed in Venice, which she addresses in more detail. The gist of it is:

¹⁶ That chant was the benedictiones *Benedictus es Domine Deus* for *Carnes tollendas*. We made a recording, which can be found at: <http://www.gregoriana.nl/videos.htm>.

¹⁷ Geert Maessen. "First Results of a Computational Analysis of Old Hispanic Chant," paper presented at the [17th meeting of the IMS Study Group CANTUS PLANUS](#) on July 30, 2014 in Venice.

¹⁸ Rebecca Maloy & Emma Hornby. "Toward a Methodology for Analyzing the Old Hispanic Responsories." in: [IMS Study Group Cantus Planus, Papers read at the 16th meeting](#), Vienna (2012), p. 242-249.

[...] I can completely see that there might be a benefit to them for performance, for the romance of a re-invention of the middle ages, but I think that in scholarly terms there is a circularity in the logic, and that undermines claims of their relationship to the Old Hispanic chant. [...] we might easily be being led up a garden path of THINKING that we have [come closer to an understanding of the musical grammar], and that's the crux of why the transcriptions bother me. [...] But I'm jolly glad you are experimenting with these things, and I look forward to you refining them and perhaps making them more persuasive. [...] In the end, my worry is that these reconstructions are misleading. [...]

I think she was essentially right. My approach was indeed misleading. While I didn't claim to generate lost melodies, I did indeed anticipate that. I've become more realistic about this. At the end of her long review, she writes:

I hope I've got the tone of this right - I want you to know that I'm not sneering at all, and not simply dismissing without thinking carefully about what you are doing [...]

In 2014, Hornby commissioned a composition competition in the *Old Hispanic Office* project, for choir SATB and/or instrumental ensemble. Because the Mozarabic rite was not polyphonic and had no instruments, the submitted compositions would not have readily given the impression of being reconstructions. In that sense, they were certainly not misleading. In an interview about these compositions, Hornby stated in April 2016:

I did briefly toy with the idea of "should we be trying to reconstruct it?" and I thought, "well, no" because that's just a fantasy – it's sort of theme park approach and that didn't seem very respectful to me of the material we had in front of us. and so then the crazy idea came to me that maybe we could take something of the essence of this music, whether it's something about its shape or something about its devotional, or spiritual, or aesthetic potential and we as scholars could communicate what we understand of that to composers and then composers could re-imagine that in their own language.¹⁹

In March 2017, I posted a call on *Musicologie Médiévale*: "Let's Compose Mozarabic Melodies." My tone towards Hornby's quest is not very friendly. I'm simply ridiculing her. What she tried to avoid in her review, I seem to be emphasizing. That probably hasn't increased appreciation of my approach:

*[...] There is no doubt, of course, such music did not exist a thousand years ago. It is unclear, therefore, what this "something" possibly could mean. The perverted scholarly reality seems to substitute the historical lack of knowledge by a modern lack of meaning. [...] Instead of modern "nonsense", for a better understanding of the lost tradition, it seems preferable to make "fake" reconstructions. [...]*²⁰

¹⁹ See: <https://podacademy.org/podcasts/i-will-pour-out-my-spirit/>

²⁰ See: <https://gregorian-chant.ning.com/group/chantwisigothiquemozarabe/forum/topics/>

New Developments

In 2016, Maloy provided me with the *Finale* files on which her edition of 94 Gregorian and Old Roman offertories was based.²¹ Peter van Kranenburg converted these into *Volpiano* font. I expanded them to include all the offertories from the Gregorian, Ambrosian, and Beneventan traditions, as well as the sixteenth-century Mozarabic rite (the *Cisneros Cantorales*). I added all the preserved authentic Mozarabic melodies. I also added all the León sacrificia in contour notation (see *Vidi in caelo* below). Van Kranenburg and I published on the relationships between all these traditions in 2017 and 2018.²² Maloy refers to this in the final chapter of her book. In 2020, we had a paper ready for a conference in Aalborg. That conference was canceled. I published this text in Dutch translation in 2023.²³

In 2017, Van Kranenburg and I improved my method, and based in part on the new data, I generated much better melodies. In particular, *Sicut cedrus* (February), *Sacrificium Deo* (March), and *Venient ad te - IV* (December).²⁴ In December, Maloy provides nuanced commentary on my two melodies for *Venient ad te*:

*The first version, based on the cantorales, doesn't make much sense to my ears. Cadences don't always sound like cadences [...] and I can't easily hear a tonal center, or a modal structure. But perhaps Old Hispanic chant did not have these things that I am so conditioned to expect. The second version, of course, sounds exactly like Gregorian chant. But perhaps Old Hispanic chant didn't. (I tend to think that it probably did sound somewhat like Gregorian chant, but I am not ready to make a full argument to that effect). So who's to say which is better? It would be interesting to hear a version of this chant based on the pitched Old Hispanic chants, for comparison.*²⁵

Since 2017, I've also been collaborating with Darrell Conklin. He introduced a new method. My method generates the most closely related melody for a chant in neume notation based on a collection of preserved melodies. Conklin's method generates the most likely melodies for a number of chants in neume notation based on a statistical model of a collection of preserved melodies. In 2017, we published two melodies for *Parvulus natus est*, based on both methods. In 2018, we published a comparison of both methods.²⁶ Then, we also published two versions for the Gregorian offertory *Scapulis suis*.²⁷ That year, Maloy broke off contact with me, possibly because of my incorrect tone. I never heard anything on the spectacular *Amplificate oblationem* (duration 21:49), nor on the two versions of *Scapulis suis*. In 2019 we published an article on Conklin's method and an edition of recent scores.²⁸

²¹ Rebecca Maloy. *Inside the Offertory. Aspects of Chronology and Transmission*. Oxford University Press (2010).

²² Peter van Kranenburg & Geert Maessen. "[Comparing Offertory Melodies of Five Medieval Christian Chant Traditions](#)." in *Proceedings of the 18th ISMIR Conference, Suzhou, China*. (2017), p. 204-210. Geert Maessen & Peter van Kranenburg. "[A Non-Melodic Characteristic to Compare the Music of Medieval Chant Traditions](#)." in *Proceedings of the 8th International Workshop on Folk Music Analysis*, Thessaloniki (2018), p. 78-79.

²³ Maessen, Van Kranenburg & Conklin, o.c. (2023), see note 3 above (p. 1).

²⁴ Published at: <http://www.gregoriana.nl/videos.htm>.

²⁵ Facebook-post of 16 December 2017. Both melodies (in mode VI and IV) are available online and in print: <http://www.gregoriana.nl/videos.htm>, Geert Maessen & Darrell Conklin. *Amplificate Oblationem, Generación computacional de melodías para el canto perdido del rito mozárabe*. Gregoriana Amsterdam (2019).

²⁶ Geert Maessen & Darrell Conklin. "[Two Methods to Compute Melodies for the Lost Chant of the Mozarabic Rite](#)." In: *Proceedings of the 8th International Workshop on Folk Music Analysis*, Thessaloniki (2018). p. 31-34.

²⁷ See: <http://www.gregoriana.nl/videos.htm>.

²⁸ Conklin & Maessen, o.c. (2019), see note 10 above (p. 3). Maessen & Conklin, o.c. (2019), see note 25.

Maloy's book was published in 2020, without any reference to our melody generation. After a lecture in March 2022, she was asked if anyone had ever tried to make sound the melodies. She replied:

*[...] there is! I was actually playing this before you came in. There is someone in the Netherlands who has reconstructed it and sings - and it's beautiful - sings in patterns that go with this notation. He has done that by putting a bunch of information into a computer. I think one of the problems with this is that all the pitches that are put in are from Gregorian chant. So not surprisingly, it sounds like Gregorian chant. Because you know, there is no way that this could actually be what he is saying that it sounds like. But it's very provocative of what it might have sounded like. So, the only problem with it is that he says he solved the riddle. [...]*²⁹

Her answer seems to explain the omission in her book. But that answer contains several factual inaccuracies. Not all our data are derived from Gregorian chant. Several other traditions, including Mozarabic, play a similar role. Nor have I ever claimed to have solved the riddle. Furthermore, her statement "there is no way..." is just an opinion. It should be substantiated. In a recent interview (January 2025), she sounds much more realistic:

*[...] there is a person who has entered all the neumes into a program and put in some parameters and had it sort of spit out what the chant could sound like. And there are recordings. And just as long as people don't think that those are actually the melodies, I think they probably do give you a sense of what the experience was actually like. You know it's funny, because you can listen to these offertory chants, I mean they last for like fifteen minutes. It's like they could do what they needed to do for the offertory rite in far less time. They were really interested in music. There is just no question about that.*³⁰

It seems that Hornby's "misleading" is central to all the criticism so far. Our melodies are misleading concerning the lost melos. Maloy translates that as *impossible*: "there is no way". I understand that criticism, and it is justified, at least in part. But that criticism ignores what we've actually been doing since 2017. We try to create melodies that conform to everything we know about the lost tradition. Melodies that can, moreover, be sung in the liturgy. The question of whether those melodies ever existed is less relevant. You don't ask that question about new polyphonic settings either. It is, however, relevant to ask to what extent these new compositions differ from the lost pieces. For polyphonic compositions, that is clear. For monophonic chants, it's less clear. We could learn something from that. In short, the question is to what extent our pieces can teach us anything about the lost melodies. In the recent interview, Maloy herself provides an obvious example of this: duration. But there may be more.

It seems clear that our recent melody for *Vidi in caelo* doesn't necessarily have the same mode as the lost melody. The ambitus could also have been quite different. The long melisma on "sedis" could have been located in the low or mid range instead of the high range. And there could have been more differences. But it is also clear that recurring patterns in the new melody most likely will have been recurring in the lost one as well. The number of

²⁹ In *Distinguished Research Lecture 118—Professor Rebecca Maloy*, published on March 14, 2022: <https://youtu.be/DB2wyKcTviw&t=3197>.

³⁰ In the *Rhythms of Faith - Podcast* of January 2, 2025: <https://youtu.be/Skh7SApKU5k&t=1687>.

patterns and their repetitions, therefore, reveal something about the lost melody. This also applies to cadences and the placement of melismas. Our more complex pieces, therefore, do reflect the lost melos in many ways.

In her book, Maloy discusses many relevant historical, liturgical, and theological matters. But regarding the lost melos, she essentially doesn't get any further than we do. Our approach also provides what she does in the two longest chapters: 4. *The Melodic Language* and 6. *The Broader Old Hispanic Tradition*. There, it's simply about mapping patterns. The theme of the final chapter, 7. *Connections Beyond Hispania*, is also eminently suitable for computational analysis. That's precisely what Van Kranenburg, Conklin, and I are working on.³¹ In my opinion, our approach has two major advantages over a manual approach. It is less susceptible to the misreading of neumes, and moreover, we can also audibly express something of the lost melos.³²

In December 2024, Conklin and I published new melodies for *Venient ad te*, now also based on the few surviving Mozarabic melodies.³³ We wrote a paper about it for the *Music Encoding Conference*.³⁴ This was rejected with the lowest possible scores in all categories: six times 0 on a scale of 10, with the comment:

*This research is undermined by a lack of understanding of the notational specificities and idiosyncrasies of the Old Hispanic chant repertory. Built on incomplete and, at times, inaccurate assumptions regarding the significance of Old Hispanic notation, the system described for melody generation holds no relevance or validity for Old Hispanic chant scholarship or performance.*³⁵

That is the most negative criticism of our work ever explicitly expressed. Maloy and Hornby's criticism is understandable, but this criticism is unreasonable. Recently, Maloy seems to be retracting her earlier criticism. She's even learning something from our work. The criticism of the anonymous reviewer, however, has gone too far. I have felt that negative tone more often over the past ten years. In that light, our 25 *sacrificia* can be seen as sacrificial chants in two ways: for their function in the liturgy, but also because the chant is considered irrelevant. What we do is only permitted under penalty of excommunication. Naturally, we gladly make that sacrifice, even though we don't understand the reasons.

Vidi in caelo

The clearest example of misreading the neumes in Maloy's book is her interpretation of the *sacrificium Vidi in caelo*. This is particularly troubling because it marks a climax in the book and therefore affects the book as a whole. The text of *Vidi in caelo* comes from the *Apocalypse* (7:9-12, 4:1-4, 4:5). The third and final section reads:

De sede autem procedebant fulgura, et tonitrua, et septem facule ignis ardentis in conspectu SEDIS, quae sunt septem spiritus Dei.

³¹ Maessen, Van Kranenburg & Conklin, o.c. (2023), see note 3 above (p. 1).

³² Cf. Willard McCarty, *Humanities Computing*, Palgrave Macmillan, London (2005), p. 1224-1235.

³³ Published at: <http://www.gregoriana.nl/videos.htm>.

³⁴ See: <https://music-encoding.org/conference/2025/>.

³⁵ From the first of three anonymous reviews mailed to us on February 14, 2025.

In translation:

From the throne came lightnings and thunders, and seven torches of burning fire are before the THRONE, which are the seven spirits of God.

The word "sedis"/"throne" has a melisma of 141 notes. This melisma is written vertically in the margin. See Figure 1 on page 2. This is not uncommon. Over the 306 sheets of the León antiphonary, there are over sixty long melismas in the margin; more than one in every five sheets. There are also many long melismas that are not in the margin. At the end of chapter 5, *Sounding Prophecy: Words and Music in the Sacrificia*, Maloy writes (p. 185):

The last section of this chant constitutes perhaps the most vivid text setting in the repertory. Related melismas adorn "procedebant" and "tonitrua" [...], the image of thunder proceeding from the throne. Varied repetitions of similar material are then used to form the long melisma on the final "sedis", written into the margin. [...] This melisma is placed in the center of a striking image: "And seven torches of burning fire before the throne, which are the seven spirits of God." Framed between two invocations of the number seven, the "sedis" melisma repeats the material from the earlier melismas seven times, with increased intensity through successive repetitions toward the melisma's close. The melodic repetition in this chant, sometimes varied, mirrors the textual repetition centered on the throne, and the melismas give added emphasis to that repetition. The culminating, climactic melisma on the final invocation of the throne, riffing seven times on material previously heard in conjunction with the thunder, aurally depicts the seven torches, which are then revealed as being the seven spirits of God that stand before it.

That sounds impressive. Unfortunately it's not true. Her analysis contains four errors based on inaccurate readings. First, it's unclear whether the long melisma on "sedis" uses earlier material. She points to similarities with the neumes in the melismas on "procedebant" / "proceeding from" and "tonitrua" / "thunder." In Figure 2, the longest pattern shared by the three words is circled in black; it contains seven notes: oriscus-trigon-trigon. This is too few to base definitive statements on. Moreover, the last two trigons on "procedebant" and "tonitrua" are different. Therefore, on "tonitrua," the pattern consists of only six notes. The pattern shared by "procedebant" and "sedis" could perhaps be extended to eleven notes (circled in white), but it remains different. In any case, the material on "sedis" cannot be clearly associated with the "thunder" / "tonitrua".

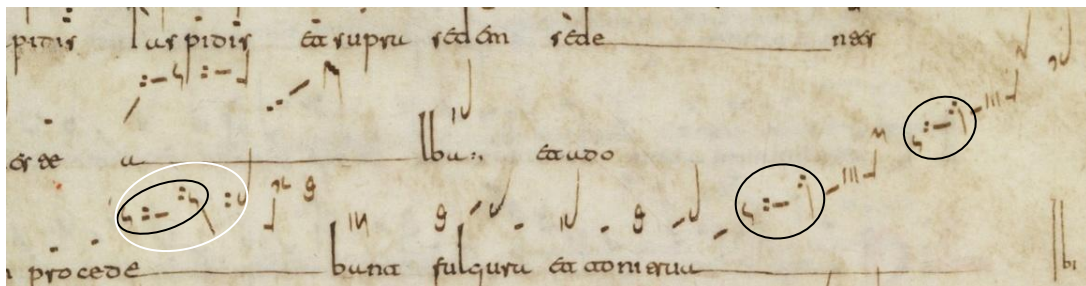


Figure 2. Melismas and common patterns on "procedebant" and "tonitrua".

She then states that material from these earlier melismas is repeated seven times "with increased intensity" towards the end. But this increased intensity is based on the fact that she missed one pattern and only partially annotated other patterns. Compare Figures 3 and 4. A third sloppiness is the annotation of her sixth pattern. That is not 10d, but 10c. But the biggest mistake is the fact that she only annotates seven identical patterns when there should have been eight (or perhaps six, see below).

Figures 3 and 4 show her and my annotated patterns with their labels. I have written out the neumes for all the labels in contour letters in Figure 3. Contour letters indicate the relative pitch of the notes: **o** stands for indefinite (the first note of a neume), **h** for higher than the previous note, **l** for lower, and **e** for the same pitch. Figure 4 shows the original manuscript with her and my annotations.

Except for the beginning and end, my annotated patterns cover all the notes of the melisma. Maloy's patterns are missing more passages (ω : omission). In one of those places, the eighth pattern appears, which refutes her argument. Each of her seven patterns (10c, d, and e) and my eight corresponding patterns (B, B', and C) ends with the same seven-note pattern: trigon, virga, trigon, in contour letters: **oel-o-oel**.

		1	2		3	4	5	6	7			
Maloy:	ω	10c	10c	ω	10d	ω	10e	ω	10d	10d(!)	10c	ω
		10c			o-oel-oel-o-oel							
		10d			oel-oel-o-oel							
		10e			oel-o-oel							

Fig 3. Patterns in the SEDIS melisma annotated by Maloy (top) and Maessen (bottom).

In the long melisma on the word "sedis" Maloy sees seven times a specific pattern. That melisma would thus refer to the previously mentioned "seven torches of burning fire" (*septem facule ignis ardentis*) and the subsequent "seven spirits of God" (*septem spiritus Dei*). For this reason, she calls this passage "perhaps the most vivid text setting in the repertory." However, she missed one pattern. There are not "seven", but "eight" patterns.

So, if there is a reference to the Apocalypse here, it is not in the number seven, but in the number eight. We find this in the Apocalypse as the completion of Creation (the ultimate "eighth day"), the new heaven and the new earth, the heavenly Jerusalem descending to earth (Apoc 21:1-11).³⁶ This also aligns better with the text of the sacrificium. For what do we see there in heaven (*Vidi in caelo*), three days after the Ascension of the Lord (*Ascensio Domini*) and a week before Pentecost? Who sits there on that throne (*sedenti in trono*), and what does He have to say us (*que oportet fieri post hec*)? That is not something about the number seven, but about the vision of a new world. This vision is possibly illuminated by seven torches in an eightfold pattern. But that eightfold pattern itself points to the vision rather than to torches or spirits.

³⁶ Thanks to Reinier van der Lof for this explanation.

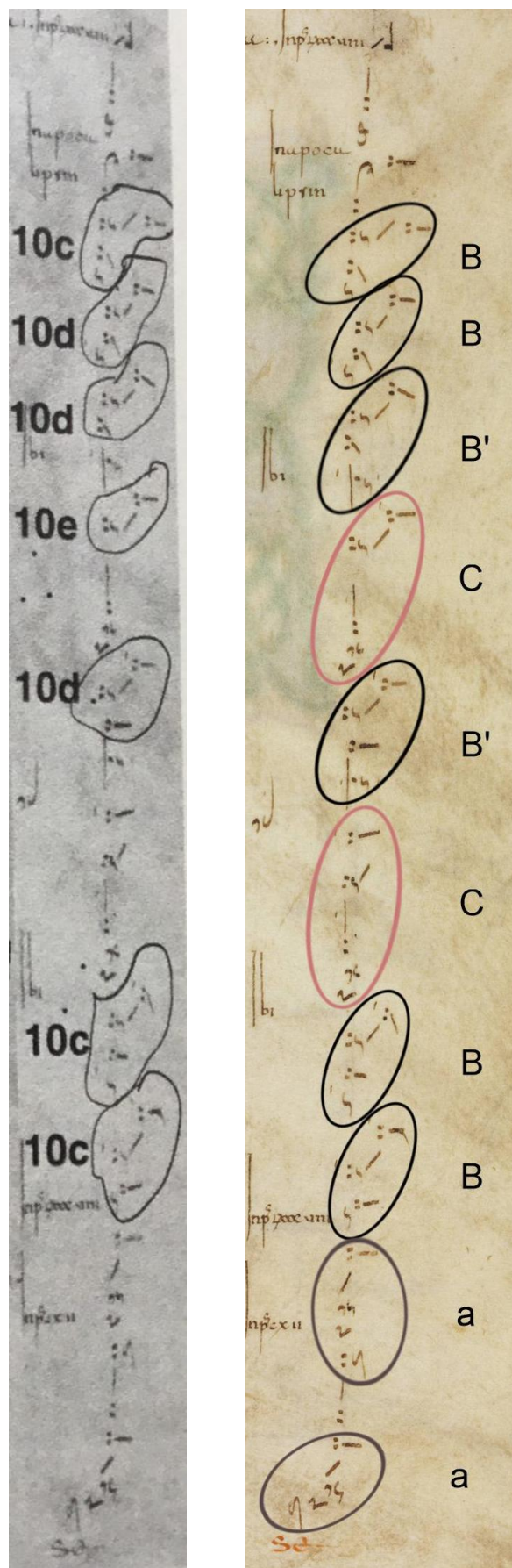


Fig 4. Patterns in the SEDIS melisma annotated by Maloy (left) and Maessen (right).

It is also possible, of course, that the number eight is purely coincidental. After all, that number appears in various melismas.³⁷ Or are all those melismas references to the eighth day? Maybe. After all, the liturgy as a whole can be seen as a reference to the new world. The number seven also appears frequently.³⁸ Does that number always refer to burning torches? Maybe. After all, the liturgy can be seen as the light that should open our eyes. Yet such interpretations seem more poetic than scientific.

Finally, there may only be six patterns, since pattern C shares only seven (or eight) notes with patterns B and B' (compare Figures 3 and 4). This might not be enough for identical intervals. In that case, only B and B' would end up identically (with ten or eleven notes), resulting in only six identical patterns.³⁹ The two possibilities (eight and six patterns) are illustrated in the score with two melodical options for C (see page 19 of this article).

The supposed textual expression of the Mozarabic melos is therefore much more subtle, or maybe much less subtle, than Maloy suggests. I have suggested this before. Then it concerned the words "ascende," "ascendit," and "descendit" in the sacrificium *Sanctificavit Moyses*.⁴⁰ Where Maloy saw only ascent and descent, I saw a genuine encounter. But perhaps, then also, my speculation was too far-fetched.

Conclusion

As I have shown, manually analyzing complex Mozarabic neumes is prone to serious errors. A clear, machine-readable encoding of these neumes could easily avoid such errors.⁴¹ Such encoding could also reduce the detection and comparison of patterns from laborious manual work to simple computations. This is precisely what I want to demonstrate with the melody of *Vidi in caelo* (generated by Conklin and edited by me).

We must conclude that computationally generated melodies can indeed lead to a better understanding of the tradition without pretending to represent the original melodies. This applies not only to the duration of chants, but also to the distribution of patterns, cadences, and melismas. Perhaps there is more. For example, our version of *Vidi in caelo* also shows that the lost melody might have been relatively simple. That is not something you can readily observe in the León neumes.⁴²

Finally, it's worth emphasizing once again that computationally generated melodies can serve as alternative chants in liturgies or concerts. If polyphonic settings by Gabrieli, Hassler, Haydn, and others are suitable for this, why not also chants from other monophonic traditions, or even computationally created Mozarabic pieces? Because, whether the generated melodies are "authentic" or not, they do unlock the Mozarabic melos, and they are certainly music.

³⁷ Melismas in the sacrificia *Ego Daniel* (E-L 8, 46r) and *Circuibio et immolabo* (104r) have e.g. 8 patterns.

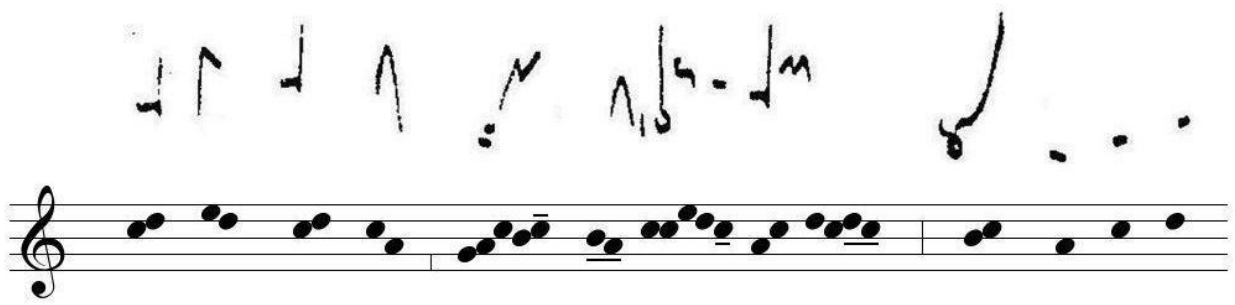
³⁸ Melismas in the sacrificia *Munera accepta* (E-L 8, 49r) and *Venient ad te* (54v) have e.g. 7 patterns.

³⁹ Melismas in the sacrificia *Venite benedicti* (E-L 8, 30v) and *Regnavit Dominus* (35v) have e.g. 6 patterns.

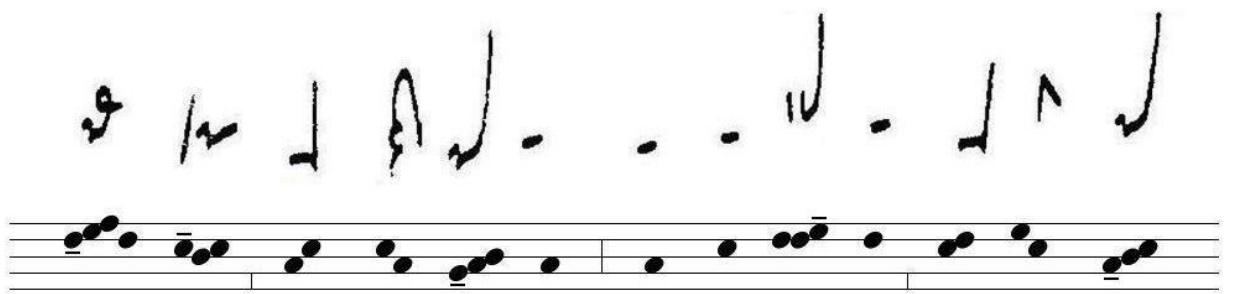
⁴⁰ Maessen & Conklin, o.c. (2018), see note 26 above (p. 6).

⁴¹ In 2018, Ishiro Fujinaga and his team were still intensively working on incorporating various medieval notations into the MEI format: Elsa de Luca, Jennifer Bain, e.a. "[Capturing Early Notations in MEI: The Case of Old Hispanic Neumes](#)," in: *Musiktheorie, Zeitschrift für Musiwissenschaft* 34-3 (2019), p. 229-249. In 2024, I heard from Emma Hornby that they had stopped this because they had concluded it was unfeasible. But in 2019, I had already encoded all sacrificia and offered them to the MEI community: Geert Maessen. "[The León Antiphoner: MEI and Manual Encoding](#)," *Music Encoding Conference*, Vienna (2019).

⁴² So it is "possible" that the melody was simple. "Possible" has two meanings: negative (we don't know; maybe), and positive (it's been proven possible). It is the second meaning that matters here.



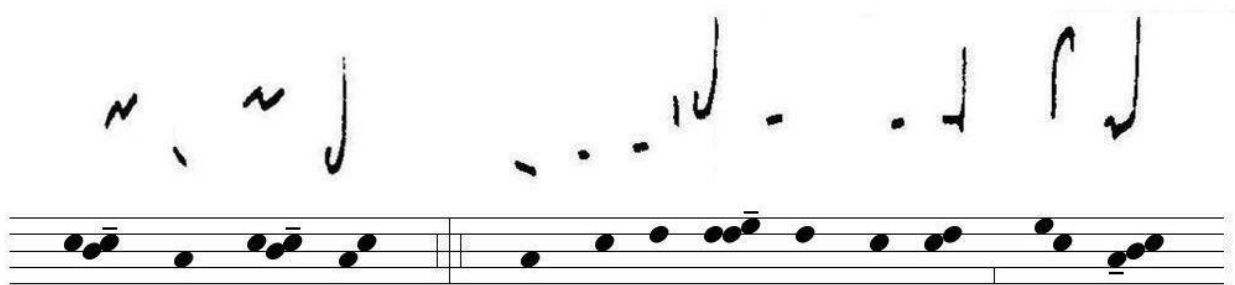
I. Vi-di in cae- lo tur- bam, quam di-nu-me-



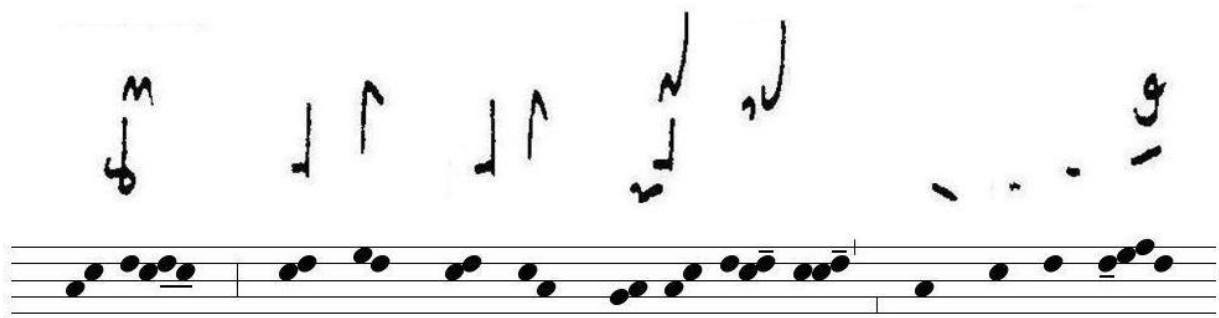
ra- re non po- te- ram, et cla-ma- bant vo- cem mag-



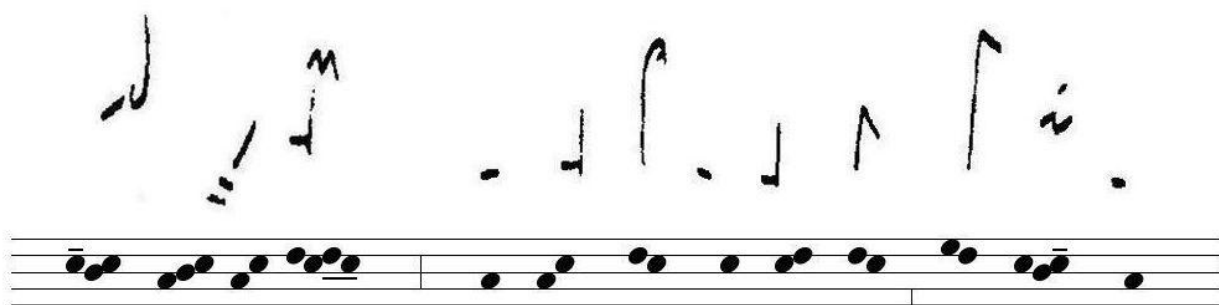
nam, sa- lus De- o nos- tro se-den-



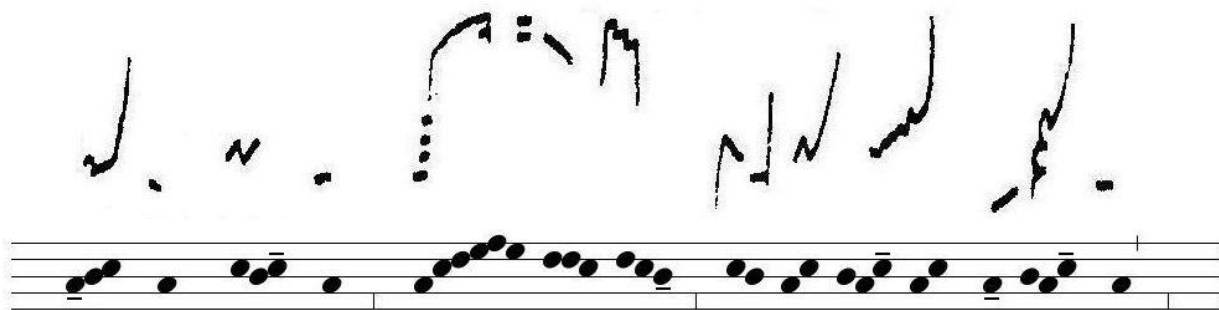
ti in tro- no, * et a-do- ra- bant e- um di- cen-



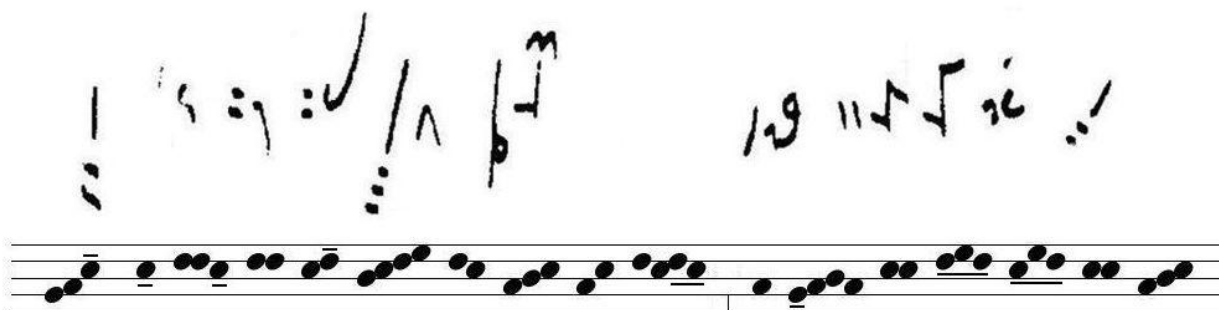
tes, ho- nor glo- ri- a et sa-pi- en-



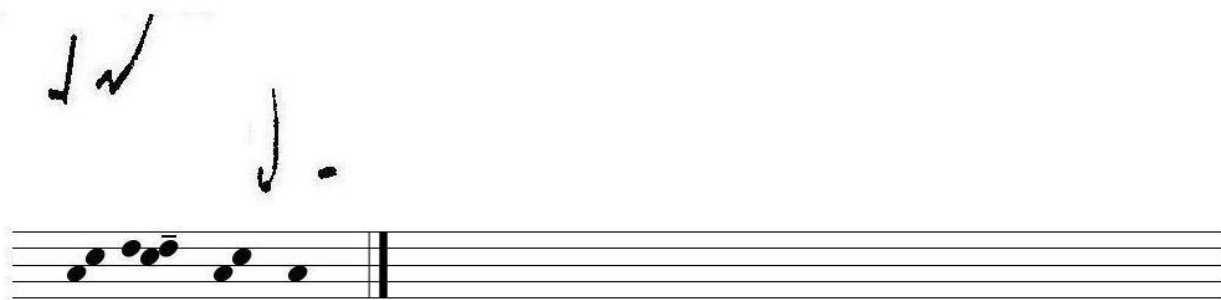
ti- a, vir- tus et po- tes- tas da- ta est



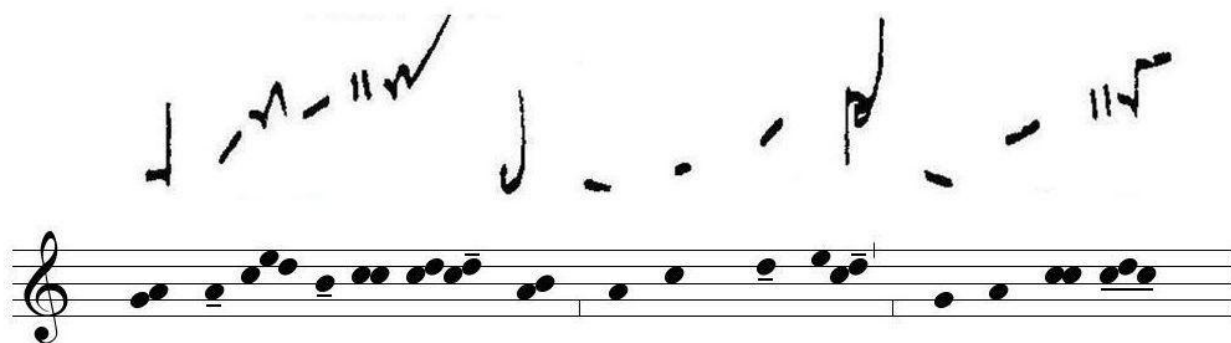
De- o nos- tro in ae- ter- num,



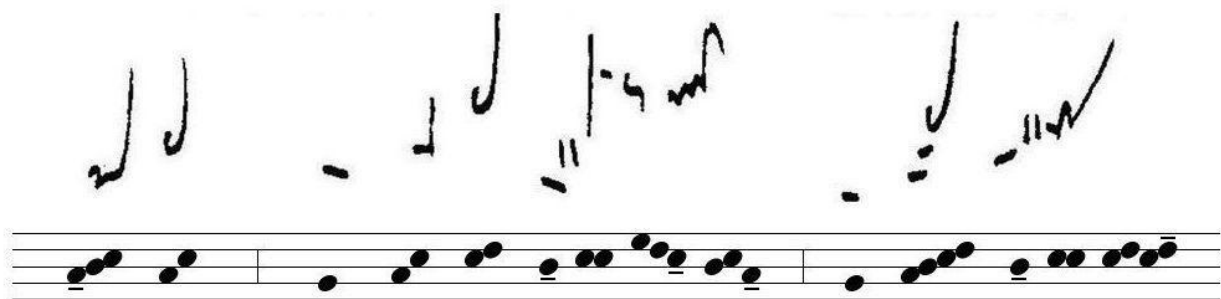
al- le-



lu- ia.



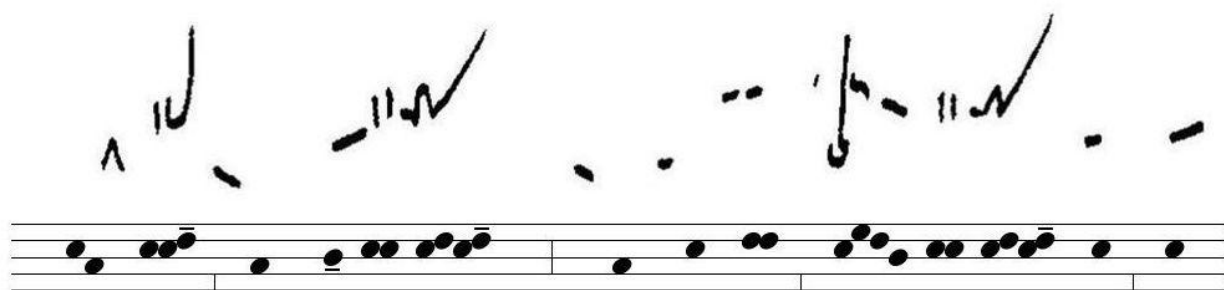
II. Au- di- bi tamquam tu- ba loquentem



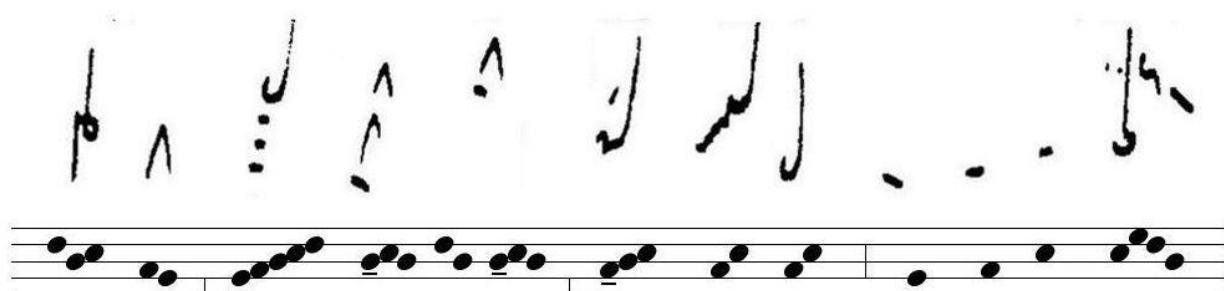
me- cum, et di- cen- tem, ascen- de



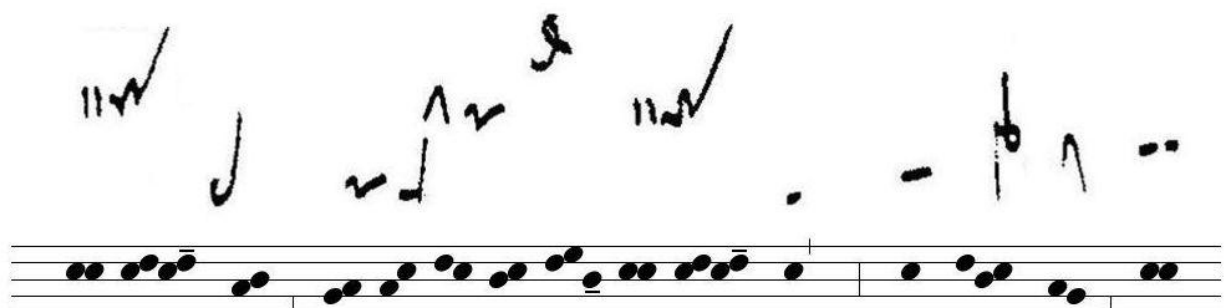
huc, et os- tendam ti- bi que o- por- tet fi-



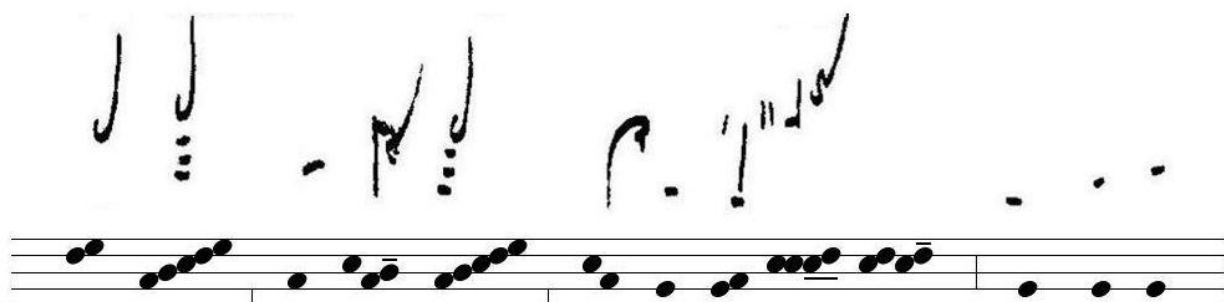
e- ri post hec, et ec-ce se- des po-



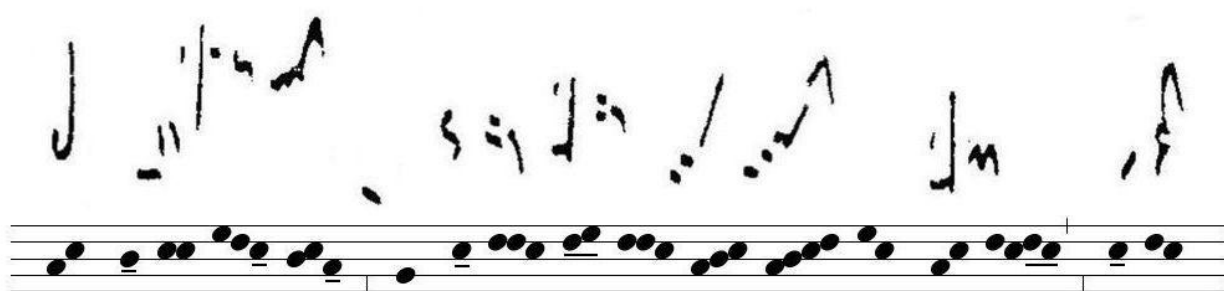
si- ta e- rat in cae- lo, et supra se-



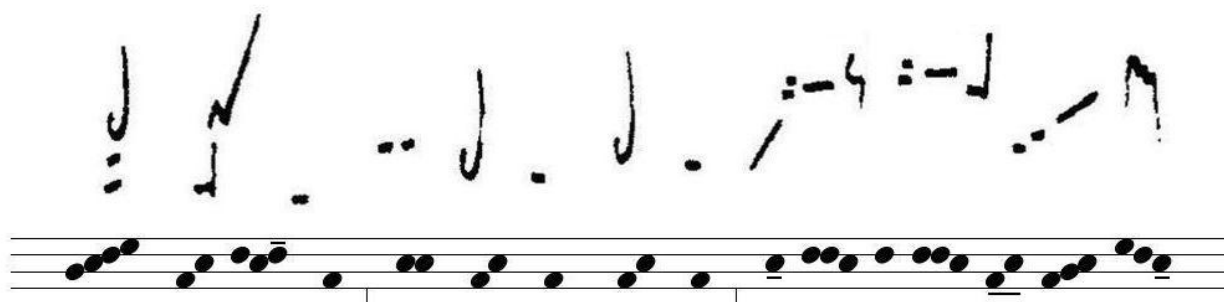
dem se- dens, si-mi- lis as-



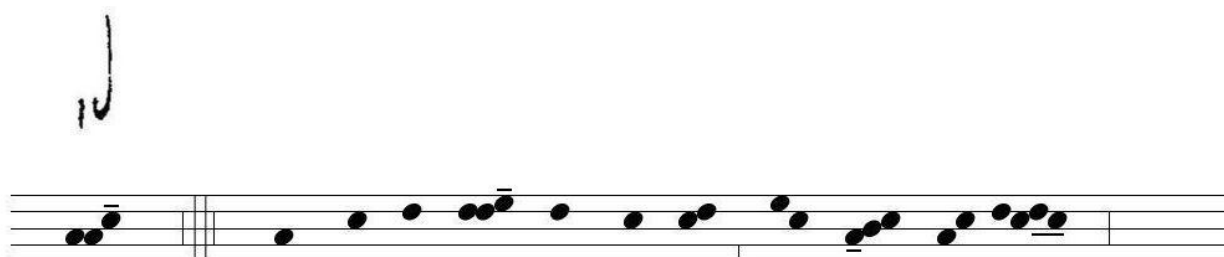
pec- tu-i la- pi- dis ias- pi- dis, et su- pra



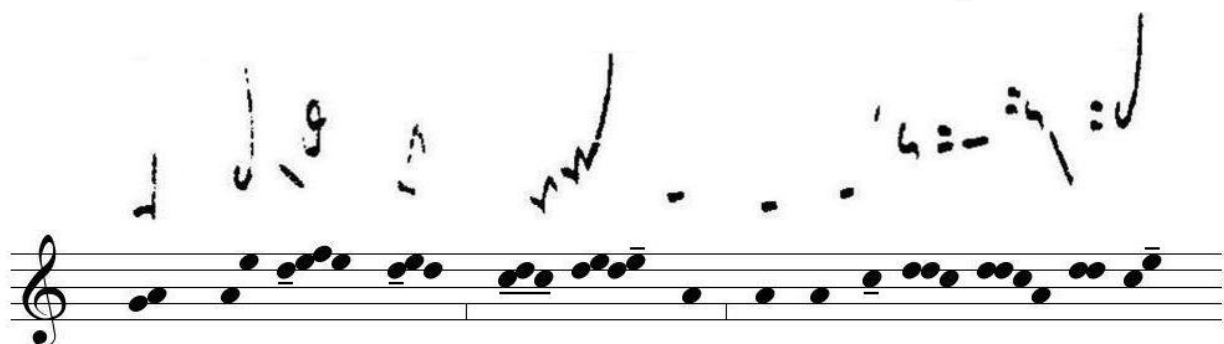
se- dem se-den- tes se-



ni- o- res a- mic- ti ves- te al-



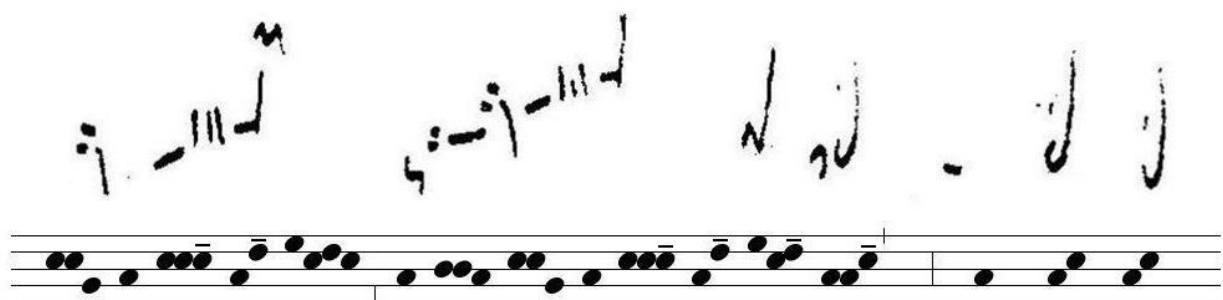
ba. * et a-do- ra- bant e- um di- cen- tes,



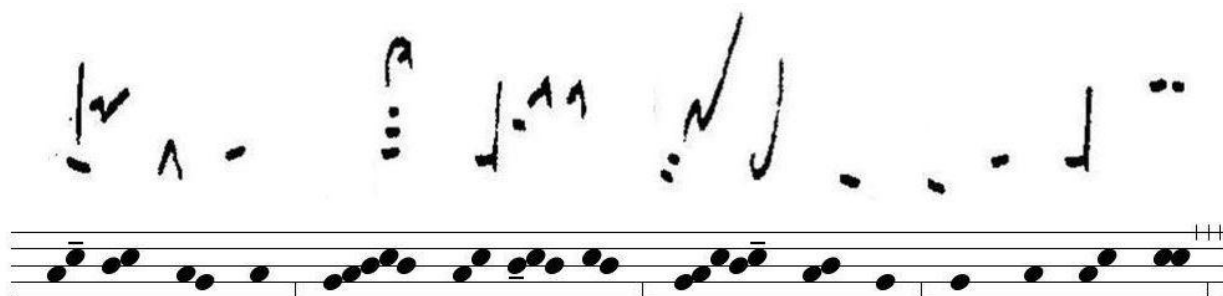
III. De se- de au- tem proce-de-



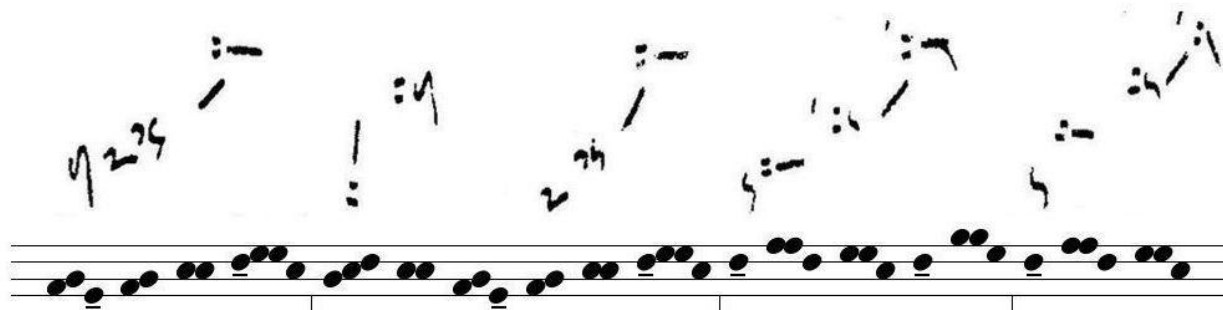
bant ful- gu- ra, et to- ni- tru- a,



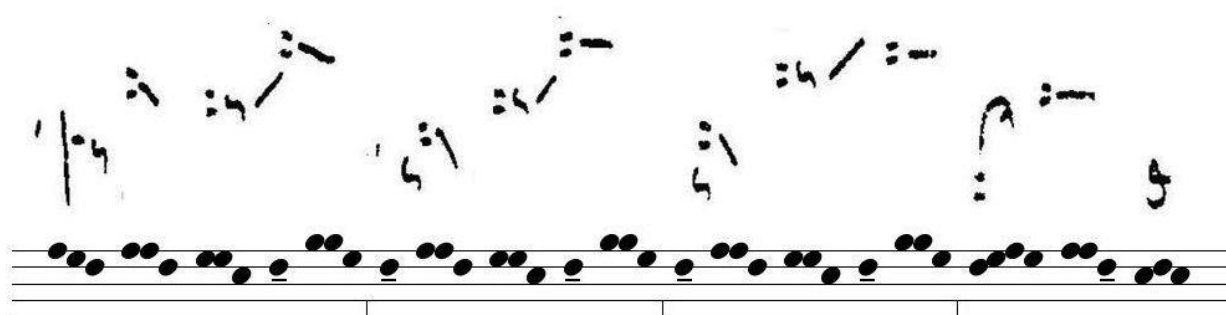
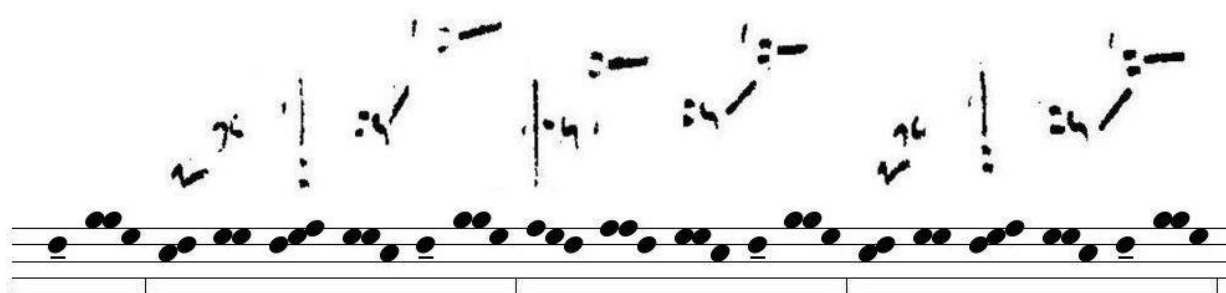
et sep-tem



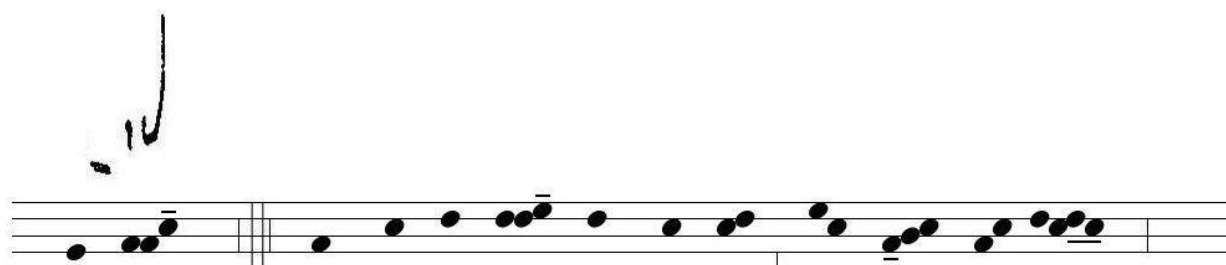
fa- cu- le ig- nis ar- den- tis in conspec- tu



se-



dis, quae sunt sep- tem spi- ri- tus



De- i. * et a-do- ra- bant e- um di- cen- tes,

063_203r03_Vidi in caelo turbam magnam

Apoc 7:9-12; ii Apoc 4:1-4; iii Apoc 4:5

Dom p Allis Dni

BM46*; BM44; T4

SCR. Vidi in caelo turbam, quam
dinumerare non poteram, et
clamabant vocem magnam, salus
Deo nostro sedenti in trono,
* et adorabant eum dicentes,
honor gloria et sapientia, virtus et
potestas data est Deo nostro in
aeternum, alleluia.

II. Audibi tamquam tuba
loquentem mecum, et dicentem,
ascende huc, et ostendam tibi que
oportet fieri post hec, et ecce
sedes posita erat in caelo, et supra
sedem sedens, similis aspectui
lapidis iaspidis, et supra sedem
sedentes seniores amicti veste
alba. * et adorabant eum dicentes,
honor gloria et sapientia, virtus et
potestas data est Deo nostro in
aeternum, alleluia.

III. De sede autem procedebant
fulgura, et tonitrua, et septem
facule ignis ardentis in conspectu
sedis, quae sunt septem spiritus
Dei. * et adorabant eum dicentes,
honor gloria et sapientia, virtus et
potestas data est Deo nostro in
aeternum, alleluia.

I saw in heaven a great multitude that
no one could number, crying out with
a loud voice, "Hail to our God who sits
on the throne!"

* And they worshipped Him, saying,
"Blessing and glory and wisdom and
power and might be given to our God
forever and ever!" Alleluia.

II. I heard what sounded like a
trumpet, saying to me, "Come up
here, and I will show you what must
happen hereafter." And behold, a
throne was set in heaven, and on the
throne sat one whose face was like a
jasper stone. On the throne sat the
elders, clothed in white robes,

* And they worshipped Him, saying,
"Blessing and glory and wisdom and
power and might be given to our God
forever and ever!" Alleluia.

III. From the throne came lightnings
and thunders, and before the throne
were seven torches of burning fire,
which are the seven spirits of God.
* And they worshipped Him, saying,
"Blessing and glory and wisdom and
power and might be given to our God
forever and ever!" Alleluia.