



Research Article

A historical and statistical view on Old-Roman, Gallican, and Gregorian Chant

Dirk van Kampen¹

Conductor of the Schola Rhythmus et Metrum, Amsterdam, The Netherlands

Article Info

Received: 15 April 2025

Accepted: 28 August 2025

Online: 30 December 2025

Keywords

Gregorian chant

Roman chant

Old-Roman chant

Gallican chant

History of Gregorian chant

Stepwise melodic motion

Ornamentation

Quilisma

Abstract

In this article, using a sample of 30 cognate Old-Roman and Gregorian proprium chants, support was obtained for the view that the stylistic features that may be assumed to characterize eighth-century Roman chant—such as the presence of tremulous notes and the use of imprecise pitches—are not only recognizable in Old-Roman chant in the form of a greater focus on stepwise melodic motion and a diminished interest in tonality and melodic structure, but also in those Gregorian chants that manifest a high degree of global contour similarity with their Old-Roman counterparts, the latter sometimes assumed to be the descendent of eighth-century Roman chant. It seems clear therefore that the stylistic features of Old-Roman chant do indeed reflect the pulsating, sinuous and tremulous notes in eighth-century Roman chant. For the remaining Gregorian chants with less contour similarity, rather the opposite characteristics were found. So in this case, and still depending on the general hypothesis that Gregorian chant originated from a blend of eighth-century Roman chant and Gallican influences, Gallican melodies appear to be comparatively more important in the shaping of Gregorian chant. Attention was also paid to the work of Hiley and McGee, as these authors offered additional information about the stylistic features of early local Roman chant. In agreement with the above-stated assumption of tremulous notes and imprecise pitches in eighth-century Roman chant, some evidence was finally obtained to corroborate the view that at least the quilisma note in Gregorian chant originated from eighth-century Roman chant.

3023-7335 / © 2025 the JMTTMS.
Published by Genc Bilge (Young Wise)
Pub. Ltd. This is an open access article
under the CC BY-NC-ND license



To cite this article

Van Kampen, D. (2025). A historical and statistical view on Old-Roman, Gallican, and Gregorian Chant. *Journal of Music Theory and Transcultural Music Studies*, 3(2), 79-90. DOI: <https://doi.org/10.5281/zenodo.18185459>

Introduction

Though several conflicting theories do still exist (see, e.g., Cutter, 1967; Levy, 2000), most present-day scholars of monophonic liturgical chant adhere to the hypothesis that what we now call Gregorian chant originated from a blend of eighth-century local Roman chant and Gallican influences (Ober, 2006).² There is much to say for this hypothesis, particularly if account is taken of the historical data mentioned below. From a purely musical perspective, however, this hypothesis does not provide much information, because, strictly speaking, nothing is known about the melodies of eighth-century Roman and Gallican chant. However, some scholars have argued that the so-called Old-Roman repertory, which has been preserved in notated manuscripts from the late eleventh to the thirteenth century (Huglo, 1954), must be considered the musical descendant of the eighth-century local Roman chant (Hiley, 1995; Dyer, 1998). Thus, according to Hiley (1995: 562), it is ‘highly likely that the Roman chant of the eighth century already had an ornate idiom, in other words, that Old-Roman chant preserves the spirit, if not always the letter, of the eighth-century state’.

¹ PhD, Conductor of the Schola Rhythmus et Metrum, Amsterdam, The Netherlands. E-mail: kampendf@gmail.com

² At various places in this publication, we speak of the Gallican liturgy, Gallican chant, and Gallican influences. However, this is a simplification, because it is not possible to speak of an uniform rite. Rather, the Gallican liturgy involves many variations within a general pattern (see Hiley, 1995: 552).

From this perspective, we may even use the known ornamental features of Old Roman chant as a substitute for the unknown ornamentation in eighth-century Roman chant. Others, however, have postulated that the Gregorian melodies, which were notated from the late-ninth century onwards, more closely reflect the eighth-century Roman chant (see, e.g., Liphardt, 1950; Maloy, 2010). With respect to the Gallican repertory, little can be said with certainty, though it is known that some archaic musical traits in Gregorian chant are still reflective of the musical language of Gallican chant (Nardini, 2018).

In this paper, a statistical study will be presented, based on a sample of 30 cognate Old-Roman and Gregorian proprium chants, to test the hypothesis that those Gregorian melodies that show a high degree of global contour similarity with their Old-Roman counterparts are also stylistically more reminiscent of the Old-Roman repertory. With that aim in mind, several stylistic variables, which mainly refer to *stepwise melodic motion*, will be examined in the present article, as that trait is usually considered to be particularly helpful in discriminating between Gregorian and Old-Roman chant (see, e.g., Snow, 1958). Global contour similarity will be so defined that there is no conceptual overlap with the stylistic features of interest in this study. Sticking to Hiley's (1995) contention that the stylistic features of eighth-century Roman chant were preserved in later Old-Roman chant, support for the just-mentioned hypothesis would also mean support for the view that Gregorian chant originated from eighth-century Roman chant. So, to say something conclusive about the temporal relationship between Gregorian and Old-Roman chant, it is important to find data which corroborates Hiley's position. In those Gregorian chants, which show only little melodic similarity with their Old-Roman counterparts, Old-Roman style characteristics are expected to occur to a lesser degree. Given the view (see above) that Gregorian chant at least partly stems from Gallican chant, we may then infer that Gallican influences are the more important. Finally, support for the notion that Old-Roman chant, because of its stylistic features, is actually 'pre-Gregorian', would also indicate the untenability of Maloy's (2010) conclusion that Gregorian chant equals early Roman chant.

Historical Data

The local Roman chant repertory or *cantilena romana* was imported into Francia in 754 by Chrodegang, the Bishop of Metz. Chrodegang was delegated to Rome by King Pippin III to accompany Pope Stephen II on his trip to Gaul to ask the king for military assistance against the Lombards, who were threatening Rome. Awaiting Pope Stephen's departure, Chrodegang had every opportunity to observe the Roman celebrations of Mass and Office, which undoubtedly must have made a tremendous impression on him (see Nolthenius, 2009: 104). During his trip to Francia, Chrodegang also became acquainted with the Roman chant and liturgy, for we know that several members of the papal *schola cantorum* formed part of Pope Stephen's travelling party (Ober, 2006: 10). Inspired by these experiences and being aware that the Frankish church before the reign of Pepin was deeply fallen into decay, it comes as no surprise that Chrodegang did everything in his power to introduce the Roman customs in his own country (Claussen, 2004).

Alignment with the Roman model

A more or less contemporary description of Chrodegang's efforts to introduce the Roman chant in his own bishopric is presented by Paul the Deacon in his *Liber de Episcopis Mettensisibus*, which was written about 784 (Kempf, 2004). Here we are informed that Chrodegang assembled his clergy and made them live on the model of a monastery within the walls of a cloister, where he established for them a rule—how they ought to serve in church. He endowed them sufficiently with victuals and the necessities of life so that, not needing to spend time on transitory matters, they might solely celebrate the Divine Office. When the clergy [probably with the help of the above-mentioned *schola cantors*] was abundantly imbued in the divinely authorised Roman chant, he prescribed them to observe the custom and ceremonial of the Roman church, which before that time was scarcely done in the Metz Cathedral³. It is interesting to note that Chrodegang had no intention to 'monasticise' the clergy, notwithstanding Paul's remark about 'living on the model of a

³ Hic clerum adunavit, et ad instar coenobii intra claustrorum septa conversari fecit, normamque eis instituit, qualiter in ecclesia militare deberent; quibus annonas vitaeque subsidia sufficienter largitus est, ut perituri vacare negotiis non indigentes, divinis solummodo officiis excubarent. Ipsumque clerum abundantanter lege divina Romanaque imbutum cantilena, morem atque ordinem Romanae ecclesiae servare praecepit, quod usque ad id tempus in Mettensi ecclesia factum minime fuit (Monumenta Germaniae Historica, Scriptores (in folio) 2).

monastery'. On the contrary, instead of a group of contemplative monks, he wanted to establish a group of active churchmen around him who were eager to transform the Metz population into a true Christian community. Because Rome was believed to be the source of all authentic Christian traditions, it was only natural to introduce the Roman customs in Metz, including Roman liturgy and chant, in order to create a community of faith and concord in agreement with the perceived unanimity of the apostolic church (see Claussen, 2004: 58, 117, 246).

In other bishoprics of Gaul, similar attempts were made to introduce the Roman chant and liturgy. We know, for instance, from a letter of about 760 written by Pope Paul I and addressed to Pippin III, that Remedius, the bishop of Rouen, was sent the prior of the papal schola cantorum to instruct Remedius' monks how they had to perform the Roman melodies. In the same letter, we are also informed that the Pope had to recall the prior to replace the deceased head of the papal schola, but the Pope assured Pippin III that the same monks, who were now in Rome, would be further trained by the prior (Levy, 2001). Because this schola member was sent to Rouen on Peppin's request, we may safely assume that Peppin himself also was interested in the introduction of the Roman liturgy in his kingdom, perhaps not so much for spiritual reasons, but certainly for political ones.

Under the reign of Pippin's son Charlemagne, further attempts were made to introduce the cantilena romana in Gaul. For instance, in the *Admontio generalis* of 789, a collection of 82 directives, Charlemagne urged the clergy 'That they are to learn the Roman chant thoroughly and correctly employ it throughout the night and day offices, as our father of blessed memory, king Peppin, strove to realise when he abolished the Gallican chant for the sake of unity with the Apostolic chair and pacific concord within the holy church of God'⁴. We see here the same care as manifested by Chrodegang in that Charlemagne was convinced about the necessity that the clergy should correct all subjects of the empire toward a Christian ideal, which could be effectuated through alignment with the Roman model (see, e.g., Fried, 2016: 235). To fulfil these aims, royal inspectors—the so-called *missi*—were sent out all over the country to verify whether the clergy adhered to the official directives, including those on liturgy and chant (see, e.g., van Rhijn, 2011).

The abolition of the Gallican liturgy was also explicitly mentioned by Charlemagne in the *Epistola generalis* (786-800) and the *Libri Carolini* of about 790. In the last-mentioned document, for instance, Charlemagne states that the Frankish church, 'While being from the earliest times of faith of the same holy religion as the Roman church, ... [is now] by the care and industry of our most distinguished and most excellent father King Peppin of venerable memory as well as by the arrival in Gaul of the most respectable and holy bishop of the city of Rome, Stephen, also joined to the Roman church in the order of singing, so that the order of singing would not be different from those who share the order of faith and who are united in the sacred reading of the sacred prescriptions'.⁵

Gallican influences and Roman criticisms

The documents mentioned thus far do only speak of the willingness of Chrodegang, Pippin and Charlemagne to abandon the Gallican liturgy completely. However, there are several indications that Peppin's and Charlemagne's desire for a liturgical and musical reform, solely based on the Roman rite, was only partly realised. This is already obvious if we realise that between 750 and 800, two important liturgical texts were compiled in Francia, the *Mixed Gelasian sacramentary* and a blended version of the *Ordines Romani*, which both contain Frankish and Roman elements (Ober, 2006). The introduction of these hybrid texts was necessary because for many ceremonies observed in the Gallican church, there was simply no substitute in the Roman liturgical books (Wright, 2008: 61). Moreover, the Gallican practices were probably too deeply rooted to be completely thrown out by superior order.

Two other documents do specifically mention chant. In the first one, entitled *De exordiis* and written by the monk Walahfrid Strabo between 840 and 842, it is still claimed that the musical reform under Pippin 'brought the more perfect knowledge of plain chant, which almost all Francia now loves.' (Harting-Correa, 1996: 168). Nevertheless, Walahfrid

⁴ Ut cantum Romanum pleniter discant, et ordinabiliter per nocturnale vel gradale officium peragatur, secundum quod beatae memoriae genitor noster Pippinus rex decerit ut fieret, quando Gallicanum tulit ob unanimitatem apostolicae sedis et sanctae Dei ecclesiae pacificam concordiam (Monumenta Germaniae Historia, Capitularia regum Francorum I, Leges Capitularia regum Francorum).

⁵ Quae dum a primis fidei temporibus cum ea perstaret in sacrae religionis unione ... venerandae memoriae genitoris nostri inlustrissimi atque excellentissimi viri Pippini regis cura et industria sive adventu in Gallias reverentissimi et sanctissimi viri Stephani romanae urbis antestitis est ei etiam in psallendi ordine copulata, ut non esset dispar ordo psallendi, quibus erat compar ardor credendi, et quae unitae erant unius sanctae legis sacra lectione (Monumenta Germaniae Historia, Concilia, tom. 2, suppl. 1).

also reports that the Gallican church was ‘provided with men who were no less skilled [than the Roman cantors], and had a great deal of material for the offices. Some of the Roman offices are said to have been mixed with theirs.’ (Harting-Correa, 1996: 166).

The second document, which refers to a mixture of Roman and Gallican chant, is John the Deacon’s *Vita Gregorii* of c. 875. In this document, the author informs us that ‘The Germans, Gauls and other European peoples might have learned and relearned in a somewhat peculiar way the sweetness of this chant, they were, however, unable to maintain it without distortion. This was due both to carelessness, for they mixed in music of their own with the Gregorian [Roman] chants, and to a native brutishness of their Alpine bodies. With their loud and thunderous voices, they could not correctly capture the musical sweetness of the [Roman] chant. The barbarous coarseness of their thirsty throats, when trying to deal with the inflexions and repercussions of the [Roman] chant, would bring about a roaring sound, just like the confusing racket of a cart upon unequal steps.⁶ It is obvious that there is little praise for the Frankish singers in the *Vita Gregorii*. Also of interest, the Roman cantilena is here denoted Gregorian, which is in agreement with the ninth-century legend that Pope Gregory the Great had invented Gregorian chant.

Roman embellishments

As mentioned above, about the precise differences and similarities between the eighth-century Roman, Gregorian (or mixed Roman-Gallican) and Gallican melodies, little can be said with certainty. Of some help, however, but unfortunately dating from the same period as the earliest notated Gregorian sources, we have John the Deacon’s account in the *Vita Gregorii* of circa 875 (see above) that the Franks had the greatest difficulty with singing properly the *inflexiones* and *repercussiones* of Roman chant. Adémar de Chabannes (see Grier, 2006), in the beginning of the eleventh century, falls back on these remarks, writing that ‘All the cantors of the Frankish kingdom have learned the Roman notes which they now call Frankish, except that the French could not perfectly express the tremulous or sinuous notes (*tremulae* or *vinnolae*) and the notes that are to be *elided* or *separated*, being naturally of barbaric voice, and rather cracking their voices in their throats than projecting them’.⁷

What exactly is meant by these designations is not always clear (see, e.g., Hiley, 1995: 562). However, according to a solution presented by McGee (1996, 1998), the inflections and repercussions mentioned by John the Deacon, as well as the sinuous and tremulous notes of Adémar, refer to two currently recognised categories of ornamental neumes—liquefiant and repercutting neumes—that were distinguished by Apel (1958: 104) and other scholars. Yet, no direct evidence exists to support these equalisations, and the medieval treatises inspected by McGee (1998: 12) to identify the various ornaments encompass the dates c. 600 to c. 1490. So, at least at first sight, it seems inappropriate to consult all these treatises.

Assuming, however, as McGee (1998: 14) does, that the information contained in later manuscripts is still reflective of the situation in earlier centuries, McGee may be right in claiming that early Roman chant was sung in an Eastern Mediterranean style, characterised by non-diatonic tones, rapid throat articulation, pulsating notes, trills, and indefinite and sliding pitches (see, e.g., McGee, 1998: 127), all of them adding to the inability of the northerners to properly adapt their voices (see also Nolthenius, 2009: 110).

It is difficult to say whether all the embellishments mentioned by McGee really represent the Roman vocal style before say, the ninth century. Moreover, we hardly have any indication which of these Roman ornaments caused serious problems to the Gauls. Fortunately, however, we are rather well-informed about the meaning and musical significance of exactly the *tremula*, and perhaps even of the *vinnola* notes of Adémar, which have led to these problems (see above). As both ornaments were mentioned in the *Musica Disciplina* of Aurelian Reomensis, a textbook about Gregorian

⁶ Huius modulationis dulcedinem inter alias Europae gentes Germani seu Galli discere crebroque rediscere insigniter potuerunt, incorruptam vero tam levitate animi, quia nonnulla de proprio Gregorianis cantibus misuerunt, quam feritate quoque naturali, servare minime potuerunt. Alpina siquidem corpora, vocum suarum tonitruis altisone perstrepentia, susceptae modulationis dulcedinem proprie non resultant, quia bibuli gutturis barbara feritas, dum inflexionibus et repercussionibus mitem nititur edere cantilenam, natarali quodam fragore, quasi plaustra per gradus confuse sonantia rigidas voces iactat (Patrologiae cursus completus, Series Latinae, 75, col. 90).

⁷ Omnes Franciae cantores didicerunt notam Romanam, quam nunc vocant notam Franciscam, excepto quod tremulas vel vinnolas sive collisibles vel secabiles voces in cantu non poterant perfecte exprimere Franci, naturali voce barbarica frangentes in gutture voces pocius quam exprimentes (Monumenta Germaniae Historica, Scriptores, in folio).

chant written in 849/850 (see Glatthaar, 2011), we may first infer that these Roman embellishments were also used to colour Gregorian chant. Of more importance, it is interesting to note that the tremula was considered in the *Musica Disciplina* to be a ‘tremulous and rising sound’, which, given a musical example presented by Aurelianus, certainly referred to what in later manuscripts was indicated by the *quilisma* (Treitler, 1992: 191; Grier, 2006: 70). However, as the French and Germans found the Roman embellishments difficult to sing (see above), it seems likely that the *quilisma* more recently was executed ‘in a more straightforward idiom’, no longer emphasizing fine detail (Hiley, 1995: 562). No further explanation was provided by Aurelianus of Adémar’s *vinnola* note. Still in Isidore of Seville’s *Sententiae de Musica* (c. 600), the *vinnola vox* was given attention, describing this voice as ‘soft’, ‘light’, and ‘agile’, characteristics which were said by Isidore to reflect the flexible and wavy shape of the ‘*vinnus*’ or grapevine. For Müller-Heuser (1963: 69), this resemblance is enough proof for the assertion that these vocal qualities point to the presence of trill-like embellishments in Roman chant. Still, nothing is known about the exact manner of singing of the *vinnola* note.

Musical style characteristics and (Old-)Roman chant

Collectively, the above-mentioned features, as well as other ones, like the absence of a strong focus on melodic lines, are considered to represent the *florid* or *continuous* musical style, which differs greatly from the *discrete* musical style with its emphasis on precise diatonic pitches, larger intervals between individual notes, a primary focus on melodic structure, and neumes that are barely if at all ornamented (see, e.g., Hughes, 2002: 1080; Rankin, 2011). This dichotomy can also be found in Aribō’s *De Musica* (11th century), in which we are informed that the cantus in Italy has a greater density (‘*spissior*’), whereas the cantus north of the Alps is more open (‘*ravior*’), particularly because of the ‘*saltatrices*, the intervallic leaps, which were avoided in the South or filled in by diatonic steps’ (Nolthenius, 1974: 15).

Florid features are also apparent in eleventh- to thirteenth-century Old-Roman chant. Based on descriptions of several authors (e.g., Snow, 1958; Crocker, 1990), McKinnon (2000: 381) summarises the evidence by saying that Old-Roman chant, as opposed to Gregorian chant, can be characterised by ‘an overlay of formula and consistently stepwise ornament that is ‘monotonous,’ ‘verbose,’ ‘redundant’ and ‘less purposeful’ than Gregorian melody, which is more ‘compact,’ ‘definitive,’ more ‘purposeful’ and, to expand upon that last word, more characterised by the ‘intense expression of a tonal plan.’’ The last-mentioned trait is considered by McKinnon (2000: 381) to be the main stylistic feature of Gregorian chant.

Though probably not in all respects similar, certain commonalities do exist between the stylistic characteristics of eighth-century Roman and later Old-Roman chant. In particular, the florid and oscillating nature of Old-Roman chant, represented by turning figures and an almost continual stepwise motion, might be understood to reflect the early Roman emphasis on pulsating, sinuous and tremulous notes. Likewise, the Old-Roman preference for melodies that show progression by step may have its early equivalent in the use of indefinite and imprecise or non-diatonic pitches, which also obscure the melodic line. With a chronological gap of at least three centuries, in which further developments of Roman chant may have taken place, stronger relationships can hardly be expected. Nevertheless, we may be pretty sure about these relationships, because theoretical treatises from as late as the thirteenth century still discuss some of the same ornamental figures as mentioned above (see McGee, 1998: 124). So, in our view, it seems likely that eleventh- to thirteenth-century Old-Roman chant grew out of the chant imported in Francia into 754. Hence, we agree with Hiley’s (1995) statement (see above) that Old-Roman chant still preserves the spirit, ‘if not always the letter’ of its eighth-century predecessor. At least, there is no compelling reason to agree with Maloy’s (2010: 143) statement that the original Roman melodies were largely forgotten in later times and that the stylistic characteristics of Old-Roman chant are only the product of centuries of oral transmission. If it is true that Gregorian chant originated from a blend of early Roman and Gallican chant, it seems also likely that Gallican chant, perhaps even more than Gregorian chant, is stylistically discrete, and thus may be characterised by a focus on structure and a purposeful tonal plan.

Statistical Data

To study the relationship between Old-Roman and Gregorian chant, 30 cognate melodies (only the antiphons) were randomly selected, referring to 10 introits, 10

Table 1. Titles of 30 cognate melodies are listed according to proprium type and page number in the *Graduale Novum*.

GrN	<i>cantus</i>
IN 3	Ad te levavi
IN 11	Gaudete in Domino
IN 20	Dominus dixit ad me
IN 43	Ecce advenit
IN 52	Misereris omnium
IN 60	Invocabit me
IN 83	Laetare Ierusalem
IN 128	Nos autem gloriari
IN 165	Resurrexi
IN 216	Spiritus Domini
CO 6	Dominus dabit benignitatem
CO 15	Dicite pusillanimes
CO 23	In splendoribus
CO 32	Viderunt omnes fines
CO 46	Vidimus stellam
CO 59	Qui meditabitur
CO 69	Scapulis suis
CO 110	Pater si non potest
CO 169	Pascha nostrum
CO 213	Psallite Domino
OF 5	Ad te Domine levavi
OF 23	Laetentur caeli
OF 31	Tui sunt caeli
OF 45	Reges Tharsis
OF 58	Exaltabo te Domine
OF 86	Laudate Dominum
OF 109	Improperium exspectavit
OF 168	Terra tremuit
OF 219	Confirma hoc Deus
OF 231	Dextera Domini

Note. IN = *introitus*, CO = *communio*, OF = *offertorium*, GrN = *Graduale Novum*

communions, and 10 offertories. For the Old-Roman version of these melodies, the *Gradual of Santa Cecilia in Trastevere* (Codex Bodmer 74), dating from 1071, was consulted (see Lütolf, 1987). This Gradual is the oldest one from five extant sources that contain Old-Roman chant, written in Rome between the 11th and the 13th century. For the (melodically corrected) Gregorian melodies, we used the *Graduale Restitutum* compiled by Anton Stingl, which is published on the internet (see <http://www.gregor-und-taube.de>). Though not referring to a particular manuscript, this Gradual can be said to reflect the earliest Gregorian melodies, based as it is on the oldest adiastematic manuscripts from the 10th century as well as on the most important diastematic witnesses from the 11th century (see the *Preface* in the melodically corresponding *Graduale Novum* of 2011). So, the 30 cognate melodies as contained in our sample make the earliest melodic rendition possible of both the Old-Roman and the Gregorian proprium chants.

The 30 chants—classified according to proprium type—are listed in Table 1 in order of their page numbers in the *Graduale Novum*. As we will see below, the chants were scored for several variables, some of them characterised by a focus on stepwise melodic motion, supposed to be particularly present in Old-Roman chant, and others representing McKinnon's (2000) claim about the occurrence of some specific tonal clusters in Gregorian chant. Moreover, attention will be paid to the view (see above) that the execution of the *quilisma* note in Gregorian chant actually was derived from early Roman chant.

The investigation presented in this paper is not the first one based on cognate Old-Roman and Gregorian melodies. For instance, in a recent investigation by Maloy (2010), 94 cognate melodies were studied, comprising the whole set of offertory chants in the liturgical year. However, as we are also interested in other types of proprium chant, we opted for a different data set, previously established by Van Kampen (2020), which includes both offertories, introits and communio chants. We also decided to make no use of the five levels and the underlying continuum introduced by Maloy

(2010: 106), with scores ranging from 1 (= strongly related) to 5 (= completely dissimilar), to describe the similarities and differences between Old-Roman and Gregorian chant. Of course, Maloy (2010) is right if she insists that the Old-Roman offertory verses are often based on formulaic patterns or that the Gregorian melodies are more expressive in range and show more individuality in their melodic contours, but her reliance on these characteristics, as well as on other features like the greater presence of formulae in the later parts of the liturgical year, the mode of the melody, and the formula's association with syntactical rules or word accent, makes her continuum more a kind of *latent variable* with different traits loading on it. It remains, therefore, unclear—as Maloy (2010: 106, 110) herself admits—how these different traits are weighted to arrive at a particular score for a certain chant. One additional reason to sustain from Maloy's approach has to do with her principal interest in *structural* criteria (like melodic range and tonal structure), rather than in stylistic features (such as the tendency towards stepwise melodic motion). While it is understandable, therefore, that Maloy prefers to analyse her sample on a *phrase-by-phrase* basis, without paying much attention to individual syllables (see Maloy, 2010: 107), such a procedure appears to be less appropriate for the testing of our hypothesis, stated in the Introduction, that those Gregorian melodies that show a high degree of melodic similarity with their Old-Roman counterparts are also *stylistically* more reminiscent of the Old-Roman repertory. Though, of course, not denying the possibility of a structural analysis on a phrase-by-phrase basis,⁸ our criteria are primarily syllable-dependent.

D as a measure of global contour similarity

In our approach, we used an index (D) to measure the degree of contour similarity between both versions of a cognate melody. As already indicated above, this measure takes the individual neume or syllable as the basic unit of interest when dividing a particular melody into separate parts. 'Similarity' and 'difference', then, are put into a theoretical framework, as the correlations found by Van Kampen (2017) between text and neume duration in Gregorian chant do clearly 'converge with the emphasis placed by Agustoni and Göschl (1987) and Cattin (1984) on the (sacred) word as the ultimate factor through which the syllables exert their influence.' Indeed, Gregorian chant is characterised by Cardine (1975: 33) as "parole chantée".

Realising that, in the case of exactly the same melody, the pitches of the Old-Roman version correlate $r = 1$ with the pitches of the Gregorian version, a high degree of contour similarity may be expected if the MIDI values related to, say, the highest notes in both series of neumes per chant prove to be strongly proportional to each other.

In estimating the degree of contour similarity for each pair of cognate melodies, we did not only register the MIDI values of the highest note (H) in both series of neumes for a particular chant, but also the values of the lowest note (L), the first note (O), and the last note (E) of these neumes. Moreover, for each of the 30 cognate melodies, the mean (M) of these values was calculated, because M seemed to us a more dependable index compared with H, L, O and E. In our sample of 1207 neumes, the Pearson product-moment correlations among the variables H, L, O, E and M proved to be very substantial, with coefficients ranging between $r = 0.80$ and $r = 0.95$ in the Old-Roman series of neumes, and between $r = 0.83$ and $r = 0.96$ in the Gregorian series. After calculating the product-moment correlations between both series of M values for each individual chant, these correlations were squared and added up to obtain D, the so-called coefficient of determination. The scores on D may vary from 0 (= no similarity in contour) to 100 (= perfect similarity).

Table 2. D values for the 30 cognate melodies, ordered from low to high

⁸ Compared with Maloy (2010), there are other, more objective algorithms that may be used to segment a particular melody (see, e.g., Cambouropoulos & Tsougras, 2004; Cenkerová, 2017).

	GrN		D
IN	3	Ad te levavi	.102
IN	216	Spiritus Domini	.250
OF	45	Reges Tharsis	.260
OF	58	Exaltabo te Domine	.281
OF	219	Confirmata hoc Deus	.292
OF	31	Tui sunt caeli	.325
OF	168	Terra tremuit	.348
IN	60	Invocabit me	.360
OF	86	Laudate Dominum	.372
IN	20	Dominus dixit ad me	.423
CO	46	Vidimus stellam	.476
CO	69	Scapulis suis	.476
OF	231	Dextera Domini	.476
CO	23	In splendoribus	.504
OF	5	Ad te Domine levavi	.518
IN	83	Laetare Ierusalem	.533
IN	165	Resurrexi	.563
IN	43	Ecce advenit	.563
OF	109	Improperium exspectavit	.563
IN	128	Nos autem gloriari	.656
IN	52	Misereris omnium	.672
CO	169	Pascha nostrum	.690
IN	11	Gaudete in Domino	.740
CO	32	Viderunt omnes fines	.757
CO	110	Pater si non potest	.774
CO	15	Dicite pusillanimes	.792
CO	6	Dominus dabit benignitatem	.792
CO	59	Qui meditabitur	.792
OF	23	Laetentur caeli	.810
CO	213	Psallite Domino	.846

Note. IN = introitus, CO = communio, OF = offertorium, GrN = Graduale Novum

Table 2 presents the D values for the 30 cognate melodies, ordered from low to high. D has a mean value of 0.53 and a standard deviation of 0.20. The median D value is also 0.53. Of the melodies with D scores ≥ 0.50 , 6 are introits, 8 communions and 3 offertories. In the group melodies with lower D scores, these figures are 4, 2 and 7, respectively. It is interesting to note that the correlation between Maloy's (dis)similarity scores (see Maloy, 2010: Table 3) and the D values of the 10 cognate melodies that are also studied by Maloy (2010) is -0.48. Though in line with expectations, this correlation is not significant ($p = 0.16$), due to the limited number of observations. Moreover, the Old-Roman offertories investigated by Maloy differ to some extent from the melodies in the present study, also suppressing the correlation.

Stylistic differences between Old-Roman and Gregorian chant

To investigate whether Gregorian chants with D values ≥ 0.50 are stylistically more reminiscent of Old-Roman influences, the above-mentioned notion was followed that the eighth-century Roman emphasis on pulsating, sinuous and tremulous notes finds its Old-Roman analogue in the presence of neumes that are characterised by a focus on stepwise motion.

Only selecting those Gregorian and Old-Roman neumes which contain 2 or more notes, the percentage of stepwise motion (Psw) in each neume was calculated by

- first registering the number of diatonic steps between adjacent notes,

- then dividing that number by the total number of notes in the neume minus 1, • and finally multiplying the outcome of that division by 100.

In the six-note neume *FG a GFG*, for instance, the number of diatonic steps between adjacent notes is 5 (*F-G*, *G-a*, *a-G*, *G-F* and *F-G*), the fraction amounts to $5 / (6 - 1) = 1$, and $Psw = 100$. For the six-note neume *d c d c c G*, the number of diatonic steps is 3 (*d-c*, *c-d*, *d-c*), the fraction is $3 / 5 = 0.6$, and $Psw = 60$. Note that no allowance is made for adjacent notes with the same pitch (*c-c* in the example).

In the 819 Gregorian neumes with 2 or more notes, the number of notes ranges from 2 to 25, with a median value of 3. The number of notes in the 947 Old-Roman neumes with 2 or more notes ranges from 2 to 27, with a median value of 4. In the group Gregorian neumes with at least 2 notes, Psw has a mean of 66.71 and a standard deviation of 37.65. The mean and standard deviation of Psw in the group of Old-Roman neumes with at least 2 notes are 82.06 and 26.15, respectively. The minimum Psw value in both groups is 0 per cent, the maximum is 100.

After having calculated the Psw values for all Gregorian and Old-Roman neumes with at least 2 notes, t-tests were applied to investigate whether the Old-Roman Psw values are indeed higher than the Gregorian Psw values, thus showing, as expected, more stepwise progression in the Old-Roman neumes. Separate t-tests were run for neumes with different numbers of notes, starting with neumes of 2 notes. However, no analyses were executed for neumes with 8 notes or more, because these neumes do only occur with very low frequencies in Gregorian or Old-Roman chant or both. All analyses were carried out one-sided, using a significance level of 5 percent. Levene's F-test was used to determine whether we had to make allowance with differences in the variance between groups.

Table 3. T-tests of Gregorian and Old-Roman style variables in various samples of Gregorian and Old-Roman neumes.

Variable	Sample	N	Mean	Sd	t	p
Psw-2	Gr	272	72.79	44.58	-1.96	0.024
	OR	219	80.37	39.81		
Psw-3	Gr	195	64.87	39.12	-4.84	0.000
	OR	208	81.01	27.14		
Psw-4	Gr	140	55.95	31.80	-7.31	0.000
	OR	125	80.27	20.34		
Psw-5	Gr	85	70.88	27.24	-2.46	0.010
	OR	107	78.97	18.22		
Psw-6	Gr	47	62.98	30.92	-5.42	0.000
	OR	84	85.24	16.17		
Psw-7	Gr	34	72.06	23.47	-3.73	0.001
	OR	48	88.19	15.74		
RE-FA	Gr	1207	0.15	0.48	-0.73	0.234
	OR	1198	0.16	0.44		
LA-UT	Gr	1207	0.10	0.36	1.75	0.040
	OR	1198	0.08	0.29		

Note. Gr = Gregorian neumes, OR = Old-Roman neumes

Table 3 lists the means and standard deviations of the Psw scores for Gregorian and Old-Roman neumes of 2 - 7 notes. The t values and their p values for the differences between these means are also shown. Furthermore, Table 3 lists similar data for the variables RE-FA and LA-UT, which refer to the main intervals in two pitch sets or tonal clusters that, according to McKinnon (2000: 382), are frequently encountered in Gregorian chant. These intervals were scored 1 or 0, depending on their presence or absence. Should the interval *D-F* or *a-c* extend over two syllables (for instance, *a* on the first and *c* on the last syllable of the word *Deus*), the value 1 was only applied to the first of both syllables and neumes.

As is clear from Table 3, all variables, except RE-FA, behave as expected. That is, the means of all Psw variables are in line with the expected greater focus on direct stepwise motion in Old-Roman chant compared with Gregorian chant. Though the difference between the means of RE-FA did not attain significance, the LA-UT difference offered some support for McKinnon's (2000) statements about the importance of particular tonal clusters in Gregorian chant.

Stylistic differences between the two kinds of Gregorian chant

Having established several style variables that may assist in the discrimination of Old-Roman and Gregorian chant, the

same variables were also investigated by means of t-tests in *two subsamples of Gregorian chant*, namely

- a subsample of those Gregorian chants in our study with D values lower than D = 0.50 (GrDL),
- and a subsample of Gregorian chants with D values above or equal to 0.50 (GrDH).

Of course, this was done to investigate the hypothesis that some Gregorian melodies are stylistically more reminiscent of eighth-century Roman influences (believed to be still discernible in eleventh- to thirteenth-century Old-Roman chant), whereas other Gregorian chants are more reminiscent of Gallican influences. However, as both subsamples contain Gregorian chant (and thus are stylistically opposed to Old-Roman chant), the differences between the two groups can only be expected to be slight or even absent. McKinnon (2000: 400) could therefore be right in his claim that ‘there are no instances in the entire Gregorian repertory of the characteristic oscillating Roman figuration—neither in the gradual nor in the other items of the Mass Proper.’

Table 4. T-tests of Gregorian and Old-Roman style variables in two samples of Gregorian chant with D scores < 0.50 and D scores ≥ 0.50 , respectively.

Variable	Sample	N	Mean	SD	t	p
Psw-2	GrDL	109	74.31	43.89	0.46	0.324
	GrDH	163	71.78	45.15		
Psw-3	GrDL	77	53.25	41.63	-3.44	0.001
	GrDH	118	72.46	35.56		
Psw-4	GrDL	76	54.82	34.30	-0.46	0.322
	GrDH	64	57.29	28.77		
Psw-5	GrDL	39	70.51	28.60	-0.11	0.455
	GrDH	46	71.20	26.34		
Psw-6	GrDL	24	50.83	26.36	-2.98	0.003
	GrDH	23	75.65	30.72		
Psw-7	GrDL	15	63.33	27.60	-2.01	0.027
	GrDH	19	78.95	17.43		
Psw-all	GrDL	362	62.61	38.33	-2.72	0.004
	GrDH	457	69.80	36.93		
RE-FA	GrDL	514	0.18	0.56	1.78	0.038
	GrDH	693	0.13	0.41		
LA-UT	GrDL	514	0.14	0.40	2.95	0.002
	GrDH	693	0.08	0.32		

Note. GrDL = Gregorian neumes in chants with low D scores, GrDH = Gregorian neumes in chants with high D scores

However, as Table 4 makes clear, McKinnon’s (2000) claim is unjustified. It is true, no significant differences exist between the means of Psw2, Psw4 and Psw5 in both groups of Gregorian chant (which is not amazing), but for Psw3, Psw6 and Psw7, as well as for RE-FA and LA-UT, the differences confirm our hypothesis. Moreover, except for Psw2, the differences are in the right direction, with higher means in GrDH. Still, the reason remains unclear why particularly, the means of Psw3, Psw6 and Psw7 led to significant results.⁹ It is also of interest that if the Psw values associated with all 25 distinct syllables are combined, resulting in scores on Psw-all (see Table 4), the difference between both samples is also apparent, with a higher mean in the GrDH sample. So, at least generally speaking, the hypothesis that Gregorian chants with high D scores reflect Roman stylistic influences is corroborated.¹⁰ It is further reassuring that the variable RE-FA that did not attain significance in the above-mentioned comparison between Old-Roman *an* and Gregorian chant, now led to significant results.

The tremula or quilisma note

⁹ However, it remains reassuring that the negative correlations between the various Psw variables, on the one hand, and the combination of scores on RE-FA and LA-UT turned out to be significant in 5 out of 6 cases, thus demonstrating their common nature.

¹⁰ In this context, it is also of interest that no support was obtained for the alternative, conflicting hypothesis that Old-Roman chant, if characterised by high D scores, grew out of Gregorian chant. Relying on the same Psw, RE-FA and LA-UT variables as listed in Table 4, but now representing the scores in the two Old-Roman subsamples based on D, no significantly higher means on RE-FA and LA-UT were found in the subsample of Old-Roman chants with D ≥ 0.50 , as well as no higher Psw means in the subsample of melodies with D < 0.50.

In the last-mentioned series of t-tests, the D score was used to make a distinction between Gregorian chants that were postulated to be primarily of Gallican origin (subsample GrDL) and Gregorian melodies that primarily have a Roman background (GrDH). So, if it is true that the *quilisma* sign was already executed in early Roman chant, one should observe a greater proportion of this note (here denoted Qu) in subsample GrDH compared with GrDL. However, by only investigating the *quilisma*, no attention is paid to such ornamental notes as the *oriscus*, the *salicus* and the *pes quassus*, which, given their very shape, may refer to similar trill-like notes in eighth-century Roman chant as the *tremula*. Indeed, in the notation of Chartres 47 and several other manuscripts, the sign for the *oriscus* note was found by Jeannin (1925: 207) to indicate the *quilisma* as well.

Scoring the Gregorian neumes in the samples GrDH and GrDL for the presence (1) or absence (0) of the *quilisma* (Qu)—or of the *quilisma* in combination with the *oriscus* (QuOr)—one-sided t-tests were applied to investigate the hypothesis that the *quilisma*, or the *quilisma* plus the *oriscus*, actually stems from early Roman practice.

Table 5. T-tests applied on Qu and QuOr in two samples of Gregorian chant with D scores < 0.50 and D scores ≥ 0.50 , respectively.

Variable	Sample	N	Mean	Sd	t	p
Qu	GrDL	593	0.04	0.20	-1.55	0.061
	GrDH	614	0.06	0.24		
QuOr	GrDL	593	0.10	0.30	-1.79	0.037
	GrDH	614	0.13	0.34		

Note. Qu = *quilisma*, QuOr = *quilisma* + *oriscus*, GrDL = Gregorian neumes in chants with low D scores, GrDH = Gregorian neumes in chants with high D scores

As Table 5 illustrates, the mean scores on Qu are not significantly different, but with a *p* value as low as *p* = 0.061, the results do at least approach significance. For QuOr, however, the results proved exactly as anticipated. Of equal importance is the finding that the scores on Qu (and to a lesser degree on QuOr) turned out to correlate positively and significantly with the various Psw scores, with *r* values for Qu between *r* = 0.23 and *r* = 0.55. This agrees well with the trembling nature, often assumed to characterize the *quilisma* note. Perhaps not in all respects, therefore convincing, these findings may at least offer some support for the view that the *quilisma* note in Gregorian chant ultimately stems from early Roman chant

Acknowledgements

The author would like to thank Dr. Peter van Kranenburg from the Department of Information and Computing Sciences of Utrecht University and the Meertens Institute of the Royal Netherlands Academy of Arts and Sciences (KNAW) and Geert Maessen, independent scholar and conductor of the Ensemble Gregoriana Amsterdam, for their stimulating comments on a preliminary version of the present paper.

Biodata of Author



Dr. Dirk van Kampen is Conductor of the Schola Rhythmus et Metrum of the Begijnhofkapel in Amsterdam, The Netherlands. Before his retirement, he was a research psychologist and assistant professor of clinical psychodiagnostics at the Vrije Universiteit in Amsterdam. Address correspondence to Dirk van Kampen, Stoutenburg 5, 1121GG Landsmeer, the Netherlands, email: kampendf@gmail.com.

References

Agustoni, L., & Göschl, J. B. (1987). *Einführung in die Interpretation des Gregorianischen Chorals: Band 1, Grundlagen*. Regensburg: Gustav Bosse Verlag.

Apel, W. (1958). *Gregorian chant*. London: Burns & Oates.

Cambouropoulos, E., & Tsougras, S. (2004). Influence of musical similarity on melodic segmentation: Representations and algorithms. In *Proceedings of the International Conference on Sound and Music Computing (SMC '04)*. Paris.

Cardine, E. (1975). *Première année de chant grégorien*. Solesmes, France: Abbaye-Saint Pierre.

Cattin, G. (1984). *Music of the Middle Ages: Vol. 1*. Cambridge: Cambridge University Press.

Cenkerová, Z. (2017). Melodic segmentation: Structure, cognition, algorithms. *Musicologica Brunensis*, 52, 53–61.

Claussen, M. A. (2004). *The reform of the Frankish church: Chrodegang of Metz and the Regula canonicorum in the eighth century*. Cambridge: Cambridge University Press.

Connolly, Th. H. (1996). Jewish influence on early Christian chant: A new model. Paper presented at the annual meeting of the American Musicological Society, Baltimore, MD.

Connolly, Th. H. (1998). Traces of a Jewish-Christian community at S. Cecilia in Trastevere. *Plainsong and Medieval Music*, 7(1), 1-19.

Crocker, R. L. (1990). Chants of the Roman mass. In R. Crocker & D. Hiley (Eds.), *The New Oxford history of music: The early Middle Ages to 1300* (Vol. 2, pp. 174-222). Oxford: Oxford University Press.

Cutter, P. F. (1967). The question of the "Old-Roman" chant: A reappraisal. *Acta Musicologica*, 39(1), 2-20.

Dyer, J. (1998). "Tropis semper variantibus": Compositional strategies in the offertories of the Old Roman chant. *Early Music History*, 17, 1-69.

Fried, J. (2016). *Charlemagne* (P. Lewis, Trans.). Cambridge, MA: Harvard University Press.

Glatthaar, M. (2011). Bernard von Réome und die Datierung der *Musica disciplina* Aurelians. *Revue Bénédictine*, 121(2), 357-381.

Grier, J. (2006). *The musical world of a medieval monk: Adémar de Chabannes in eleventh-century Aquitaine*. Cambridge: Cambridge University Press.

Harting-Correa, A. L. (1996). *Walahfrid Strabo's Libellus de exordiis et incrementis quarundam in observationibus ecclesiasticis rerum*. Leiden: Brill.

Hiley, D. (1995). *Western plainchant: A handbook*. New York: Oxford University Press.

Hughes, A. (2002). Charlemagne's chant or the great vocal shift. *Speculum: A Journal of Medieval Studies*, 77(4), 1069-1106.

Huglo, M. (1954). Le chant "Vieux-Romain": Liste des manuscrits et témoins indirects. *Sacris Erudiri*, 6, 96-124.

Kempf, D. (2004). Paul the Deacon's *Liber de episcopis Mettensisibus* and the role of Metz in the Carolingian realm. *Journal of Medieval History*, 30(3), 279-299.

Levy, K. (2000). A new look at Old Roman chant. *Early Music History*, 19, 81-104.

Levy, K. (2001). A new look at Old Roman chant II. *Early Music History*, 20, 173-197.

Lipphardt, W. (1950). Gregor der Grosse und sein Anteil am römischen Antiphonar. *Actes du Congrès International de musique sacrée*, 248-254.

Lütolf, M. (1987). *Das Graduale von Santa Cecilia in Trastevere, II: Faksimile*. Cologny-Geneva: Fondation Martin Bodmer.

Maloy, R. (2010). *Inside the offertory: Aspects of chronology and transmission*. Oxford: Oxford University Press.

McGee, T. J. (1996). "Ornamental" neumes and early notation. *Performance Practice Review*, 9(1), 39-65.

McGee, T. J. (1998). *The sound of medieval song: Ornamentation and vocal style according to the treatises*. Oxford: Clarendon Press.

Müller-Heuser, F. (1963). Vox humana: Ein Beitrag zur Untersuchung der Stimmästhetik des Mittelalters. In K. G. Fellerer (Ed.), *Kölner Beiträge zur Musikforschung* (Vol. 26). Regensburg: Gustav Bosse Verlag.

McKinnon, J. W. (2000). *The Advent project: The later seventh-century creation of the Roman Mass proper*. Berkeley: University of California Press.

Nardini, L. (2018). In the quest of Gallican remnants in Gregorian manuscripts. In P. Hall (Ed.), *The Oxford handbook of music censorship* (pp. 7-38). Oxford: Oxford University Press.

Nolthenius, H. (1974). *Oud als de weg naar Rome: Vragen rond de herkomst van het Gregoriaans* [Old as the way to Rome: Questions about the origins of Gregorian chant]. Amsterdam: Noord-Hollandsche Uitgevers Maatschappij.

Nolthenius, H. (2009). *Muziek tussen hemel en aarde: De wereld van het Gregoriaans* [Music between heaven and earth: The world of Gregorian chant]. Nijmegen: Uitgeverij Vantilt.

Ober, M. E. (2006). The role of Chrodegang of Metz (712-766) in the formation of western plainchant (Doctoral dissertation). University of Pittsburgh.

Rankin, S. (2011). On the treatment of pitch in early music writing. *Early Music History*, 30, 105-175.

Snow, R. (1958). The Old-Roman chant. In W. Apel, *Gregorian chant* (pp. 484-505). Bloomington: Indiana University Press.

Treitler, L. (1992). The "unwritten" and "written transmission" of medieval chant and the start-up of musical notation. *Journal of Musicology*, 10(2), 131-191.

Van Kampen, D. (2017). The rhythm of Gregorian chant: An analysis and an empirical investigation. *Journal of Music Research Online*, 8, 1-17.

Van Kampen, D. (2020). The rhythm of Gregorian chant: A regression-analytical investigation in 30 chants. Unpublished manuscript. Retrieved from <http://gregorian-chant.ning.com>

Van Rhijn, C. (2011). 'Wie niet corrigeert, regeert niet': Politiek en religie rond het jaar 800 ['Who does not correct, does not rule': Politics and religion around the year 800]. *Leidschrift*, 26, 107-119.

Wright, C. (2008). *Music and ceremony at Notre Dame of Paris, 500-1550*. Cambridge: Cambridge University Press.