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Music Theory in the Middle Ages

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Introduction

Medieval music theory in one sense begins with the late-classical author Boethius (c. 480–524), who transmitted in Latin the two-octave gamut of the Greeks; in another sense it begins with the ninth-century writers Aurelian of Réôme (fl. c. 843) and Regino of Prüm (c. 842–915), who attempted to describe the music of their times without any music notation or indeed much understanding of Boethius' scale. The achievement of the Middle Ages was to develop a music notation, first for gesture, then for pitch and finally for rhythm. As well, starting from Boethius' idea of what constituted a perfect consonance, musicians of the period developed polyphonic composition from monophonic chant. These two things underpin the subsequent evolution of western music. The composer and theorist Johannes Ciconia (c.1370–1412) marks the end of that period of rhythmic experimentation and of the dominance of Boethian perfect consonances in harmonic theory.

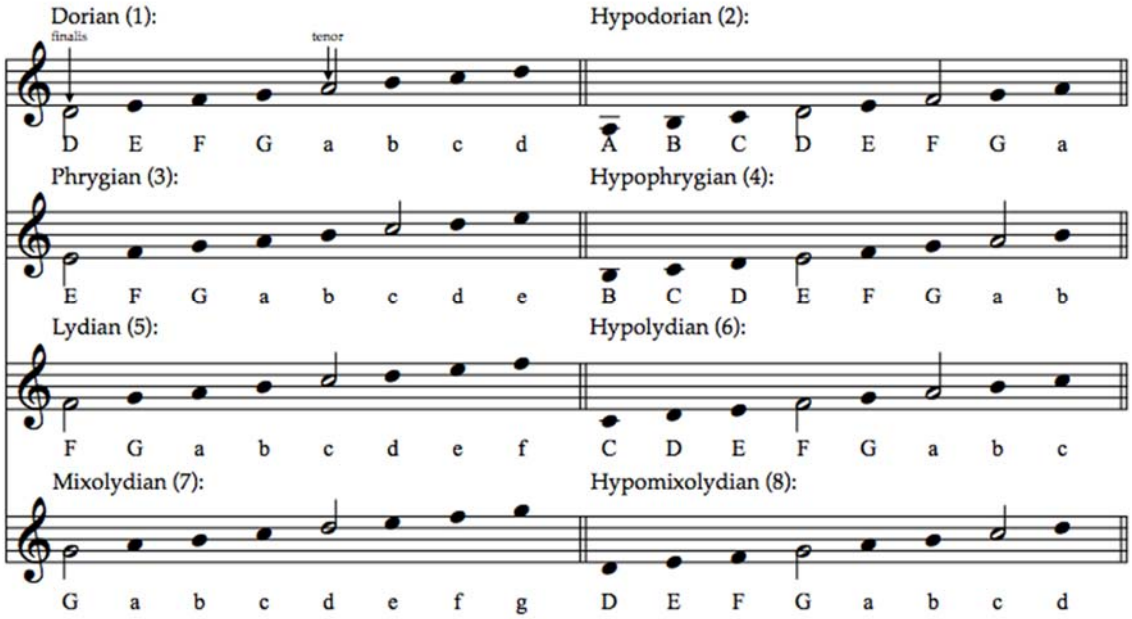
Chant

Aurelian and Regino attest to the eight medieval modes of chant as far back as the ninth century; indeed, as a system for classifying chant the modes predate any written musical sources.[1] Chants are classified or assigned to a mode according to their final note, D, E, F or G; a secondary classification then groups the chants according to whether their melodic activity is primarily above that final, or around that final (See Example 1). Aurelian and Regino, display an awareness of these tonal centers although they were unable even to describe in words a scalar system consisting of tones and semitones. This classification of chants was important in a notationless musical culture in which a large part of the day of a medieval monk, whose job description required him to be a singer, was spent in singing psalms. This activity involved being able to link a piece of chant called an antiphon to one of eight psalm tones,[2] and get back to the antiphon again. The monks needed to be able to deduce what the final was and how to get there, as this in turn would determine which of the eight psalm tones they then used for the psalm. In an environment where the communal ethos was of central importance, an ethos built on the monk's abnegation of the individual as one of the primary tasks to be accomplished on the route to holiness, a seamless transition and perfect unison in the choir evidently mattered. As all the modes employ the same notes, the white notes of the piano, chants need to have a way of signposting the final. In a predominantly stepwise musical style, this is achieved either through a

[1] Aurelian can be found in English in Joseph Ponte, *Aurelian of Réôme (ca. 843): The Discipline of Music (Musica Disciplina* (Colorado Springs, 1968). Regino can be found in Edna Marie (Sr Mary Protase) Le Roux, *The 'De Harmonica Institutione' and 'Tonarius' of Regino of Prüm* (PhD diss., Catholic University of America, 1965).

[2] The Old Testament of the Bible contains 150 psalms, which are essentially songs which have a two-part construction. Although regarded as Hebrew poetry, in Latin they amount to prose, so a psalm tone is a loose method for singing prose rather than a melody as such. The psalm tone recites on a single note, with an introduction, middle cadence for the end of the first half and final cadence for the end of the second half. These cadences are tailored to fit around the accentuation of the text, and have variable final notes. The relationship of the psalm tone to the mode of the antiphon lies in the reciting-note, or tenor.

Example 1. Modal Octave Species in Gregorian Chant.



leap up from that final early in the piece, or by a pattern of leaps characteristic of a certain mode. As well as the final, a note of secondary importance is the tenor, or reciting-tone, as it is the note that will be used for the recitation of the psalm. The most characteristic leap is from final to tenor. The following discussion will name pitches according to the medieval gamut by capital letters from the lower octave A–G and lower-case letters for the upper octave a–g: a way of laying out the scale which was first used in a tenth-century treatise called the *Dialogus de Musica* and became standard thereafter.[3]

The first antiphon for Christmas vespers, *Tecum principium*, shows this leap clearly in a manner which is a hallmark of the authentic dorian mode. The leap from final D to tenor note a is saved for the accented syllable, “ci”, of *principium*. The falling third which opens the piece does not have the same power as a rising interval, but does what falling intervals often do: decorates a note, often an important note, by two neighbor-note figures, E–D and C–D. Melodic activity then sits around the tenor, leaving the D as a trace in memory to which a return needs to be made.[4] The melodic line then wafts slowly back down, using falling thirds in disjunct neighbor-note patterns to decorate G, then F, on the way down to the first cadence at *tuae*. All subsequent leaps up are from D. However, these are smaller leaps of a third, so the piece ends by a gradual stepwise, if scrambled, descent, with each note on the way down prolonged and highlighted

[3] *Dialogus de musica* has been partially translated by Oliver Strunk, *Source Readings in Music History* (New York, 1950).
[4] For experimental evidence of this point see Diana Deutsch & John Feroe, "The internal representation of pitch sequences in tonal music", *Psychological review* 88 (1981): 503–22, and Diana Deutsch, 'Delayed pitch comparison and the principle of proximity', *Perception and Psychophysics* 23 (1978): 227–30.

through neighbor-note movement. This gravity-defying leap, followed by the slow return of the melodic line to its resting place, constitutes the tonal grounding of medieval chant.[5]

The first theorist who was able to lay out diagrammatically the two-octave diatonic system and identify the pitches of the four finals, Hucbald of St Amand (c. 840–930), demonstrates clearly the way the medieval monastic singer was able to keep in mind the note from which a leap upwards was made.[6] Hucbald starts his discussion by identifying each melodic interval in terms that his readers would recognize: the connections between particular syllables found in particular chants. (Anyone who has been taught a perfect fifth by means of *Twinkle twinkle little* star will recognize the technique.) His first interval is unison: it is easy enough to recognize unisons when singing a lot of the same notes in a row, Hucbald writes, more challenging if the two notes which are the same are separated in time. The opening G of the Christmas introit antiphon *Puer natus est*, left behind by its leap to the Mixolydian tenor d and prolonged decoration of that note, will be found later in the piece, he writes, pinpointing accurately the syllables on which G recurs.

The second phrase duplicates the G–d leap, thus keeping alive the sense of G as tonal center and final, and shows one of the features of composition in this mode: an abrupt c–G descent at a cadence point at *nobis* in the second line of music, and the decoration of G by its upper neighbor note. That upper neighbor note has a function, however, for the stepwise descent is merely prolonged by interruption: coming down from the tenor at *filius* the melodic line almost reaches G with the note a at the end of that word. Because of the sense of G as final, the following leap a–c in itself manages to prolong the expectation that G should have been the goal of that descent. The neighbor-note decoration therefore fulfils the expectation that the note a should lead back down to the final G. The cadence points on the note a at the end of the third and fourth phrases, each time on the word *ejus*, strengthen this sense of a natural connection withheld, of G as the pitch to which a return needs to be made. Again, the final cadence at *angelus* uses the upper neighbor note figure to stress the connection. Formally, the introit consists of its antiphon, a psalm *Cantate domino* truncated to one verse and its final doxology *Gloria patri*, and a return to the antiphon. The bits enclosed by double barlines in line 6 are cues for how to begin and end the *Gloria patri*, which the editor has supplied for those who require more than just cues to perform it. The letters EUOUAE are a shorthand for the final words of the *Gloria patri*, *s[a]EcUlOrUm AmEn*.

Goal-directed motion is thus present even in the earliest monophonic music of western musical culture.

Early Polyphony

The addition of a harmonizing voice to chant is again attested by music theorists long before there are written sources of pieces. Hucbald, always acute, provides us with our first glimpse of a practice of harmonizing chant by perfect parallel intervals. He culminates his description of the

[5] For a full discussion of this point see Fiona McAlpine, *Tonal Consciousness and the Medieval West* (Bern, 2008).
[6] Hucbald can be found in English in Warren Babb, *Hucbald, Guido and John on Music: Three Medieval Treatises*, ed. with introductions by Claude V. Palisca (New Haven, 1978).

intervals of music, which we saw an example of above, with setting out the medieval gamut in tone or semitone steps in a way which derives from Boethius, respected by all medieval theorists and properly understood by none.[7] Boethius justified the scale by theories of consonance based on particular ratios: 2:1 for the octave, 3:2 for the perfect fifth and so on. Hucbald wishes to point out that not all intervals count as consonances. Only the octave, fifth, fourth and their compounds the fifteenth, twelfth and eleventh are consonances. In order to make this clear he provides us with a piece of anecdotal evidence: "Consonance is then a proportionally determined and concordant mixture of two sounds, which will not come about unless two sounds, produced from different sources, come together in one musical combination as occurs when a man's voice and a boy's voice sound at the same time, or indeed in that which they usually call 'making organum'".[8] Such harmonizing of chant by parallel intervals is shown in a pair of late ninth-century or early tenth century treatises, *Musica Enchiriadis* and *Scolica Enchiriadis*. Parallel organum at the fourth involves a particular issue in a diatonic system: a stepwise procession of perfect fourths will soon end up with a tritone. The solution to this problem can be seen in *Rex caeli*: to drone on a single note in the harmonizing or organal voice until it is possible to move once more in parallel perfect fourths. *Rex caeli* is on page 3 of the previous score. This droning is simply "not organum", says the writer of *Musica Enchiriadis*. It is not organum until the parallel perfect fourths appear.[9]

Guido of Arezzo, a Benedictine monk who died around 1050, describes such flexible fourth-bounded organum with characteristic rationality, and it is to Guido that we owe the distinction between consonances – octave, perfect fifth and perfect fourth for Guido – and what he called "concords": all the other useful intervals in flexible fourth-bounded organum, namely, in his order of preference, the perfect fourth, major second, major third, and, at a pinch, the minor third. Consonances are suitable for cadences, and concords are particularly useful in the movement to a unison cadence, which Guido calls *occursus*, or running-together. Guido's examples show either a major second or major third preceding the cadence. Although his music examples resemble *Rex Caeli*, Guido has put practice onto a completely different theoretical footing by opening up a variety of intervals for legitimate use, thus setting in motion modern functional harmony, which depends on different functions for different intervals. Interestingly, although parallel fourths are the default interval for much of the organum, Guido shows no cadences on a fourth. The fourth in fact only behaves like one of Guido's concords, even though he gave it a dual classification as both consonance and concord. The fourth has begun its journey from consonance to dissonance. History's subsequent focus on Guido's achievements in devising staff notation and solmization has underrated this aspect of Guido's thought.

[7] Anicius Manlius Severinus Boethius (c. 480–524), *De Institutione musica*, translated into English by Calvin Bower, *Fundamentals of music: Anicius Manlius Severinus Boethius* (New Haven, c.1989).
[8] Sarah Fuller, "Early Polyphony", *The Early Middle Ages to 1300*, ed. Richard Crocker and David Hiley, New Oxford History of Music, vol. 2, second edition (Oxford, 1990): 487.
[9] An English translation of these two treatises can be found in Raymond Erickson, *Musica Enchiriadis and Scolica Enchiriadis* (New Haven, 1995).

Later in the eleventh century a new style emerged, described in a treatise usually dated around 1100, *Ad organum faciendum*.[10] The most notable feature of this style is spatial separation of the two voices, and the emergence of contrary motion writing. Often known as "new organum", it could be described more precisely as note-against-note contrary motion. In this style the organal voice is very angular, mainly sitting above the plainsong voice, and the focus is very much on the vertical distance between the two parts, almost always one of the consonances, fourths, fifths and octaves, here called "symphonies". A favored cadence point is the octave, reached by "any appropriate consonant interval", by which the treatise means an acceptable, but non-symphonic, interval. Unlike Guido, the treatise does not spell out what these are. The treatise uses alphabet notation written out in score for its illustrations, so letters above other letters. The example attached to the treatise, *Alleluia justus ut palma*, is notable for its final octave cadence above the word *cedrus*, before which come three non-symphonic intervals, a sixth, third and another sixth, using the notion of contrary motion to counter the stepwise descent to the cadential degree in the chant below by a sixth moving outwards by step to an octave. It is a cadence which is destined to have a long future as the cadence of choice in subsequent medieval music.[11] Only one sixth in the piece is not pre-cadential.

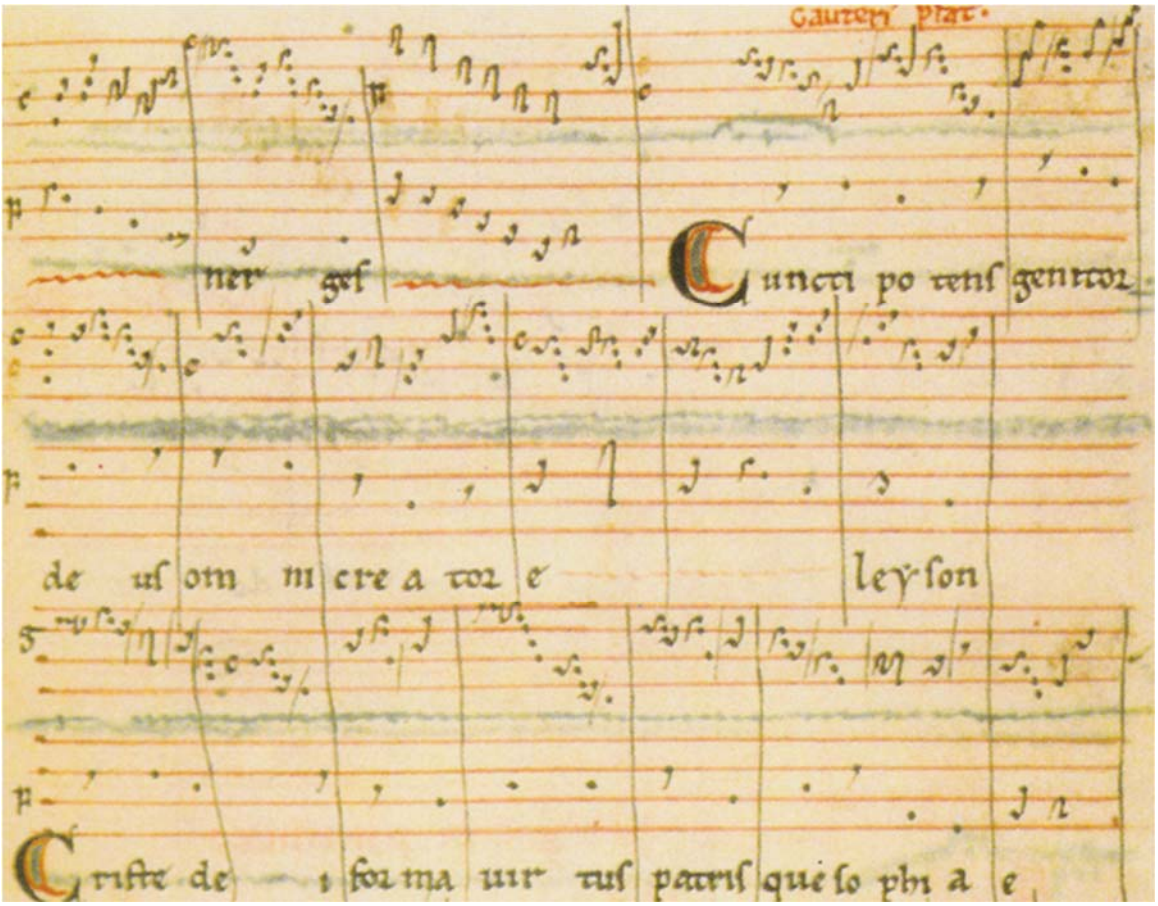
Melismatic Free Organum of the Twelfth Century

One way to extend the idea of a journey from non-consonance to consonance is to add many notes in the organal voice to one note in the plainsong or principal voice. This can be seen in *Kyrie cunctipotens genitor deus* from the Codex Calixtinus from the middle of the twelfth century.

In the manuscript (shown below in Example 2) this is written out in score with two staves of music, using the neume shapes of central France, above a single set of words. Big vertical barlines through both staves, and indeed the text as well, divide the music into segments, represented in the transcription by ordinary barlines. Every segment ends with either an octave or a unison, with the unison at six occurrences being easily the least frequent, and segments start with fifths (eleven times), octave (three times) unison (once), and a perfect fourth (once). (I have excluded two problems of transcription from my tally, "measures" 10–11 and 14–15, of which more below.) A journey from lesser consonance—the perfect fifth, 3:2—to greater consonance—the octave, 2:1, or unison, 1:1, is clearly the driving force of this musical style. It is not always obvious how the voices should be coordinated in time, but sometimes small vertical dashes appear in the organal voice which are obviously intended to clarify the relationship. These are shown in the transcription by commas above the organal voice. The clearest cadences are those where both voices sing a single syllable on the cadence degree, as seen at the end of "measure" 1, a unison reached by step from a third collapsing inwards, or at the end of "measure" 17, an octave reached by a sixth moving outwards. Less clear-cut are "measures" 2, 3 and 5. They look the same: a sixth moving outwards or a third moving inwards, but in order to achieve this effect the voices have to change syllables at different times. But there is a different possible reading of

[10] An English translation of this treatise can be found in Jay Huff, *Ad organum faciendum & Item de Organo*, Musical Theorists in Translation 8, New York, n.d.
[11] There is an analysis of this piece by Sarah Fuller in *The Early Middle Ages to 1300*, ed. Richard Crocker and David Hiley, New Oxford History of Music 2, 2nd edition (Oxford, 1990): 512–13.

Example 2. Santiago di Compostela, Catedral, Codex Calixtinus, f. 190 recto.



the manuscript. Take "measure" 2: three pitches in the plainsong voice, three groups as shown by vertical dashes. It strongly suggests that syllables ought to be coordinated in both voices. In such a reading, the syllable “tor” of *genitor* would begin with what in modern terms we might call a struck dissonance: both voices together articulating a sixth a–f. This would make the move to the octave consonance more forceful, and is certainly a valid reading of the manuscript.

Such a reading also addresses the two segments that appear to begin on a dissonance: "measures" 11 and 15. The rests that appear just before these two "measures" are not indicated in the manuscript, nor is the pitch G at the end of "measure" 10 repeated at the beginning of the following segment. The implication of the manuscript is that the lower voice simply holds the G until the cadence point on the note a at the end of "measure" 11. In other words, "measure" 11 progresses from the consonance of the octave at the end of "measure" 10 to the consonance of the unison at the end of "measure" 11. A similar reading of "measure" 14 allows a progression from the octave F–f at its end to the octave D–d at the end of "measure" 15.

However one reads the manuscript, the effect of this melismatic free organum style is one of much passing dissonance over a slower-moving foundation, all of which makes the move from

dissonance to consonance more forceful. One of the side-effects of the style is to restore melodic smoothness to the organal voice.

Notre Dame Organum

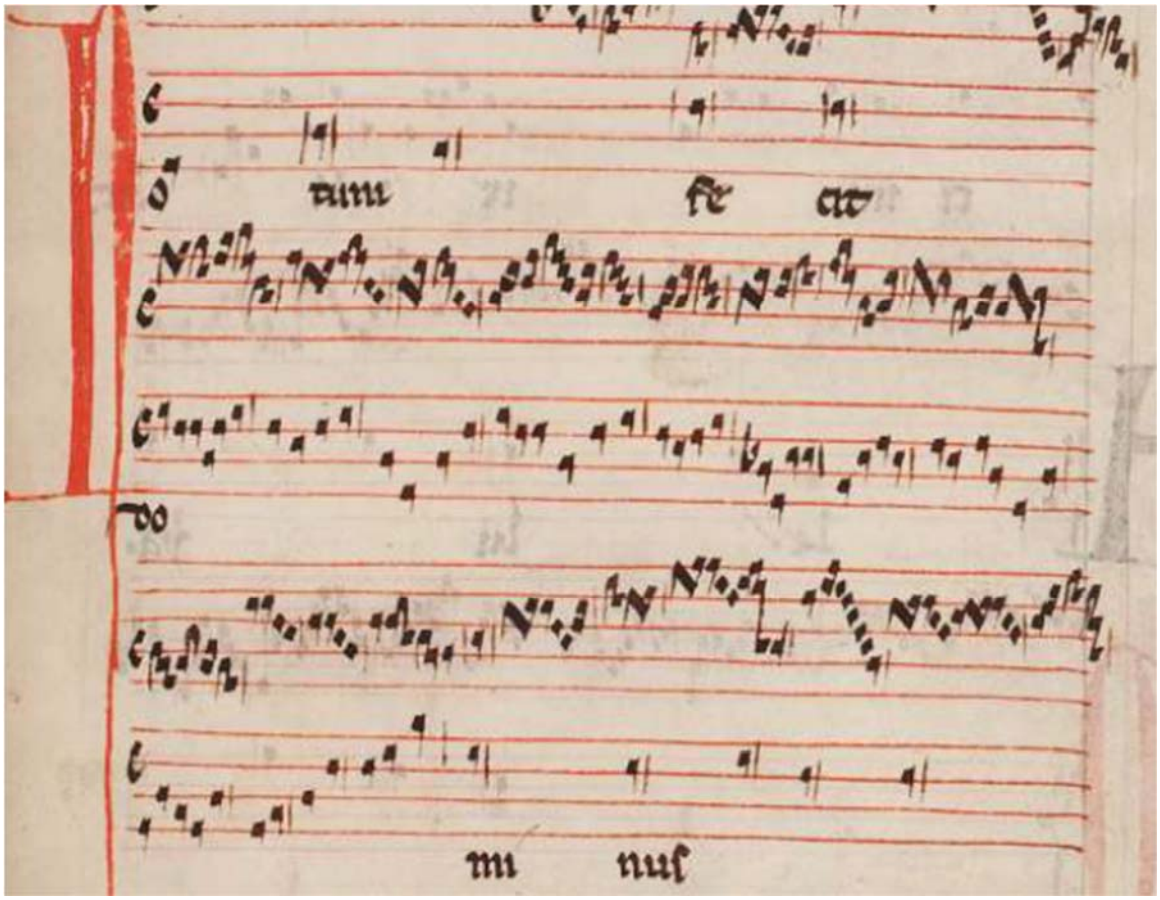
The foregoing discussion should make it clear that even a stringent vertical layout was not always unambiguous when it came to ensuring arrival at a consonance between the voices. A solution was provided by the Notre Dame school: meter in both voices. The organa of the Notre Dame school, associated with the names Leonin and Perotin and the four manuscripts collectively known as the *Magnus Liber Organi*, combine three musical styles.[12] The first, *organum purum* ("pure organum"), is very similar to the style of the Codex Calixtinus, except that the plainsong voice is much more drawn out so that the added voice, now known as *duplum*, has many more notes to each pitch of the plainsong voice, which is henceforth known as the tenor, because it holds the note. (Think of related English-language words, like "tenacious".) One interesting consequence of this is that the neumes of the plainsong, such as we can still see at the word *eleyson* in Example Two, are necessarily disconnected into single pitches. Neumes are now free to take on another meaning. The second style is known as discant, and this is the metrical style. It involves a patterned rhythm, known as modal rhythm because there were six modes, or manners, of notating such a rhythm, and its notation was ingenious. It took the neume shapes of plainsong, dissociated them from their former relationship to syllable (which was not needed, as these passages set words which had been given a melismatic setting in the underlying chant), and gave them a rhythmic significance instead. No longer neumes, these same shapes are known in this context as "ligatures". If a passage starts with a three-note ligature, followed by a series of two-note ligatures, the rhythm goes long-short-long short-long short-long until its cadence point, always on a long. The principle to remember is that the last pitch in a ligature is always long. This rhythm, which sounds like three-eight or six-eight to us, is the commonest duplum rhythm. We can see this in *Viderunt omnes*, attributed to Leonin.

Page 3, system 3, brings us to the melisma on the first syllable of the word *dominus*. The tenor is in the fifth rhythmic mode, equal dotted quarter notes in the transcription, and the duplum in the first rhythmic mode, a quarter note (a long) then an eighth note (a breve). A look at the manuscript (See Example 3) shows the system in operation: the separate equal notes of the tenor indicate mode 5, whereas the three-note ligature in the duplum, followed by a series of two-note ligatures, indicates mode 1. (It is not hard to learn how to sing from the manuscript, which is rather fun. It is like learning how to ride a bicycle: once one starts, one has to keep going or one falls off.)

The fourth ligature in the duplum has a tiny line descending from the right-hand side. This is a plica, a sign derived once more from a plainsong symbol, the liquescent neume. The plica enables the value of the *g*, which would be long as it is the last note of the neume, to be subdivided into two short notes, a decorative feature called *fractio modi*, or the breaking-up of

[12] The source for these names, and indeed for the way to reading the rhythmic notation, is a theorist known to modern times as Anonymous 4, whose work can be found in English in Jeremy Yudkin, *The Music Treatise of Anonymous IV: a New Translation*, Musicologial Studies and Documents 41 (American Institute of Musicology, 1985)

Example 3. Wolfenbüttel, Herzog August Bibliothek, cod.Guelf 628 Helmstadt, f. 25.



the mode. It still keeps the essential patterning of the ligatures. The first segment is terminated by a small vertical stroke in both voices. These strokes are shown in the transcription as rests in the duplum, and as commas above the tenor, which divide the music into unequal segments. The segments always end with a perfect consonance: the favored cadence is unison, but this can be preceded by a third only in those instances where the tenor rises by step, as we see in the first two cadences in system three. Not only that: there is a consonance on every long note value, in other words the final pitch of each ligature, so the arrival point on a new tenor note. So the drive to consonance exists not only at the phrase ends, but also at ligature ends. All phrases end on what we would think of as a downbeat, thus marking the beginning of centuries of cadences on downbeats. Directed motion thus goes short-long from non-consonance to consonance. All struck vertical intervals are consonant except for the sixth at the beginning of system four and the third which opens the final segment at the end of system six. The sixth is interesting because of *fractio modi*: technically, the f is not a long. The third is also interesting because it actually emphasizes the drive to consonance which is achieved with the perfect fourth which finally achieves consonance with the tenor *c*.

The third Notre Dame style was known as *copula*: coupling. It uses a measured duplum above an unmeasured tenor, thus combining features of both styles. It can be seen in *Viderunt omnes* just before the melisma on *dominus*, where the editor suggests above the stave a metrical reading of the duplum, which would help ease the transition to the measured style of the discant section.

The Motet

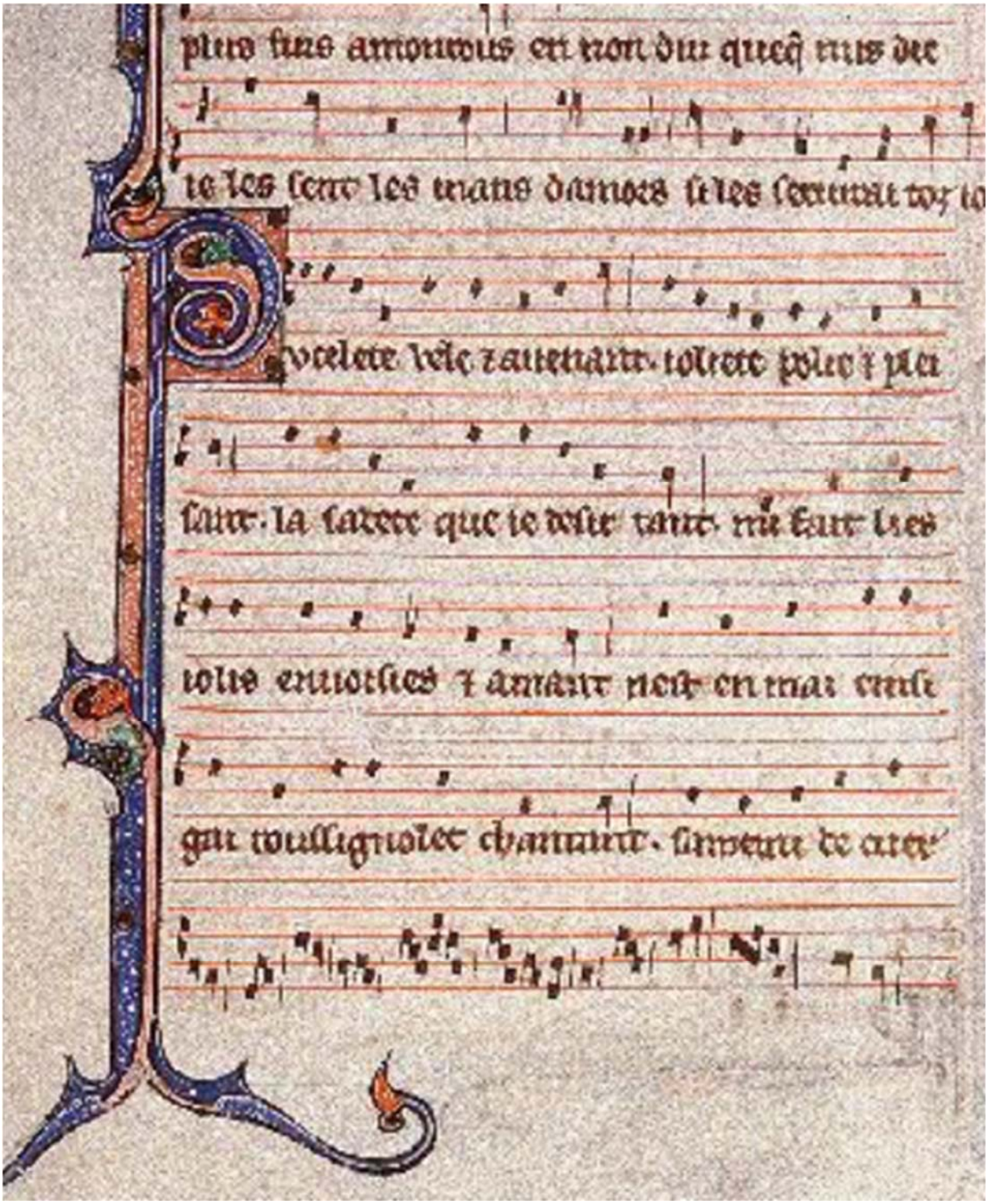
Notre Dame discant is only possible in melismatic passages. For setting text in a polyphonic context, composers once again had recourse to the familiar notation of syllabic chant. Two neumes, the punctum and the virga, which before the stave had indicated whether the melody was to fall or rise, were appropriated and given a metrical significance, for their pitch significance had become redundant. The punctum became the breve, and the virga, which has a stem going down on its right, became the long. (In fact, the tenor in *Viderunt* was already notated in longs.) Not only that: the breve, if angled to become a diamond shape, became half a breve, the semibreve. This rhythmic control led to manuscripts which are no longer set out in score, but in parts. The manuscript of *Pucelete/Je langui/Domino* has the top voice, or triplum (the origin of our word 'treble') singing from the verso side of the book, the duplum singing from the facing page, and the tenor, whose line took up the least space, singing from one line at the bottom. The singers do not need to be able to see what the other singers are doing. Rhythmic notation is the development which has enabled modern orchestral musicians to play from their part only, instead of having to play from a whole score.

The first two phrases of the triplum each show two semibreves followed by two breves, two semibreves again followed by two further breves, ending with a long, which would be better transcribed as a quarter note. It is in fact the sixth rhythmic mode, which consists of three equal breves to one long in the tenor, here with *fractio modi* on the first beat (See Example 4). The second line, now known as the motetus, perhaps to distinguish its wordy nature from the former duplum, alternates breves and longs in a second rhythmic mode pattern, which goes short-long (see Example 5). Right at the bottom is the tenor in equal longs (the fifth mode again), and which shows that a long can be worth two beats, or a quarter note, or three: a dotted quarter note. (The motetus here takes a little figuring out: only the first four notes are on the first stave, as the previous piece had to borrow a bit of stave to fit in its final phrase “hui qui amiete je sui.” The line drawn through the whole stave separates the two pieces. Phrase 1 of *Je langui* continues on the second stave.)

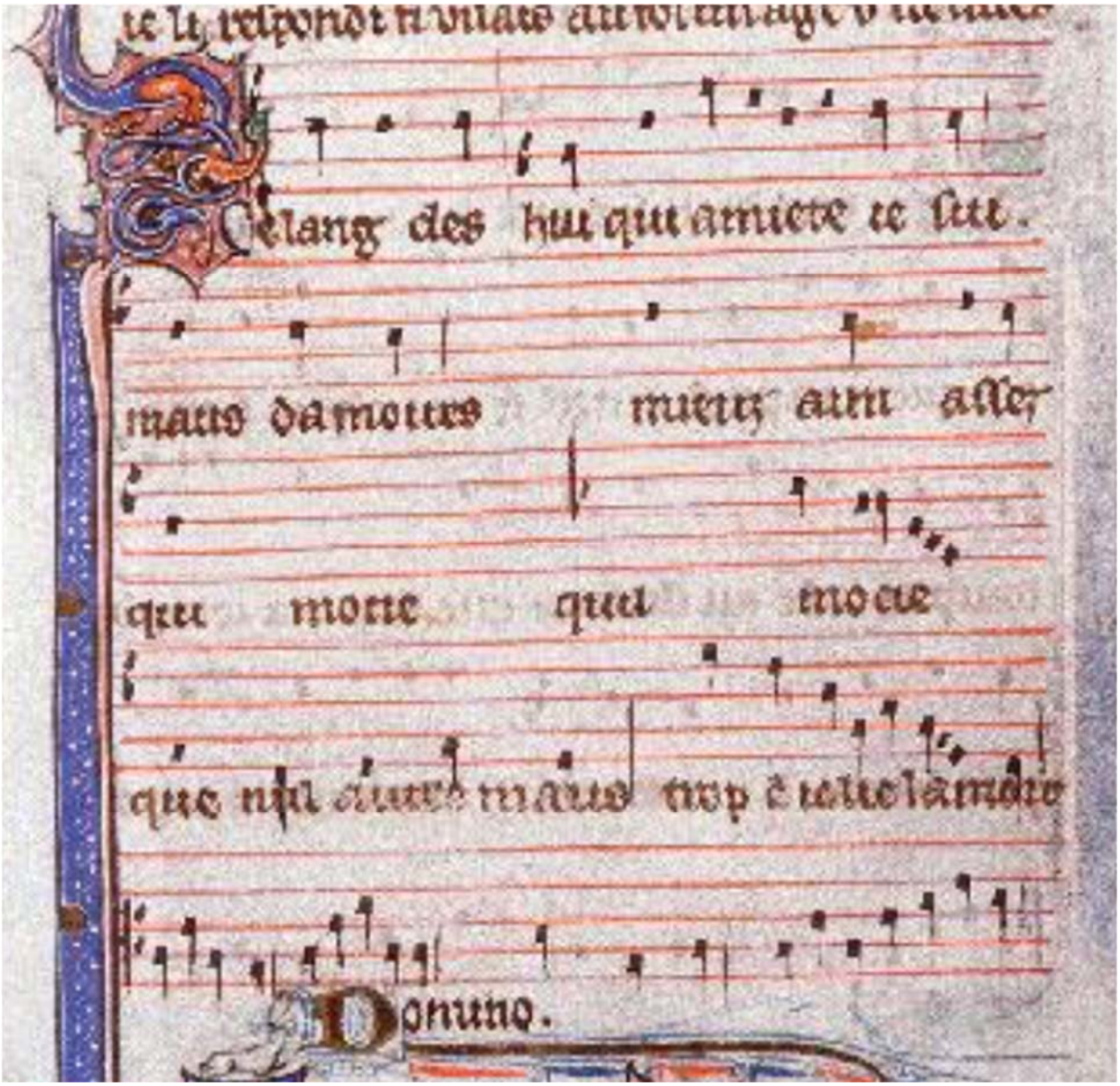
Here one of the curious features of the three-part motet becomes apparent: each voice has a different text. If the patterned rhythms of Notre Dame discant suggest a natural affinity with accentual verse, the same verse is unlikely to fit both triplum and motetus. Just as the voices are characterized by different rhythmic patterns, so the texts contrast: the triplum is optimistic and in love with his girl, whereas the motetus is almost suicidally depressed by the agony of love. Yet, perhaps not so curious: differing texts with a rhythmic offset are part of the stock in trade of an opera composer. Where Donna Elvira sings "I'll never trust you", Don Giovanni sings "Poor girl, she's mad" and Donna Anna and Don Ottavio sing "Who should we believe?"[13]

[13] Mozart, *Don Giovanni*, the Act 1 quartet "Non ti fidar".

Example 4. Triplum from *Pucelete/Je langui/Domino* Montpellier, Bibliothèque Universitaire Médecine H 196, f. 193v.



Example 5. Motetus and tenor from *Pucelete/Je langui/Domino* Montpellier manuscript f. 194.



Perfect consonances are still the goal of every segment of the tenor, with an octave and a perfect fifth above the bass being the favored vertical array. It appears in four of the seven segments of the tenor, and a perfect fifth appears at the end of two. The one exception is the chord at the end of the second segment, in measure 5; as a struck sonority, it appears as a triad, one of only four that appear in the entire piece. However, there are two considerations here: one is that the eighth notes in the triplum and tenor are actually longs, therefore should be shown as quarter notes, which would mean that the goal sonority is actually a fifth, which is consistent with other cadences in the piece. The second is more complicated and involves the analyst having to come to grips with the manuscript evidence; it is always rash to attempt analysis of medieval music

without keeping the original format in mind. Before this piece existed as a three-part motet, it existed as a two-part clausula, or alternative discant setting of the same fragment of chant. In that version the third beat of measure 5 is simply what in modern notation would be a dotted quarter-note, or a quarter-note: in other words, at that point the original cadence was a unison, and, if the triplum had been conceived in relation to that two-part clausula, the final cadence would be a perfect fifth. Eight-five or a perfect fifth are also the commonest vertical arrays within segments and there are very few outright struck dissonances: only the sevenths in measures five and 10 and the second in bar 13. Passing dissonance remains just as it had in the earlier Notre Dame organum style. A final thing to notice is the absence of the careful voice-leading of earlier periods, such as *Alleluia justus ut palma* displays. There are only two cadences where the motetus and tenor achieve a unison by circling it with a third (measures 5 and 14), and one where the triplum and motetus arrive at an octave by an outward-moving sixth (measure 8). It is as if the challenge of adding a metrical, texted third voice was enough without having to worry about voice-leading as well.

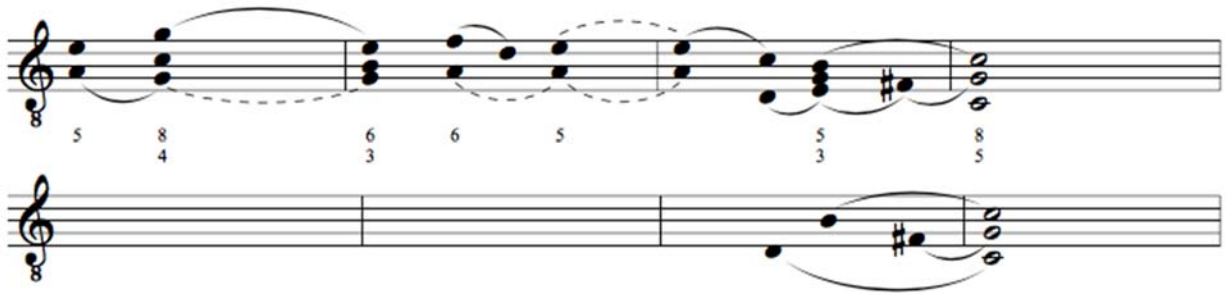
Ars Nova

Notational developments complicate the journey from non-consonance to consonance in fourteenth-century music. They included not only a subdivision of the semibreve into two or three discrete minims, but also rests with a precise durational significance. The resulting possibilities of syncopation and cross-rhythms constitute one of the most distinctive features of fourteenth-century music, which is often highly dissonant as a result. Fourteenth century treatises on elementary two-part composition, now known as contrapunctus ("counterpoint"), admit a wide variety of consonances, classified into perfect (unisons, fifths, octaves, and their compounds), and imperfect (thirds, sixths and their compounds). This provides a consonant framework underlying a dissonant surface in which directed progressions from imperfect to perfect consonance stand out clearly (see Example 6).

Machaut's ballade *Je puis trop bien ma dame comparer* shows the familiar goal of an eight-five vertical array marked by its longer duration in measures 4–5, 9, 16 and 34. These C–G–c sonorities give the piece a very clear sense of tonal center, and all except the first (of which more later) are preceded by a doubly-imperfect sonority: a sixth and a third above the lowest note.[14] The major sixth D–b moves outwards to the octave and the major third D–F-sharp leads outwards to the perfect fifth: voice-leading has returned. The cadence in the first-time bar at measure 13 is highly contrasted: an imperfect eight-six sonority one degree above the tonal center. It is approached by another imperfect sonority, a minor sixth (one that not all writers on contrapunctus admitted as a consonance). This is the first cadence to correspond with a rhyme word, and marks an important structural point in the piece, leaving the listener with a clear sense that something is unfinished, a preparation for the repeat and sense of a goal finally reached in the second-time bar. The cadences in the second part of the piece stress D again, with eight-five sonorities at measures 21, 23 and especially the last cadence before the refrain at measure 28, this again approached by the doubly imperfect six-three chord. This approach distinguishes it

[14] The terminology was proposed by Sarah Fuller, "On Sonority in Fourteenth-Century Polyphony: Some Preliminary Reflections", *Journal of Music Theory* 30 no. 1 (1986): 35–70.

Example 6. Consonant Framework and Voice-Leading, Measures 1–4, Machaut *Je puis trop bien ma dame comparer.*



from the other eight-five D sonorities, which are approached by two voices only from an imperfect consonance in bar twenty and a perfect consonance in measure 22. The refrain begins at measure 29 with another held eight-five sonority, but with F as its basis. A reduction of the first phrase shows its journey from a perfect interval via various categories of imperfect sonority to its goal of a perfect sonority.

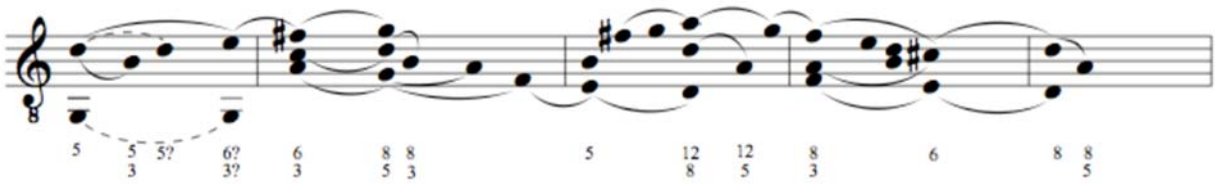
The eight-four chord in measure 1 is borderline: contrapunctus treatises do not show the fourth as a consonance, yet perhaps it still inhabited a gray area left over from its thirteenth-century classification as a medial consonance, along with the fifth. There is only one struck dissonance, the seventh between cantus and contratenor in measure 3; familiar categories such as passing notes and neighbor notes account for all other dissonant moves. Measure three is a good example of rhythmic displacement: the seventh emphasizes the lowest note in the piece so far, D, which eventually moves to C once the other notes of the usual pre-cadential six-three chord, F-sharp and b, appear. Is this only chance, a momentary lack of control by Machaut, or does dissonance emphasize and even enhance voice-leading? Ars Nova also harnessed long drawn-out tenors as a form of harmonic control in the isorhythmic motet, which many standard textbooks discuss.[15]

Ars Subtilior

By the end of the century the development of time signatures led to extremes of cross rhythms and lateral displacement, in a style variously known as late fourteenth-century mannerism or Ars Subtilior: "an art too subtle for its own good" is a cheeky translation. It is much harder to construct a convincing consonant framework for Ciconia's French virelai *Sus une fontayne* (shown in Example 7) than it was for the Machaut (in Example 6). Ciconia, who could write in

[15] Philippe de Vitry's *Garrit gallus* is discussed by Richard Hoppin, *Medieval Music* (New York, 1978):362–3. The music is at http://www.armusicanthology.com/anthology/?music_id=293. Jeremy Yudkin discusses Vitry's *Douce playsance* in *Music in Medieval* Europe (Englewood Cliffs, 1989): 462–74. The music is at http://www.armusicanthology.com/anthology/?music_id=492. Daniel Leech-Wilkinson analyzes Machaut's *Rose, Liz* in "Machaut's *Rose, lis* and the Problem of Early Music Analysis", *Music Analysis* 3 (1984): 9–28. The music is at http://www.armusicanthology.com/anthology/?music_id=657.

Example 7. Consonant Framework and Voice-Leading, Measures 1–5, Ciconia, *Sus une fontayne*.



every style of his day and exhibits good harmonic control in Italian-style pieces and isorhythmic motets, here barely allows any consonance to sound.

Using the same framework derived from the contrapunctus teachings, looking for perfect consonances, a very brief eight-five sonority on G appears in measure 2, which quickly becomes an eight-three then is abandoned to dissonant neighbor notes, A and F. The standard six-three doubly-imperfect sonority prepares for the "cadence", but it is so fleeting. Were it not on G, which is the tonal center of the whole piece (which is incomplete here, as it does not have the B section of the virelai, which consists of lines 2 and 3 of the poem), one could refuse to call it a cadence at all. Similarly, the sixth in measure 4 leads to the octave on D in measure 5. As D is the goal of the B section, it seems fair to call this a cadence. Because of the conflicting time signatures there is no actual struck dissonance in these measures, but the feeling of dissonance is strong. The experimentation with rhythmic notation that has marked medieval polyphony has reached its apogee and the Boethian consonances barely get a chance to sound; the renaissance will seek a smoother rhythmic style, admit triadic writing without note, and harness dissonance by controlling its types and the beats (or offbeats) on which it should be allowed to happen.

Conclusion

The medieval period in many ways seems impossibly distant: not just in the centuries that have elapsed since then, but also in the musical styles of that period. Yet those musicians laid the groundwork for so many things that we now just take for granted. Why should we call notes A, B or C? Why are notes written on a stave? Where did those note shapes come from? Why do we have the white notes on the piano (those of the medieval diatonic modes) and the black notes (those that literally fall betwen the cracks)? If there are two defining features of western European music, considered globally, these are its music notation and its harmonic emphasis. Both of these characteristics were developed in the middle ages.

The harmonic emphasis of western music has been very much related to tonal center, and we have seen the importance of a tonal center in the very earliest notated music, as in the plainsong pieces *Tecum principium* and *Puer natus est*. We have seen the evolution of harmonic practice from the parallel harmonies of *Tu patris sempiternus es filius*, through the contrary-motion harmonies of *Alleluia justus ut palma* to the integration of dissonance as an important part of the music's flow in *Kyrie cunctipotens genitor*. We have seen the refinement of rhythmic notation in

Viderunt omnes and *Pucelete/ Je langui/Domino*. Finally, we have seen the beginnings of formalized voice-leading in Machaut's *Je puis trop bien ma dame comparer*, and Ciconia's *Sus une fontayne*. Each stage in this evolution integrates a harmonic development with a notational innovation that made such a development possible.

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(Contains inventories of various manuscripts, texts of early liturgical items, musical incipits of hymns and a large selection of relevant links)

Global Chant database
http://globalchant.org
(A search of beginning texts of plainchant items will show musical incipits, with links to Cantus, and also display in a synoptic version musical incipits of different chant texts that basically use the same melody.)

Comparatio
http://comparatio.irht.cnrs.fr
(Displays in a synoptic table in staff notation different versions of the same chant from different manuscripts. Very useful for an oversight of differing versions of a single chant. The website is in French.)

Thesaurus Musicarum Latinarum
http://boethius.music.indiana.edu/tml/
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Guillaume de Machaut, works
http://gallica.bnf.fr/ark:/12148/btv1b84490444/f1.item.zoom

Philiipe de Vitry, works
http://gallica.bnf.fr
(One day they will work out how to put the manuscript f fr 146/ fonds français 146, AKA the Roman de Fauvel, online, or make their search engine find it.)

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