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Hidden colouration: deep metrical flexibility in Machaut

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ABSTRACT. *This article introduces a metrical adaptation to the* contrapunctus *method of pitch reduction commonly used to analyse* Ars Nova *counterpoint. Expanding the medieval concept of colouration from the mensural to the metrical, my* contrapuncti *highlight the flexible toggling between perfect and imperfect groupings at various rhythmic levels in selected motets by Guillaume de Machaut (c.1300–77). The viewpoint advanced here assumes no a priori metrical grid to parse the musical surface, but rather allows the articulation of sonority, cadence and form to reveal a fluid and unique metrical grouping structure for each piece. With metrical emphases shown as inextricable from contrapuntal and harmonic ones, the metrical* contrapunctus *captures a more comprehensive picture of Machaut's musical language.*

Introduction

Much modern analysis of the polyphony of Guillaume de Machaut (*c.*1300–77) is undertaken through *contrapunctus* reduction. Such analyses represent a reverse-engineering of an often busy and dissonant surface back to consonant note-against-note counterpoint of the kind recommended as a starting point by medieval composition manuals.[1] While discant reductions have been fruitful for modelling *Ars Nova* counterpoint, such reductions are less able to represent the characteristically flexible metrical organisation of the period.[2] This study therefore introduces an adaptation to the *contrapunctus* method that not only discloses but also highlights the most intriguing features of the metrical grouping of sonorities, cadences and formal

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[1] Sarah Fuller, 'On Sonority in Fourteenth-Century Polyphony: Some Preliminary Reflections', *Journal of Music Theory*, 30/1 (1986), 5–70, at 38, discusses how the simpler discant of thirteenth-century counterpoint came to act as the foundation for more florid polyphony in the fourteenth century. The resultant distinction between levels of surface and essential structure noted by Fuller is represented in the present study by the analysis of single harmonies (the 'essential consonances') as active over a measured duration space. Elizabeth Eva Leach, 'Counterpoint and Analysis in Fourteenth-Century Song', *Journal of Music Theory*, 44/1 (2000), 45–79, provides a highly detailed heuristic for using basic medieval theoretical tenets, especially for assessing ficta and directed resolutions, as a starting premise for sophisticated modern analysis of Machaut's polyphony. Leach differs from Fuller in parsing three-voice music into simultaneous duets, reflecting the essentially dyadic nature of medieval counterpoint teaching. In portraying the grouping of sonorities at broad metrical levels, local surface misalignments resolve out and I pair the upper voices against the tenor.

[2] Karen Desmond's recent monograph, *Music and the* moderni, *1300–1350: The* Ars nova *in Theory and Practice* (Cambridge, 2018), attributes the freedom to notate metrical irregularities in *Ars Nova* France to a fundamental shift in the conception of time.

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articulations.[3] While any pitch analysis will have considered metrical grouping at least implicitly, my focus is on developing a systematic analytical notation that explicitly presents metrical grouping as inextricable from tonal articulation.[4]

Flexibility with metrical grouping will be shown to occur within a single voice (horizontally) as well as concurrently between voices of polyphony (vertically). In the more complex examples, metrical ingenuity is revealed in both of these ways simultaneously and across several levels of metrical breadth (i.e., *tempus*, *modus*, *maximodus*). The analyses begin by showing how irregular metrical grouping substantively shapes tonal articulation in Machaut's Motet 4, *De Bon Espoir/Puis que la douce/Speravi*. As Jacques Boogaart notes in his recent complete edition, 'Transgressions in mensuration occur in this motet more than in any other.'[5] Metrical grouping will be further shown to play a central role in the tonal drama between two competing finals in this motet. Motet 17, *Quant Vraie Amour/O Series summe rata/Super omnes speciosa*, follows as an example of how a flexible approach to independent metrical groupings can clarify surface misalignments, even of the final cadence, without sacrificing the metrical integrity of each part individually. Finally, an examination of the four-voice Motet 5, *Aucune gent/Qui plus aimme/Fiat voluntas tua/Contratenor*, explores the complex tonal ramifications of a mensurally opposed tenor/contratenor pair, with metrical grouping further complicated by divergence of the upper-voice pair from the tenors. Throughout these analyses, my methodology is developed as a mode of modern critical reception and not of medieval production.[6]

Among recent analyses that grapple with metrical flexibility in Machaut, Sarah Fuller highlights grouping play at the *modus* level in the score of Motet 22: three imperfect longs (=6 breves) in the space of two perfect longs (=6 breves).[7] Fuller also notes a similar case in which regular duple groupings are temporarily replaced by two triple ones (3+3 semibreves) in Machaut's Motet 7.[8] Jacques Boogaart describes flexibility at the *modus* level in the tenor of Machaut's Motet 17, in which 'three imperfect longs

[3] Metrical organisation is here distinguished from mensural by its tracking of tonal articulation across spans of time independent of any singly notated rhythmic value, though measured in those terms. For example, a work's mensuration of the notated breve, be it perfect or imperfect, is here less pertinent than a sonority of n-breves' duration that is judged perfect or imperfect at the next higher level (i.e., *modus*).

[4] The practice of arranging *contrapuncti* in vertical alignment with their score helps penetrate melodic embellishments and clarify surface mensurations. See, for example, Jared C. Hartt, 'Rehearing Machaut's Motets: Taking the Next Step in Understanding Sonority', *Journal of Music Theory*, 54/2 (2010), 179–234, at 206. However, such analyses themselves do not explicitly record the layered metrical play to be detailed here.

[5] Jacques Boogaart, *Guillaume de Machaut: The Complete Poetry and Music*, 13 vols. (Kalamazoo, 2018), 9: 15.

[6] David Maw's seminal study, '"Trespasser mesure": Meter in Machaut's Polyphonic Songs', *Journal of Musicology*, 21/1 (2004), 46–126, by contrast, explicitly claims composer intent for the metrical groupings identified because they result directly from Machaut's notated mensural values. For example, Maw states that 'the changes from imperfect modus to perfect modus are very much part of the original and indicate that Machaut was thinking not in terms of a consistent modus but in terms of an inconsistent one' (76).

[7] Sarah Fuller, 'A Motet Conceived in Troubled Times: Machaut's Motet 22', in *A Critical Companion to Medieval Motets*, ed. Jared C. Hartt (Woodbridge, 2018), 321–340, at 329–33.

[8] Sarah Fuller, 'Modal Tenors and Tonal Orientation in Motets of Guillaume de Machaut', *Current Musicology*, 45/47 (1990), 199–245, at 229–31, esp. Example 19.

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taken together equal two perfect ones'.[9] David Maw points out the same hemiola in Machaut's Rondeau 5 and Ballade 2, among a wealth of other examples.[10] These references, like my own analyses later in this article, are metrical rather than mensural in their grouping of free rhythm within a measured space (e.g., of a long) rather than to one discretely notated duration itself.[11] Durational measurements independent of the particular rhythmic values that comprise them are dubbed 'super-modes' by Maw, building on Petrus frater dictus Palma ociosa's *Compendium de discantu mensurabili* (1336).[12]

The notation of the three complete editions of Machaut's motets – by Friedrich Ludwig (1954), Leo Schrade (1956) and Jacques Boogaart (2018) – demonstrates their editor's investment in representing metrical grouping and its flexibility.[13] Following Schrade, Boogaart analogises mensural levels at the outset by a common practice time signature with a *modus* multiplier. For example, 2x 2/4 in the upper voices of Motet 4 indicates two groups (2x) of imperfect *tempus* (2/4). These bars proceed regularly until the manuscript notation dictates a change, in which case Boogaart and Schrade write in a new time signature. Ludwig's edition of Machaut's motets, in contradistinction to his edition of the secular songs, has no time signatures, though his bar lines are suggestive. Boogaart alone sometimes signs deeper mensural levels in his tenors, where the multiplier refers not to *modus* but to *maximodus* and the time signature to *modus*. Except for some four-voice motets (nos. 5, 21 and 23), Boogaart's initial labels of *maximodus* remain fixed, unlike his re-notations of mensural changes at smaller levels.[14] For Boogaart, 'a consistent modus division often entails large-scale syncopations that exceed the modus bars', which results in musical groupings that cut across editorial bar lines.[15] By contrast, the bar lines of my own examples derive from dynamic tonal articulations rather than representing an a priori grid against which a particular phrasing is interpreted as expanded, contracted or displaced.

The view of medieval metrical organisation advocated here is an emergent one, in which a particular grouping or its continuation is never supposed – through a regular

[9] Jacques Boogaart, 'Encompassing Past and Present: Quotations and their Function in Machaut's Motets', *Early Music History*, 20 (2001), 1–86, at 48. Further metrical analysis of Motet 17 is undertaken later.

[10] Maw, '"Trespasser mesure"', 85–7 and 106.

[11] See also Maw '"Trespasser mesure"', 55, n. 21. Desmond, *Music and the* moderni, 216 and *passim*, makes a clear distinction between notated rhythm and the interpretation of grouping through tonal articulation. She writes that 'a voice notated in imperfect *modus* could project perfect or imperfect *modus*, or even no particular *modus* at all'.

[12] Maw '"Trespasser mesure"', 57–8. The distinction between practical mensuration and the analysis of metrical organisation is made evident in Jacques Boogaart's 2018 edition of Machaut's motets; for example, in his observation that 'M20 has just one longa, so that the modus mensuration is irrelevant'. *Guillaume de Machaut: The Complete Poetry and Music* (Kalamazoo, 2018), 9: 20. From an analytical view, Machaut's directed progressions in that motet effect a regularly alternating pattern of perfect and imperfect *modus* groups (3+3+2+2+2), which thus alternate imperfect and perfect at the level of *maximodus* grouping, that is, two groups of 3s + three groups of 2s.

[13] Friedrich Ludwig, ed., *Musikalische Werke: Motetten*, vol. 3 (Leipzig, 1954). Leo Schrade, ed., *Guillaume de Machaut: Oeuvres completes*, 2 vols. (Monaco, 1956). Boogaart, ed., *Guillaume de Machaut*, vol. 9.

[14] In his critical notes, however, Boogaart acknowledges flexibility at the *maximodus* level. In Motet 4, for example, he notes that a *talea* of 17 longs cannot be divided regularly into twos or threes (imperfect or perfect *maximodus*). Boogaart, *Guillaume de Machaut*, 9: 196; see also 29.

[15] Boogaart, *Guillaume de Machaut*, 9: 20.

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metrical grid, for example – but is continuously created by the coordination of tonal and formal events.[16] The concept of syncopation, common to medieval mensural theory and its modern analysis, is precluded in a *metrical* approach that projects no norm against which to hear it.[17] It is my emphasis on metrical grouping as emergent and as inextricable from tonal articulation that distinguishes my approach from studies of mensural notation and from modern studies of medieval metre.

Describing mensural rhythm in the *Notitia artis musicae* (1321), Johannes de Muris began with the broadest level, what he called the first degree.[18] We may refer to this division as *maximodus* (i.e., *major modus*), the number of longs per maxima. *Modus*, breves per long, was a division of the second degree, and so on down. The *Quatuor principalia musicae* of 1351 presents a sample of these divisions in eight mensural trees all with the maxima as their trunk, *maximodus* its first branching.[19] While a secure theoretical possibility, Ugolino of Orvieto's *Declaratio musicae disciplinae* (*c.*1430) reports that systematic organisation at the *maximodus* level was so little employed by composers that mensuration signs, when they refer to *modus* at all, refer only to *minor modus*.[20] Echoing Ugolino's reservations about *major modus*, Elizabeth Eva Leach confirms that 'it is relatively rare to find regular rhythmic organisation at this level [*maximodus*]' in fourteenth-century French polyphony.[21] Yet a lack of regularity is not the same as the absence of musical structure. As Maw has suggested, irregularity

[16] This flexible, moment-by-moment perspective of medieval metrical organisation is informed by Christopher F. Hasty, *Meter as Rhythm* (New York, 1997), especially in the continuous reckoning of projected grouping durations with 'a readiness to interpret emerging novelty in the light of what has gone before' (69). Speaking more specifically about fourteenth-century notation, Karl Kohn, 'The Renotation of Polyphonic Music', *The Music Quarterly*, 67/1 (1981), 29–49, at 31, affirms that mensural notation as a means of quantitative measurement carries no inherent sense of metrical pulsation.

[17] The Berkeley Manuscript implicitly excludes the possibility of syncopation at mensural levels deeper than *modus*. See Lawrence Earp, 'Notation II', in *The Cambridge History of Medieval Music*, ed. Mark Everist and Thomas Forrest Kelly (Cambridge, 2018), 674–717, at 706. Yet this omission may be a reflection of the practical range of notated values and a medieval focus on the three central mensural levels: *modus*, *tempus* and *prolatio*.

[18] See the table in Oliver Strunk, ed., *Source Readings in Music History: The Early Christian Period and the Latin Middle Ages* (New York, 1998), 267. A critical edition is found in Hans Ulrich Michels, ed., *Johannes de Muris, Notitia artis musicae, Compendium musicae practicae*; with *Petrus de Sancto Dionysio, Tractatus de musica*, Corpus Scriptorum de Musica 17 (Rome, 1972), 79. For a detailed discussion, see Desmond, *Music and the* moderni, 104 and 184–6. Similarly, Petrus frater dictus Palma ociosa's *Compendium de discantu mensurabili* of 1336 goes no deeper than *modus* in its treatment of practical composition.

[19] Oxford, Bodleian Library, Digby 90, fols. 44v–45r. A translation can be found in Luminita Florea Aluas, 'The Quatuor principalia musicae: a critical edition and translation, with introduction and commentary', Ph.D. diss., Indiana University (1996), 673–5.

[20] Albert Seay, ed., *Declaratio musicae disciplinae*, 3 vols. (Rome, 1959), 2: 198–201. Anna Maria Busse Berger, *Mensuration and Proportion Signs: Origins and Evolution* (Oxford, 1993) traces the convoluted history of signalling *modus*; see esp. 14. Most fourteenth-century French manuscripts, such as those of Machaut's motets, use no mensuration signs. Nevertheless, *modus* is sometimes discernible through the length of long rests, the long spanning either two or three vertical spaces on the staff for imperfect or perfect *modus*, respectively.

[21] Leach's valuable Moodle course on reading fourteenth-century notation can be found at: http://diamm.nsms.ox.ac.uk/moodle/ (accessed 17 February 2020). Ruth I. DeFord, *Tactus, Mensuration, and Rhythm in Renaissance Music* (Cambridge, 2015), 36, observes of fifteenth-century repertoire that 'minor *modus* is limited to relatively complex works and major *modus* is extremely rare'. All these authors refer to practical rhythmic notation in the repertoire, whereas the present analytical study refers to the musical organisation of those measured duration spaces, regarding notated values as idiomatic diminutions.

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may rather be valued as integral and expressive in reading *Ars Nova* motets today. I hope to demonstrate that these deep metrical levels are worth close scholarly attention, even in analyses focused mainly on pitch.

Drawing attention to the importance of the *modus* level in *Ars Nova* mensural theory, Maw situates Machaut's habitual flexibility at the level of 'modus meter' within a medieval aesthetic that valued variety, imperfection and novelty.[22] He regards metric displacement as the primary agent of misalignment among various musical stresses (e.g., agogic accent, recurrent motivic figures, stressed syllables) and interprets the degree to which these coincide with a prevailing metrical grouping.[23] In her recent monograph, Karen Desmond examines the destabilisation of *modus* through notated dots in some *Ars Nova* motets (not by Machaut). By taking notated rhythm as the analytical object, Desmond is able to separate out an underlying metre from rhythmic displacements that may obscure or even work against it. Tonal articulation can therefore arrive on any beat of a bar in Desmond's view. Following their subtle analyses, both Maw and Desmond call for a more nuanced representation of *modus* in modern editions.[24] The notation system developed in this article offers tools to further refine the modern representation of *Ars Nova* metrical grouping.

In his pioneering deep-mensural study, Graeme M. Boone observes 'unequivocal evidence of consistent rhythmic patterning, aligned with steady pulse framework'.[25] While I agree that regular hypermetre can pool up in substantial excerpts from Machaut's works, my approach is based upon an opposite orientation. Rather, I define metrical units bottom-up wherever they occur rather than probing the degree to which consonance alignment and tenor patterns play off an axiomatically fixed metrical dot-grid. As with Maw and Desmond, Boone's view of metrical irregularity is shaped by displacement and his analytical perspective is one of omniscient remove. By contrast, I understand displacement as resultant from irregular metrical grouping (perfect vs imperfect) and regard metre as a vital process that unfolds moment by moment. I agree with Boone's characterisation of deep mensuration as often variable, and thus resistant to a hypermetric grid approach, and am prompted towards developing a more flexible approach to the analysis of medieval metre.[26]

For my analyses, I have adapted the concept of colouration from medieval notation to signify alteration in metrical grouping. As mensural notation matured, composers of the fourteenth century began fluidly swapping perfect and imperfect groupings in the

[22] See Maw, '"Trespasser mesure"', 46–126. His compendious Table 7 (at 94–5) catalogues the lively motion between perfect and imperfect *modus* in the polyphonic songs of Machaut. The present study is in part a response to Maw's call for more formal analytical procedures to parse irregular *modus* in Machaut's output, with focus here on the motets rather than the songs (62).

[23] Maw, '"Trespasser mesure"', 62.

[24] Desmond, *Music and the* moderni, 212–13, n. 38. See Maw, '"Trespasser mesure"', esp. 77, for an argument against mechanical barring and 72 for a score excerpt of Machaut's *Honte, paour* (B25) barred according to a flexible reading of *modus*. Maw (at 74) puts it boldly: 'If the barring [of a modern edition] seems arbitrary or subjective, that is because the rhythmic organization is so; and it is the composer's prerogative that this is how it should be.'

[25] Graeme M. Boone, 'Marking Mensural Time', *Music Theory Spectrum*, 22/1 (2000), 1–43, at 11.

[26] Ibid., 40.

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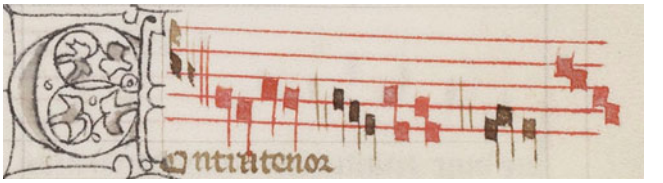


Figure 1. Colouration in the contratenor of Machaut's Motet 5 (T. *Fiat voluntas tua*); BnF fr. 1584, fol. 419r. (colour online)

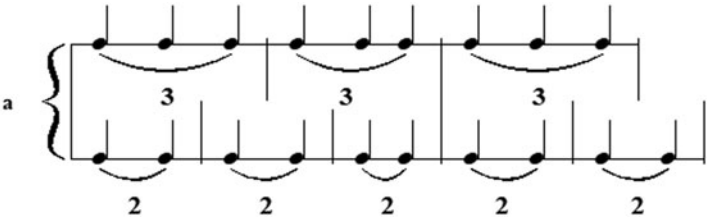
same voice as well as simultaneously against other voices. This technique was sometimes indicated through colouration, a change of ink from black to red or from filled to void note heads or both. Machaut's use of colouration connotes the imperfection of perfect rhythmic values (reduction by a third). In Figure 1, for example, groups of longs alternate between imperfect (red) and perfect (black) in Machaut's Motet 5, to be discussed in further detail later.

Unlike the composer's colouration of single notated values in Figure 1, my analytical colouration is an interpretive tool that indicates something more abstract. Analytical colouration hereafter indicates a change of grouping – perfect to imperfect or vice versa – within some measured space of duration. For example, two longs-worth of any decorated surface rhythm, not necessarily two notated longs themselves, may be shown in the analysis with all concerned pitches 'coloured', here placed under brackets. This is not to say that each of those pitches' durations has been individually imperfected, but that the bracketed pitches occur within a measure of duration that has been imperfected. The analysis is therefore in the domain of the metrical rather than the mensural and analytical colouration takes on a broader reference to grouping alteration. Since it is an act of modern critical reception, 'hidden colouration' went unnotated in the production of medieval manuscripts.

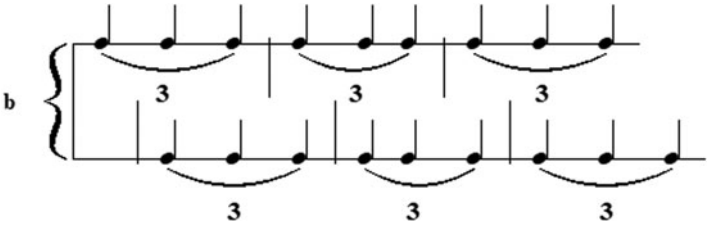
My interpretation of the toggling between duple and triple grouping independently in the voices of Machaut's motets is informed by Harald Krebs's two categories of metrical dissonance, shown in Examples 1a and 1b.[27] The category called grouping dissonance (3s against 2s in Example 1a) results in misaligned metrical accents that periodically coincide (here, every six beats). This is categorically distinguished from displacement dissonance, in which the same grouping (3s against 3s in Example 1b) is offset by some amount of beats. Note that metrically displaced voices will not periodically coincide unless a change of grouping brings their metrical stresses (back) into alignment. I call upon Krebs's two categories to draw a careful distinction from the preceding seminal authors. I argue that in Machaut's motets, the apparent metrical displacements are a result of dynamic metrical grouping. As shown in Example 1c, a pattern of regular duple grouping is disturbed by a single triple group in one voice. This momentary grouping dissonance causes that voice to appear displaced one

[27] Harald Krebs, *Fantasy Pieces: Metrical Dissonance in the Music of Robert Schumann* (New York, 1999). For an analysis of metric displacement at the *modus* level in Machaut, see Maw, '"Trespasser mesure"', 68–9. Maw's displacement occurs because of irregular grouping in one voice, as in my own examples.

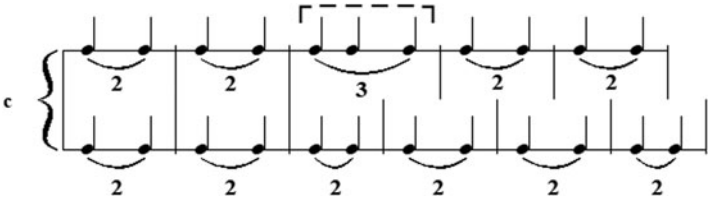
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Example 1a. Krebs's grouping dissonance.



Example 1b. Krebs's displacement dissonance.



Example 1c. Displacement as a result of grouping dissonance.

beat thereafter, usually heard as a delay in otherwise clear harmonic units. The effect of metrical displacement in such cases is the result of a prior *grouping* dissonance, an instance of 3 against 2.

Such metrical play has ramifications for how we regard harmonic structure, cadential strength and formal articulations; the elements metrically organised. In medieval theory and practice, consonance and metrical grouping were closely paired. For Franco of Cologne (whose *Ars cantus mensurabillis musicae* is dated *c.*1280), the triple grouping of tempora and the consonant sonority that marked the first tempus were both kinds of 'perfection'.[28] Johannes de Garlandia similarly called for the coordination of stable

[28] See Desmond, *Music and the* moderni, 202–9, for a recent review of the development of mensural theory. Desmond details a change in the conception of time from cyclic, in the modal perfections of Garland

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sonority with the beginnings of mensural units.[29] Expanding upon this medieval perspective, for the modern analyst to mark the consonant arrivals of directed progressions is to draw a map of downbeats, defined as initiating a new metrical grouping (perfect or imperfect) at some level. The tonal emphases of perfect consonance thus engender a flexible *in situ* metric organisation.[30] As Desmond states, 'the deployment of perfect sonorities and directed progressions within each *talea* contributes to this sense of mixed [perfect and imperfect] mensuration'; that is to say, tonal markers articulate metrical grouping, which can be irregular. In Maw's study of *modus* grouping in Machaut's songs, he similarly measures metrical groups as spans between points of simultaneous articulation, agogic accent, recurrent rhythmic figures and the like.[31] Charting sub-surface levels of metrical organisation in this study, my emphasis is rather on directed progressions and isorhythmic boundary points as articulating deeper metrical groupings. Karl Kohn was a pioneer of re-notating parts according to independent metrical streams that coalesce at cadences. Kohn lamented the loss of 'the varied splendors of true rhythmic polyphony' as modern editions packaged early music 'into tidy but inappropriate and misleading measures'.[32] By his metrical re-notation of Machaut's Ballade 4, with comparison to Ludwig and Schrade, Kohn

and Franco, to an unconstrained continuum in Jean des Murs. An important statistical account of the pairing of metrical perfections with consonant perfections in over sixty motets from Montpellier (Bibliothèque Interuniversitaire, Bibliothèque universitaire de médecine, H. 196) to Ivrea (Biblioteca Capitolare, 115) is given in Desmond's Figure 6.1 (206). An initially strong association, the curve trends towards creative substitutions of sonority without seriously challenging the norm of pairing perfect with perfect. Indeed, the stylistic encoding of that pairing enabled composers to play with expectation while maintaining coherence. Examples of this ingenuity in *Ars Nova* polyphony are detailed in my own analyses of Machaut in the following sections.

[29] Sarah Fuller 'Theoretical Foundations of Early Organum Theory', *Acta Musicologica*, 53/1 (1981), 52–84, at 77, notes how the regular grouping of consonances contributes to the perception of downbeats, manifestly so in the bar line practice of modern editors.

[30] Discussing twelfth-century polyphony, John Caldwell, 'Rhythm and Meter', in *The Cambridge History of Medieval Music*, ed. Everist and Kelly, 718–46, at 737, notes parenthetically that final syllables coincide 'on a metrically strong (and ipso facto consonant) position'. Similarly linking metrical grouping with consonance, Fuller, 'Theoretical Foundations', 84, finds that 'in Western medieval music theory a categorical and systematic distinction between consonance and dissonance lay dormant until the emergence of meter'. Desmond, *Music and the* moderni, 210–12, traces the arrivals of directed progressions on the coincidence of *modus* downbeats in Philippe de Vitry's *Colla/Bona* (and other examples throughout chapter 6). The motet's novel mensural design, featuring a tenor in imperfect *modus* against a perfect upper-voice pair, is highlighted by directed progressions marking the coincidence of their downbeats every six breves (three bars of the tenor against two of the upper voices). My own analytical notation to follow was developed to highlight and interpret such metrical misalignments. Whereas in this example Desmond resolves the *modus* misalignment into a single tonal rhythm as the driving 'experiential mensuration', reasonably based upon regular directed progressions, I wish to emphasise the push and pull of layered metrical dissonance as central to the musical experience and argue for how both tonal and poetic narratives reflect that tension. Desmond's reading of Vitry's *Vos/Gratissima* (see 222–8) provides a model wherein tonal-metric rupture is foregrounded as the central conceit of the motet.

[31] Maw, '"Trespasser mesure"', 65, describes how 'a rhythm of simultaneous articulations can be abstracted from the texture as the durations between such points, and the sequence of these durations may form rhythmic groups that will suggest a metrical outline'.

[32] Most inappropriate, for Kohn, was the 'inevitable assertion of the bar line with its mechanical projection of regular metrical beats [that] generates a superimposed pattern of artificial and distorting pulsations'. See Kohn, 'Renotation', 30.

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sought to 'elucidate rhythmic contours in each part while clarifying their confluence into cadences where they truly occur'.[33] Although Kohn's methodology may lack today's precision and grounding in medieval concepts, his advocacy for the mutual dependence of downbeat and consonance is a principle worth pursuing.[34] I admit that a modern edition given to re-notating metres every few bars, and separately in each part, might be vexing at first glance. Yet may it also yield compensatory benefits. The independence of voices roving deliciously in and out of phase, encouraged by such a score layout, could pair well with the independence of Machaut's polytextual poetry. Second, a motet's form may become more readily discernible (if that is a virtue) as the voices more audibly snap together to mark important arrivals. The more obvious articulation of form can highlight Machaut's expressive play with expectations, as tonal arrivals and the formal seams of isorhythm are subtly attenuated or subverted.

Analyses

Motet 4

The analyses begin with a synoptic picture of Machaut's Motet 4, *De Bon Espoir/Puis que la douce/Speravi.* An ametrical *contrapunctus* reduction of the motet's complete polyphony is given in Example 2.[35] After a review of its tonal narrative, the effects of metrical grouping will be isolated for scrutiny. Motet 4's isorhythmic tenor is cast in 3:2 proportion: three *taleae* for every two *colores* (eighteen notes from chant).[36] There are four *colores* in all, the second pair in diminution by half. Each *color* statement, vertically aligned, closes on F and a slim majority of Machaut's directed progressions are also to F. Yet an almost equal number of directed progressions are to G and the first two of three *taleae* divisions conclude with G. If these competing pitch centres are
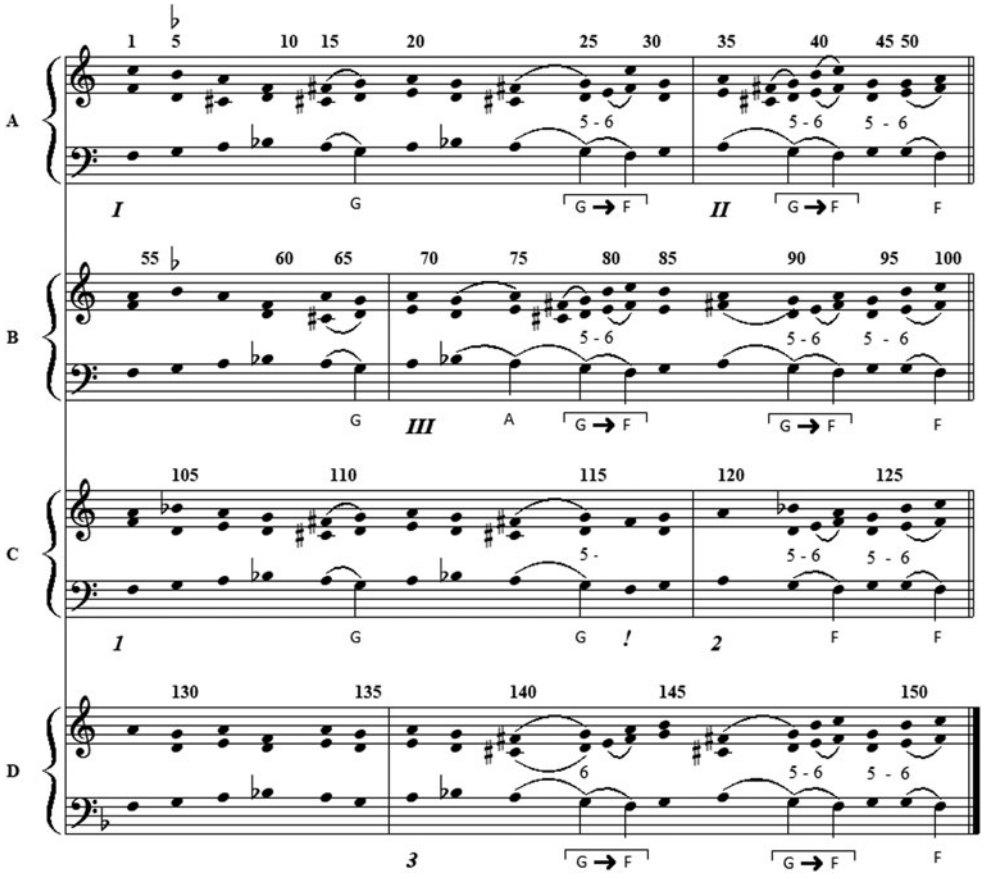
[33] Kohn, 'Renotation', 46–7.

[34] The interpretation of cadences as downbeats settles the ambiguity of the tenor's *modus* in Machaut's Motet 10, as described by Margaret Bent, 'Machaut's Motet 10 and its Interconnections', in *A Critical Companion to Medieval Motets*, ed. Jared C. Hartt (Woodbridge, 2018), 301–20, at 309–10. The question of whether the opening breve in the *talea* pattern BLLLBB is an upbeat (placing the first long on a downbeat) or a syncopating agent that displaces the three longs (completing its own perfection with the final two breves) can be decided by the cadence on that pattern's penultimate breve in breve 35. If that cadence is a downbeat, the first breve must be a pickup. Boogaart's 2018 edition (at 29 and 103) is set in this way.

[35] Because medieval notation is so demanding of judgements about accidentals, the chance to design the tonality of a work is ever dangled before the modern editor and analyst. To wit, whether I wish to raise some notated F to F♯ can depend upon whether I think the goal tone G is worth emphasising. Whatever their liberality or reservations about adding *musica ficta*, the analyst is obligated to first create the score they wish to analyse through a prefatory act of analysis. To recuse myself from such consequential assessments, I have accepted Boogaart's 2018 edition of Machaut's motets (from *Mach A*, *c.*1375–77) as my texts, reproducing his ficta above the staff in my figures and *Mach A*'s accidentals in line with their pitches. On the 'preconditions for analysis', see Margaret Bent, 'The Grammar of Early Music: Preconditions for Analysis', in *Tonal Structures in Early Music*, ed. Cristle Collins Judd (New York, 1998), 15–59.

[36] Alice V. Clark, 'Tracing the Tenor in Medieval Motets', in *A Critical Companion to Medieval Motets*, ed. Jared C. Hartt (Woodbridge, 2018), 61–76, at 65–6, describes the sourcing and liturgical context of this chant tenor.

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Example 2. *Contrapunctus* reduction of Machaut's Motet 4.

roughly equal in appearance, Machaut's counterpoint makes their hierarchy clear.[37] With one exception, whenever a directed progression to G follows with another step down to F in the tenor, Machaut makes a subsequent directed progression there. Arriving thus on F undercuts the consonant stability of G through 5–6 exchange (bracketed in the Example 2), transforming a stable sonority (the perfect consonance G/d) into a directed one (the imperfect G/e, which resolves out to F/f).[38] The tonal weight of G, though of nearly equal frequency, is thereby superseded by the tonal hegemony of F. An exclamation mark in *color* C indicates the one place where Machaut omits this counterpoint, allowing G to stand and the following F to pass by without polyphonic

[37] See Sarah Fuller, 'Tendencies and Resolutions: The Directed Progression in "Ars Nova" Music', *Journal of Music Theory*, 36/2 (1992): 229–58, at 234–9, for further detail on the emergence of pitch hierarchies A→G→F in Motet 4.

[38] Leach, 'Counterpoint and Analysis', 63–5 (esp. Example 10), defines this common procedure as contrapuntal concatenation.

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emphasis. The following analysis reveals how G is subordinated to F at deep metrical levels at this moment and elsewhere throughout Motet 4.

In Example 2, *colores* A, B, C and D denote repetitions of the chant tenor, concluded with double bar lines, while *taleae* I, II and III denote repetitions of the rhythmic series assigned to pitches of the *colores* and conclude with a single bar line.[39] *Taleae* 1, 2 and 3 are the same rhythmic series in diminution for the last two *colores.* Slurs highlight directed progressions, with arrivals accentuated by tenor stem and pitch label.[40]

To bring the metrical groupings of these pitches to the fore, I shall now recast excerpts from the same reduction of Example 2 in a notation that captures duple and triple groupings in each voice independently.[41] Such a metrical *contrapunctus* logs not only the various stops along a tonal journey but also a detailed timetable. Machaut's motets prove fruitful ground indeed for such metrical analysis insofar as they 'explore all the possibilities the *Ars Nova* theorists had uncovered by their systematization of rhythmic and notational experiments at the beginning of the fourteenth century'.[42]

I first consider some correspondences between the first three *taleae* in the integer valor section of Machaut's Motet 4.[43] In the metrical *contrapunctus* of Example 3, a filled note head represents the manuscript's breve, while in the more abstract Example 2 each tenor pitch was presented successively without rhythmic consideration. The bar lines added in Example 3 are a visual aid that group music of a long's duration, perfect when equal to a count of three breves and imperfect when two. Because Machaut's harmony and directed progressions do not as a matter of course settle concurrently in every voice, my analytical notation bars each voice independently, as in Desmond and implicit in Boone. This offers a level of nuance beyond Maw's typical practice of ascribing one *modus* at a time to the polyphonic whole, however irregular their succession.[44] In my modern adaptation, analytical colouration serves dual purpose: not only indicating the customary reduction of perfect to imperfect (shown in square brackets), but also the enlargement of imperfect to perfect (shown in dashed brackets). That is, analytical colouration highlights any change from a prevailing metrical grouping. There is some historical precedent for this. In

[39] I cannot help but suggest *bb♭* early in the first two *colores* for contrapuntal reasons (the *minor* tenth resolving inward) and to bring them into line with *color* C's notated *bb♭* in the manuscript (*Mach A*). In the analytical reductions to follow, a choice has been made to display directed over stable harmony when both are set against the same tenor pitch, even if the directed sonority represents only a fraction of the duration of the stable one, because of the defining importance of directed progressions to the mapping of downbeats in this study. For example, see the first directed progression to G in *color* C (breves 109–11), a quick contrapuntal resolution marking text breaks in the upper-voice poetry.

[40] Slurs have advantages over arrows, as used by Fuller and Desmond, in specifying which two voices are crucial to a directed progression and in their familiarity as inherently musical symbols.
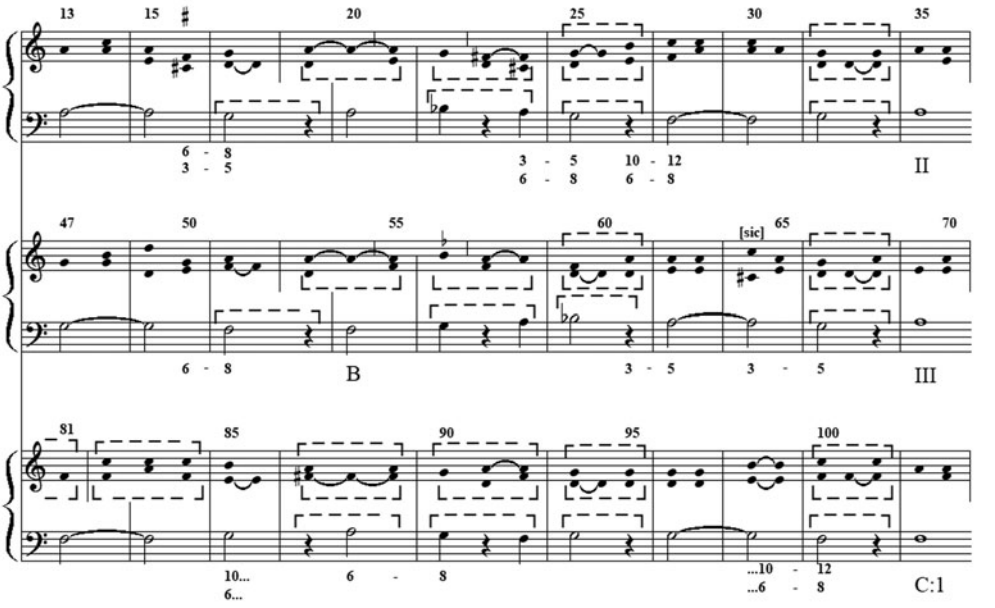
[41] Kohn, 'Renotation', 39–43, sounds an early call for a notation of Renaissance and medieval polyphony that more accurately depicts flexibly independent metrical groupings in each part. His examples include polyphony by Josquin, Dunstable, Landini and Machaut (B4).

[42] Boogaart, *Guillaume de Machaut*, 9.

[43] The opening twelve breves of each *talea* are omitted here to focus the figure on isorhythmic boundaries.

[44] See the discussion of polymetre resulting from metrical displacement in Machaut's polyphonic songs in Maw, '"Trespasser mesure"', 103–6.

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Example 3. Metrical *Contrapunctus* reduction of Machaut's Motet 4, *Talea* boundaries in the integer valor section. Breves 13–36, 47–70 and 81–104.

the *Ars Nova* treatise (*c.*1320), the author first explains that red ink imperfects perfect groupings of three tempora to two, but then also notes that 'occasionally the converse is true', citing the tenor of the motet *Plures errores sunt* as an example.[45] Because the metrical context in this example is of imperfect *modus*, analytical colouration here represents (with dashed brackets) broadening to triple groupings.
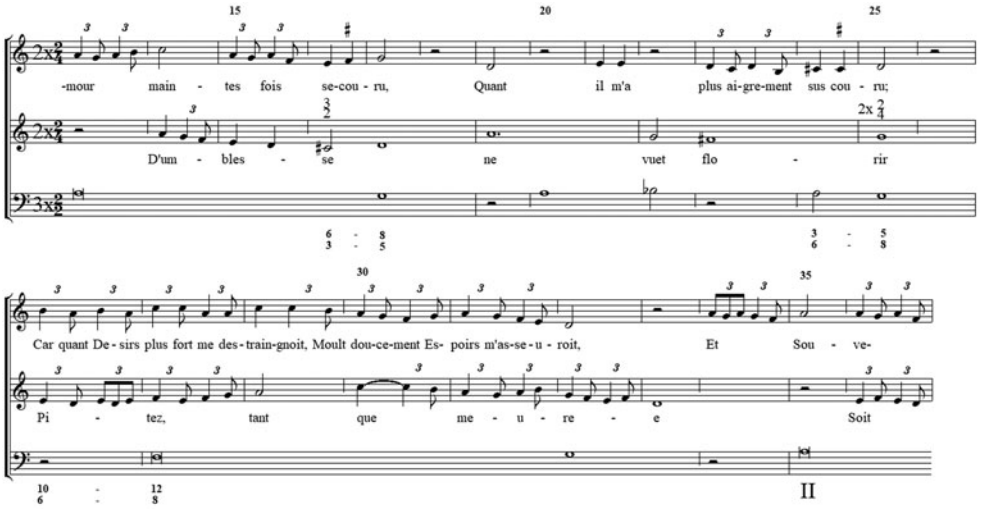
A passage of flexible metrical grouping at the beginning of Example 3 serves to introduce the analytical method. For the detailed discussion that follows, an annotated score of breves 13–36 is provided as Example 4a (corresponding to the first system of Example 3).[46] Example 4b then presents a metrically flexible score with weighted bar lines and analytical colouration as an intermediary between my metrical *contrapunctus* and the score itself.

The space from breves 17–25, spanning the first and second directed arrivals of the excerpt, is worth eight breves and could be read squarely in imperfect *modus* 2+2+2+2 as the motet's prevailing *modus* division. I will argue instead for a more metrically flexible reading defined by directed progressions, formal boundaries and isoharmonic parallelisms. The motetus alone in breves 19–24, voice crossed above the triplum (A–G–F♯), broadens into perfect *modus* while the triplum below it (D–E–E–D–C–D–B–C♯) retains

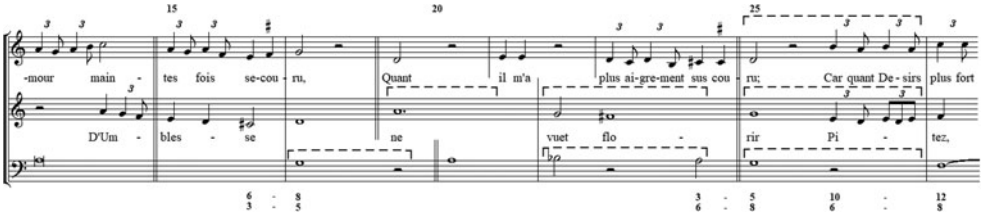
[45] Leo Plantinga, 'Philippe de Vitry's "Ars Nova": A Translation', *Journal of Music Theory*, 5/2 (1961), 204–23, at 218. Lawrence Earp, 'Isorhythm', in *A Critical Companion to Medieval Motets*, ed. Jared C. Hartt (Woodbridge, 2018), 77–102, at 96, attributes the innovation of red ink to illuminate grouping play to Vitry, as used in his *Fauvel* motet *Garrit/In nova*.

[46] All score examples of Machaut's motets come from Boogaart, *Guillaume de Machaut*.

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Example 4a. Annotated score of Machaut's Motet 4, breves 13–36.



Example 4b. Metrical analysis of Machaut's Motet 4, breves 13–28.

the original imperfect grouping of the upper voices. This same metrical disjunction is also effected in *talea* II but not III, when all voices come together for an extended perfection swelling to the ultimate arrival on final F in breve 100. As the upper voices first briefly diverge, a strong $\frac{3}{6}$–$\frac{5}{8}$ cadence on G in breve 25 (correlated with poetic closure, agogic accent and followed by rest in the triplum) capitalises on their periodicity. A larger implication of this cadence-downbeat is grouping alterations at two levels: a 2:3 *modus* perfection (minims per bar line in the Example 4b) that is balanced by 3:2 imperfection at the *maximodus* level (single bars per double bar line), both amounting to six breves. The subtle grouping dissonance that set up a cadence on G in breve 25 a step above the ultimate final of the motet is succeeded by the *modus* perfection of all voices together to herald the arrival of the ultimate final, F, in breve 28.[47] As opposed to the balanced metrical play of 3:2 vs 2:3 above, the effect in breves 25–7 is an audible

[47] When this repeats in diminution during *color* C (breves 112–17), I interpret no mensural expansion (i.e., no *modus* perfection) because Machaut withholds the directed progression to F; recall the exclamation point in Example 2. This alternative tenor setting suggests a composer well-attuned to the interdependency of metrical and tonal emphases.

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broadening out of the highly directed sonority G^{+6}_{+3}. The way metrical disorientation was introduced and then mastered in this phrase resonates with the triplum's poetic narrative. Having been beset by the 'fierce attacks' of Desire, the *amant* is reassured by Good Hope and others and the voice parts snap back together metrically. Yet at this early point in the tonal rivalry of the two finals, F (breve 28) does not yet appear on a *maximodus* downbeat. The G of breve 25 is metrically stronger. F is only affirmed on the same grand scale in *talea* III, which concludes the integer valor section and the full motet after a repeat in diminution.

Further insight is gained by comparing the metrical grouping of this passage with its parallel in the next *talea*. All three complete Machaut editions – Ludwig, Schrade and Boogaart – initiate *color* B as a syncopated long on breve 2. If the directed progression at breve 51 is understood to instigate a perfection of *modus* in the tenor, however, the *color*'s return is showcased on a downbeat at 54.[48] The metrical ramifications of this downbeat informed a parallel reading of the corresponding passage in *talea* I, in which the tenor's long at breve 20 was not syncopated by the preceding breve rest.
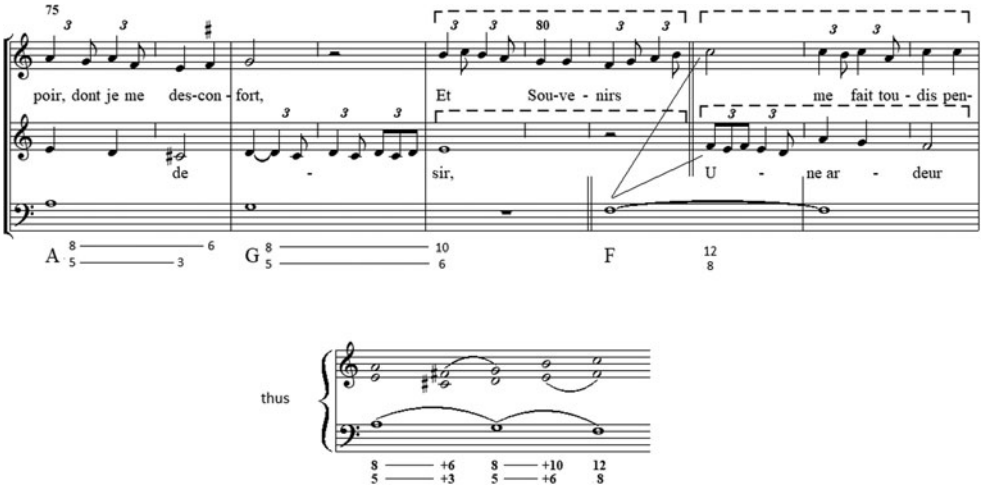
Allowing isorhythmic boundaries to define downbeats suggests considerable metrical flexibility across the work. If Motet 4's first such formal marker, the onset of *talea* II (breve 35), is a *modus* downbeat, and if the directed progression to F at breve 28 also defines a downbeat (as in the preceding discussion), then there is the odd sum of seven breves to account for between them. Breves 28–31 linger on the arrival sonority, $F^{\ 5}_{+3}$, followed by three breves of $G^{\ 8}_{5}$. This G sonority (breves 32–34) may be heard as a passing tone linking *talea* I into *talea* II (tenor: F–G–A). Its *modus* perfection, indicated by a dashed bracket in Example 3, thus signals a build up to the formal boundary of *talea* II. In *talea* II, the corresponding place (breve 66, vertically aligned) sees a metrical expansion of the subordinate arrival sonority G^{8}_{5}. In *talea* III, the same *modus* perfection underscores the concluding cadence of the integer valor section of motet, to be detailed later.

Near the beginning of *talea* III, a *modus* perfection in the upper voices stages the first arrival of F on a *maximodus* downbeat, shown in the annotated score of Example 5. Machaut's structural counterpoint is clear: a descending stepwise chain of sonorities alternately stable and directed. The tenor voice does not participate in the upper voices' mensural expansion, like in breves 25–27 in Example 4, but sounds instead as if it jumps in a beat early (breve 81). Yet from a perspective of metrical independence, all voices arrive on their own beat 1 on every mensural level.[49] This interpretation is no theoretical sleight of hand, but eminently practical. Each singer from manuscript, counting their own part without score alignment, lands on F/F/C on their own beat 1.

[48] The upper voices remain imperfect here so that the motetus's perfect long (on A4) in breve 53, consistent with breves 19 and 87, also initiates on a downbeat.

[49] While the tenor's metrical independence and overlapping poetry blur the aural strength of arrival here, the methodological focus is on contrapuntal alignment. In the corresponding diminution section, the broadening of *modus* is omitted but the directed progression to F is retained, arriving together in all voices.

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Example 5. Unaligned downbeat in Machaut's Motet 4, annotated score of breves 75–84.

If grouping at the *modus* level is irregular in this motet, the swapping between imperfect and perfect groups is at least uniformly irregular across *taleae* I and II. The pattern is broken in *talea* III, however, the last of the integer valor section.[50] At breve 85, the doubly imperfect G^{+10}_{+6} – the most pointed, energetic sonority the *Ars Nova* composer wielded – is not afforded resolution. Though primed to resolve out to the doubly perfect F^{8}_{5}, the chant tenor steps up (G–A, breve 88) instead of down (G–F). The leading E of the motetus overshoots its mark as well, stepping too high to F♯ (breve 87) rather than resolving to F, in portrayal of the text 'desmesuree' ('beyond measure').[51] Leaving that G^{+10}_{+6} hanging, there is little in Machaut's poetry or counterpoint that emphasises the subsequent tenor descent G–F (breves 90–2) as an arrival.[52] An annotated score is given in Example 6.

Pure pitch analysis offers no hint as to why this obvious opportunity to highlight the work's global final was minimised if not passed over. A metrical *contrapunctus*, on the other hand, suggests a 'perfect' reason. Breve 92 is beat 3 of a *modus* perfection; not a place for tonal arrival but for propulsion to the next downbeat. Nor could this be mistaken for an imperfect group, given how squarely the harmony of the following perfection is set (breves 93–5, nearly isomelic with 32–4 of *talea* I). At breve 98, Machaut restores the same unresolved sonority from breve 85, G^{+10}_{+6} the voicing is identical. Only now does this directed sonority find its mark, resolving firmly on F in breve 100, the final of the tenor's mode and of the motet when this all repeats in diminution.[53]
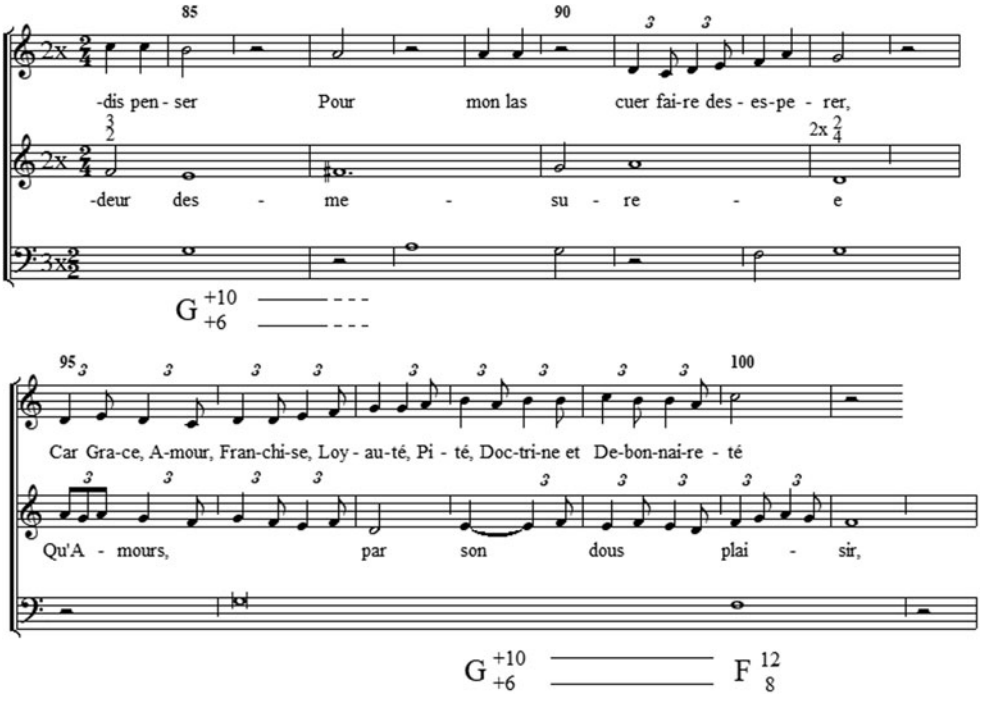
[50] Alice V. Clark, 'Listening to Machaut's Motets', *The Journal of Musicology*, 21/4 (2004), 487–513, at 500, describes how departure from an established pattern can signify impending closure in Machaut.

[51] I thank my anonymous reader for pointing out this revealing text–music relationship.

[52] While the tenor/triplum pair does progress +6–8 (G/e–F/f), the triplum is in the middle of a word ('despair'), it gives F no agogic accent, and the motetus's A does not participate in directed counterpoint.

[53] For all its contrapuntal strength, Machaut's text setting bridges across this cadence into the diminution section. The motetus's arrival on F is extended a breve by an illustrative post-cadential flourish on

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Example 6. Annotated score of Machaut's Motet 4, breves 84–101.
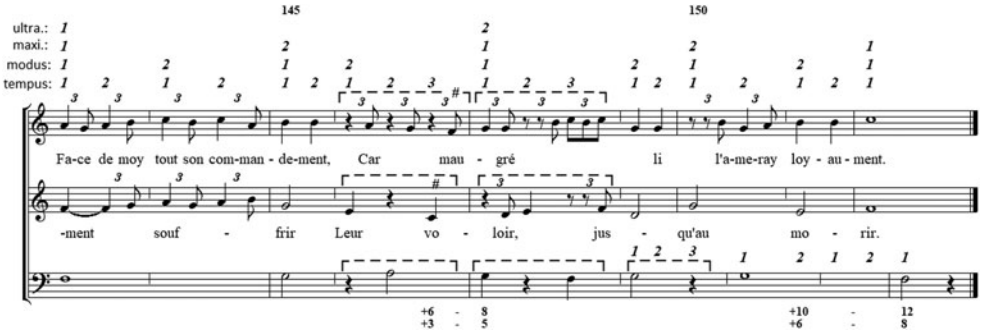
It is remarkable to hold an expressively yearning sonority in mind across a swirling group of three perfect longs – one perfect *maximodus* (breves 87–95) on the next mensural level up, a metrical portrayal of 'desmesuree' – even subsuming within it a weak directed progression to a subordinate pitch (breve 90). Thus the gratification of the ultimate close on the chant's final is delayed across some fifteen breves, gradually broadening out in metrical divisions of 2+3+3+3+4, no less. In its tonal context, the triplum's 'despairing weary heart' on the G of breve 90 sounds a hopeful note insofar as it sets up the ultimate final F as salvific. While the benefits of a synoptic first-species view of counterpoint are many, it is a more comprehensive representation of the music that includes such compelling and explanatory metrical play.

Having discussed the end of the integer valor portion of Motet 4, this case study closes with the work's ultimate and unusual conclusion. The asynchronous alignment of the final cadence in Machaut's Motet 4 – like Motets 9, 10, 15 and 17 – has been the subject of some analytical inquiry.[54] As Margaret Bent recently stated, 'The problem of

'plaisir'. As for the triplum, it is not revealed until the next line of poetry that the prior auspicious list of personifications (e.g., Grace, Love, Generosity) have in fact fallen asleep for the poor *amant* alone.

[54] Recent discussions are found in Bent, 'Machaut's Motet 10', 313–15 (including a modern transcription); Boogaart, 'Encompassing Past and Present', 54–5; Boogaart, *Guillaume de Machaut*, 196; and Jared C. Hartt, 'Tonal and Structural Implications of Isorhythmic Design in Guillaume de Machaut's Tenors', *Theory and Practice*, 35 (2010), 57–94, at 67–70. See Maw '"Trespasser mesure"', 116–21, on the editorial decisions faced by Ludwig and Schrade at the conclusions of some of Machaut's ballades

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Example 7. Grouping play disrupts the conclusion of Machaut's Motet 4. A flexible re-barring of breves 143–53.

these endings remains unresolved, and has hitherto been largely swept under the carpet.'[55] In editions of Motet 4, Schrade follows Ludwig in emending the tenor's penultimate G so that all voices cadence together on F. Yet, as Bent explains, this takes some purposeful misreading of the notated durations in the various Machaut manuscripts.[56] Boogaart's modern edition transcribes *Mach A* faithfully and lets the tenor arrive late.[57]

As shown in Example 7, Motet 4's imperfect *tempus* (usually transcribed as a bar of two crotchets) is upset in breves 146–7, where I interpret perfect grouping and re-bar Boogaart's edition to illustrate my metrically flexible reading. A count of 1–2–3 above the staff notes this temporary change from duple entrainment, with deeper mensural levels tracked above.[58] Such a metrical extension by one semibreve has the advantage of putting the directed progression to G at 147 on a *tempus*, *modus* and *maximodus* downbeat. This flexible reading is in contradistinction to the mostly regular barring of Ludwig, Schrade and Boogaart, all of whom pass over this strongly directed progression in the middle of a breve. While the contrapuntal resolution A^{+6}_{+3}–$G\,\frac{8}{5}$ is strong, G as a final is subordinated to F in the text setting, where it is passed over in the middle of a word in both upper voices, and at the highest metrical level. The G of breve 147 arrives on an *ultramaximodus* upbeat (beat 2), appropriately subsidiary to the motet's ultimate final of F, which concludes the work on the following *ultramaximodus* downbeat.[59]

and his suggested solution. The difficulty lies in realising rests as general pauses or for their notated value, especially when faithful transcription would skew parts out of metric alignment for the end of a section.

55 Bent, 'Machaut's Motet 10', 313–15.

56 Ibid., 315.

57 Boogaart, *Guillaume de Machaut*, 71. His directive to ignore the final rest in the tenor, though it is found in all manuscript sources (196), is unsupported by his edition (71). The tenor rest is required to counterpoint the full duration of the final notated long in both upper voices.

58 This simple counting system is a flexible version of that established by Boone, 'Marking Mensural Time'. A similar system is adopted by Desmond, *Music and the* moderni, 220.

59 In the course of this study, it became necessary to coin a term for this next mensural level. *Ultramaximodus*, going beyond the medieval *maximodus* and outside the range of singly notated rhythmic values, is a capacious domain of metrical organisation in the modern reception of *Ars Nova* music.

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Following the directed motion to G at breve 147, the tenor's grouping diverges from that of the upper-voice pair. The tenor has one more perfected breve (counted above its staff) while the upper voices return to an imperfect division of two semibreves per breve. That additional length in the tenor pushes its final arrival on F a semibreve late without changing its mensural position as a downbeat. Rather, the displacement momentarily detaches the tenor into a metric stream independent of the upper-voice pair. Both streams end on a downbeat, those downbeats just come at slightly different times. One can easily imagine diminishing the tenor's G in breve 148 to a crotchet or simply omitting the crotchet rest that follows to snap the final cadence into surface alignment at the expense of the *talea* pattern.[60] Or, to preserve the tenor's rhythm, perfecting breve 148 in the upper voices as well, and extending the stable G^{8}_{5} sonority to three beats.[61] In the first of two possibilities presented on this point in Machaut manuscripts, the *talea* proceeds strictly and the final F arrives late, as in *Mach Vg* and *Mach G* (see Example 7). In *Mach A* and *E*, however, the penultimate long (semibreve G) has been reduced to a breve (minim), which only succeeds in making the tenor a beat early instead of a beat late. More egregiously, it places the final cadence of the piece on a *modus*, *maximodus* and *ultramaximodus* upbeat. The account offered here is not a solution but an explanation as to why the misalignment occurs, which for all we know may have been Machaut's original intent.[62] In any case, the issue is not with the penultimate breve, as the adjustment in the manuscript record might suggest, but rather lies with the consequences of divergent grouping.

As we have seen, Motet 4's counterpoint is brought into sharper focus when the metrical forces that inherently shape and, at times, distort its tonal content are highlighted. Metrical patterning at various layers was shown to support the large-scale tonal drama, whereby a local final G was comprehensively subordinated to F. Metrical broadening was shown to herald formal articulations like the onset of *taleae*. Finally, independent metrical grouping among voices was proposed as the cause of the final cadence's misalignment, perhaps in depiction of the ultimate disunity between the protagonist and the beloved.

[60] Following Maw, '"Trespasser mesure"', 111, it is often 'possible to imagine a version of [Machaut's] music in regular meter which was altered to create something less predictable with an irregular meter'. Indeed, an unmeasured *contrapunctus* represents just such a realignment of counterpoint by the analyst.

[61] Insofar as the metric independence of one voice may suggest successive composition, adjusting other voices to bring the polyphony back into alignment would represent a later stage of composition. See the subtle sense of 'successive composition' in Bent, 'The Grammar of Early Music', 33, which refers to 'the procedure uncovered by analysis and inherent in its grammar, and not necessarily to the order of working or compositional process of a native-speaking composer'.

[62] Acknowledged by Bent, 'Machaut's Motet 10', 315. Typical of Machaut's motets generally, the lover and the beloved do not come together in unity at the conclusion of M4. There is, rather, a stubborn commitment to love faithfully until death despite all the suffering and disregard, interpreted in part as metric dislocations.

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Motet 17

Grouping dissonance at deep metrical levels is pervasive among the voices of Machaut's Motet 17, *Super omnes speciosa/O series summe rata/Quant vraie Amour*, leading to another unaligned conclusion. Boogaart's edition, guided by the mensural value of notated durations, reads the tenor in perfect *modus* with 'six imperfect longa rests in each color (two per talea) [that] add up to form a long-term syncopation' against the upper voices in imperfect *modus*.[63] In Boogaart's reading, the upper voices' duple grouping is bookended by two singleton breves (15 and 126) that first displace them from the tenor and then realign them at the last possible moment. By contrast, an analysis that groups according to harmonic identity and directed progressions, with no overarching grid of metrical expectation to syncopate against, distills Machaut's counterpoint into straightforward metrical groupings. A metrical *contrapunctus* of excerpts from the beginning and end of Motet 17 is given as Example 8, with *taleae* in roman numerals. Because brackets are needed to represent temporary groupings of both triple and duple in this example, bracketed counting without italics is used here to signal imperfection (see the tenor voice). Curly brackets are used to signal expansion to perfect grouping in the otherwise imperfect grouping of the upper-voice pair.

A lightly annotated score of breves 7–25, corresponding to the first system of Example 8, is given in Example 9.
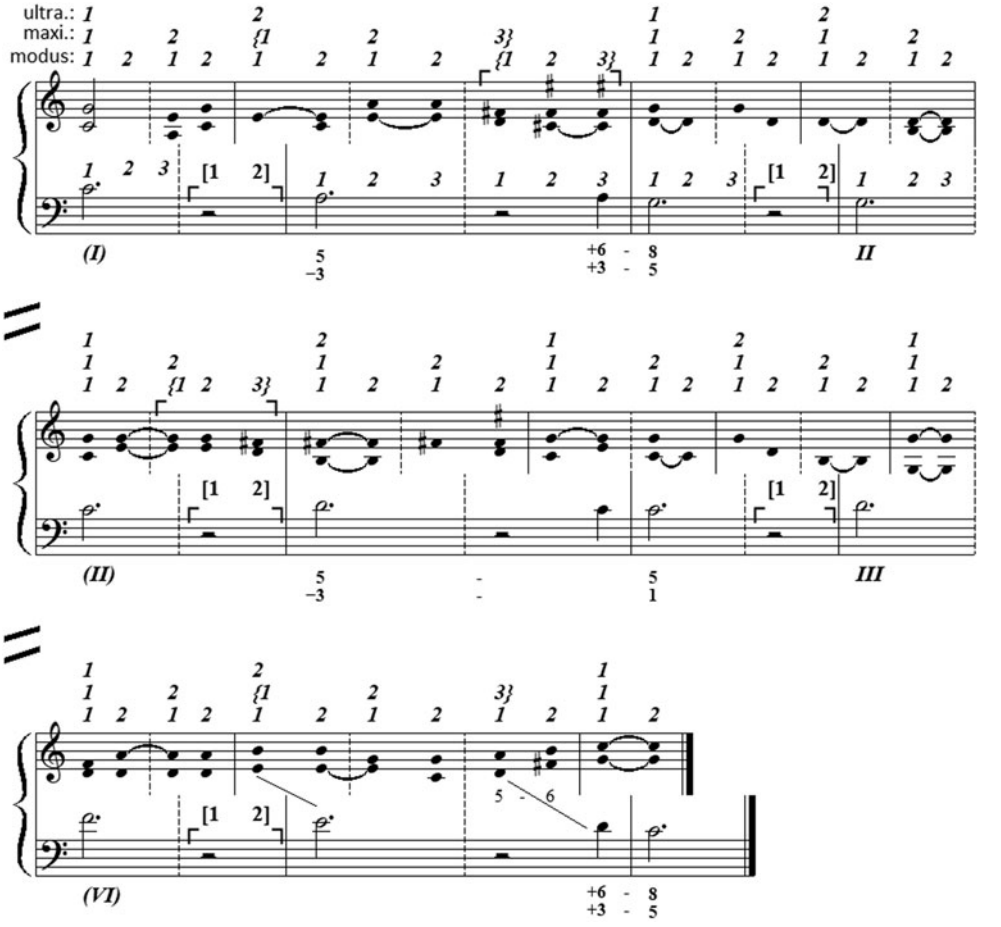
In *talea* I there is dynamic metrical organisation at multiple levels concurrently. The upper-voice pair is set in imperfect *modus* with irregular perfections (bracketed as deviation from its norm) while the tenor is the opposite, perfect *modus* with regular imperfections (customarily bracketed in modern transcription). The perfection of the upper-voice pair's long in breves 15–17 is amplified by the concurrent perfection of the maxima (accompanied by 'just when it's the right time' in the triplum text), where those breves are subsumed by long-count 3 above the staff (numbered in curly brackets) against a context of imperfect *maximodus.* In effect, this is a written-out ritard that intensifies the drive towards resolution in breve 18.[64]

The $^{5}_{-3}$ sonority that coalesces over the tenor's A in breve 12 began (as A^{5}) in the upper voices a breve earlier, in 11. This A^{5}_{-3} is harmonically stable for the first two longs. In the third long, the perfect extension of that maxima, the A sonority surges through 5–6 exchange to the charged A^{+6}_{+3} (breve 16) targeting arrival on G^{8}_{5}. Given all the metrical displacement in this motet it is remarkable that the cadence at breve 18 (correlated with poetic closure, agogic accent and followed by rest in the triplum) should arrive in all voices together. In fact, without a perfection drawing out the

[63] Boogaart, *Guillaume de Machaut*, 230. His syncopation deviates from Ludwig and Schrade.

[64] Modern scholars have pointed to how the broadening of mensuration can achieve the effect of what we call a ritard before cadence. Kohn, 'Renotation', 41–2, comments upon a cadential retardation effected through mixed metres in the Dunstable motet *Sancta Maria.* Desmond, *Music and the* moderni, 217 (Example 6.5), shows a change in all voices from imperfect to perfect *modus* as cadential retardation to conclude the Fauvel motet *Garrit/In nova*. Maw, '"Trespasser mesure"', esp. 64–5, locates *modus* perfections in an imperfect context leading up to cadences in Machaut's ballade *Gais et jolis* (B35), among other examples. He later (86) calls this effect 'a reverse hemiola at the cadence'.

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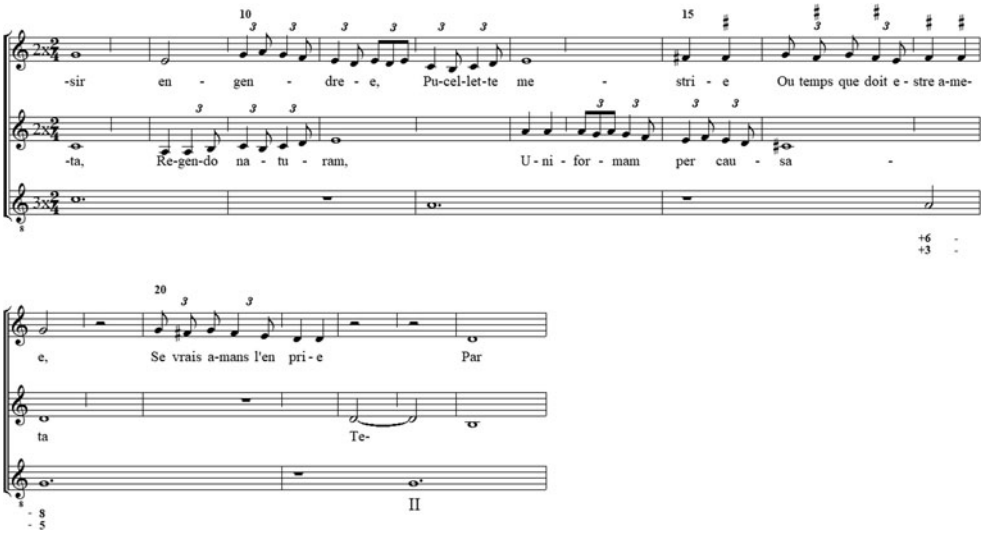


Example 8. Metrical *Contrapunctus* of Machaut's Motet 17, breves 7–25, 29–47 and 117–28.

upper voices, they would have anticipated the tenor's arrival on G by a breve, as at breve 11 previously and later at the onset of *talea* II.

By zooming out to survey the deepest levels of metrical organisation, the misalignment of the *talea* II boundary (breve 23) amounts to a surface disturbance. As in Motet 4, it is a non-simultaneous *modus* and *maximodus* downbeat for both the upper-voice pair and the tenor, respectively. As before, it is easy to imagine perfecting the long in the upper voices at breve 18, which do no more than echo their stable arrival sonority (G^{8}_{5}), to lock all voices together at *talea* II. At the *ultramaximodus* level, the first *talea* pitch figures as a beat 2 pickup throughout Motet 17, as the text setting also suggests.

Machaut's approach to *talea* III features even more metric flexibility. The cadence on C coalescing finally at breve 40 (with the very same cadential parameters as previously) is even further displaced: two breves early. Yet displacement, however pervasive, is only an effect. Flexible metrical grouping is its cause. As demonstrated earlier, in *talea* I the stable $^{5}_{-3}$ sonority on A surged to an unstable $^{+6}_{+3}$ in its drive

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Example 9. Annotated score of Machaut's Motet 17, breves 7–25.

to G. The tenor's D at breve 34 similarly descends to cadence on C, but D is superficially found as the third of the harmony B $^{5}_{-3}$. Its first long (breves 34–5) sounds like a stable B $^{5}_{-3}$ (b/d/f♯), while retrospect casts its second long (breves 36–7) as unstable, in pursuit of C $^{5}_{1}$, though it is the very same pitches. That is, B$^{5}_{-3}$ in the second long acts as an 'inverted' D$^{+6}_{+3}$.[65] There is so much hurry to arrive on C in breve 40 – that is, to achieve the 'perfect act of union', 'not to suffer breakage' sung of by the upper voices – that the upper-voice pair arrives two breves early; even the tenor has an anticipation. This multivalent interpretation has it both ways. It captures the expressive excitement of the early arrival on the surface levels while at the same time reveals a satisfying structural downbeat in deep metrical reckoning. The upper voices in breve 38 and the tenor in breve 40 align on their own count 1, respectively.

Machaut truncates the sixth and final *talea* statement, shown in the bottom system of Example 8. Schrade's edition again diminishes the tenor's final rest in order to align the cadence. Boogaart, on the other hand, keeps the tenor late and lets the misalignment go off the end of the piece, the upper voices' final semibreve aligning with eight beats-worth of tenor. From the more flexible metrical perspective advanced here, this ultimate misalignment is little to wonder at. Every *talea* boundary in Motet 17 is misaligned at the *modus* level. Indeed, the deep grouping dissonance between an imperfect upper-voice pair and their perfect tenor – not to mention the tenor's own toggling between perfect and imperfect *modus* – is a foundational feature of this motet, not a hiccup at the end to be edited away.[66] However salient, such misalignment resides ultimately on the music's surface. Each singer looking at their own part,

[65] Fuller, 'On Sonority', 45, describes the dual nature of the imperfect $^{5}_{-3}$, which she marks with the symbol ł.

[66] Described in Boogaart, 'Encompassing Past and Present', 47–50.

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unencumbered by score format in the fourteenth century, arrives on a downbeat in their own time.

Syncopation between polyphonic forces in Motet 17, however pervasive, has been considered here to arise out of grouping dissonance. The restoration of metrical regularity can be achieved through a second, compensatory grouping dissonance that realigns the tenor with the upper-voice pair. Yet a sense of closure can also be gleaned by counting each voice separately. Just as a melodic dissonance may decorate but not obliterate our recognition of standard harmonies, so too can we gather a metrically offset voice into one coherent downbeat in our mind.

Motet 5

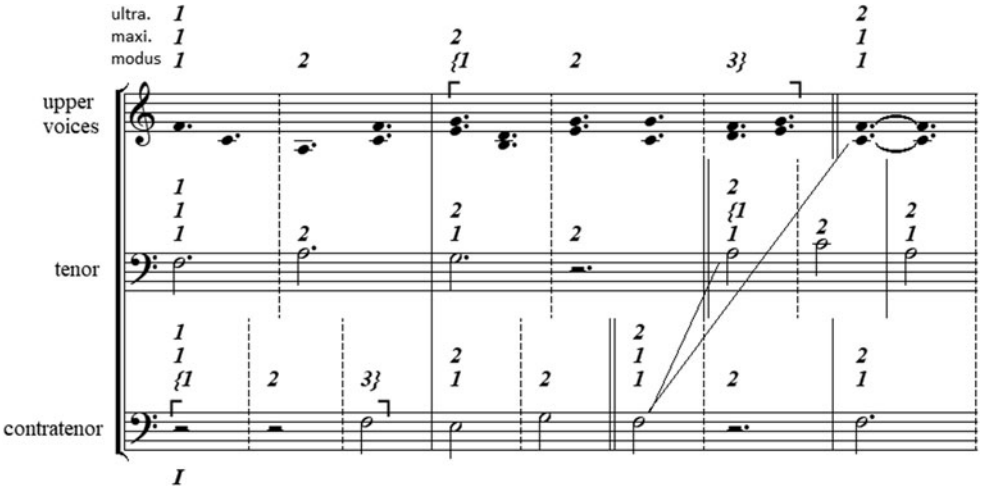
The presence of a contratenor affords another layer of potential metrical complexity of which Machaut takes full advantage in Motet 5. Machaut adopts the *talea* from Philippe de Vitry's motet *Douce playsence/Garison/Neuma quinti toni* for both his tenor and his contratenor, setting the latter in retrograde. Because this *talea* switches *modus* midway through (as indicated by red colouration in the manuscript example of Figure 1), Machaut's palindromic design effects a perpetual state of grouping dissonance (3:2) between his two tenors. The upper-voice pair begins in imperfect *modus* and *maximodus* until a temporary perfection of *maximodus* in longs 3–5 (breves 5–10), labelled 1–2–3 in curly brackets on the top system of Example 10. This broadening out pulls the upper voices away from the tenor, which continues in imperfect *maximodus* (labelled 1–2 in black on the middle system, comprising breves 5–8), and also the contratenor, which is simply shorter.

For all its grouping play, Machaut's counterpoint is a straightforward harmonisation of the chant in lockstep with deep-mensural divisions. As a metrical *contrapunctus* reveals, the first *maximodus* bar (single bar line) expresses F^{8}_{5}, the motet's home sonority. The second *maximodus* bar amounts to G^{8}_{+6}, the directed $^{+3}$sonority that seeks a return to F^{8}_{5} in the third *maximodus* bar (breve 11, after the double *ultramaximodus* bar line), in conjunction with text terminations.[67] This simple neighbour figure concludes on a *modus* and *maximodus* downbeat no differently than one would expect in a simpler metrical context. In Motet 5, however, Machaut distributes that same downbeat across three different metrical plans such that the arrival sonority coalesces gradually from bottom to top: F–a–c/f.

There is an anomalous surface harmony caught up in this extraordinary counterpoint that can be explained through metrical organisation. The tenor's a at the point it switches to imperfect *modus* (undotted minim, breve 9 of the upper voices) is the bass of an apparent $^{6}_{4}$ sonority: A/D/F. Notated as A in *Mach A*, this dubious surface sonority is replaced by b♭ in *Mach B, C, E* and *Vg*. While a $B♭^{5}_{+3}$ sonority makes better

[67] The contratenor's E sounds below the structural G^{+6}_{+3} in breve 5 before skipping up to G in unison with the tenor. Insofar as this 'inverted' E^{5}_{-3} is directed towards the very same resolution on F^{8}_{5}, the reduction in Figure 13b represents G^{+6}_{+3} as the primary form that encapsulates the analogous sonority.

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Example 10. Flexible metrical reading of Machaut's Motet 5, breves 1–12.

local sense than A^{6}_{4},[68] the propriety of a musical surface full of passing dissonances may be considered subordinate to the contrapuntal unfolding of a cadence, where that A takes its definition as the third above F. The imperfect sweetness of the tenor's third (a) in the arrival sonority F/a/c/f on *ultramaximodus* beat 2 is then contrasted by a stronger, doubly perfect directed progression to D/d/aa on the *ultramaximodus* downbeat that closes *talea* I (breve 15). The poetry that began a new grammatical unit after the previous cadence on F (breve 11) more weakly articulates this arrival on D, bridging across into *talea* II to complete its meaning. Example 11a provides a score of *talea* I followed by Example 11b, a tonal summary of its simple harmonic plan, blurred by tectonic metrical forces beneath the surface. Metrical analysis at the levels of *modus* and beyond proves valuable in clarifying such unaligned and dissonant surfaces.
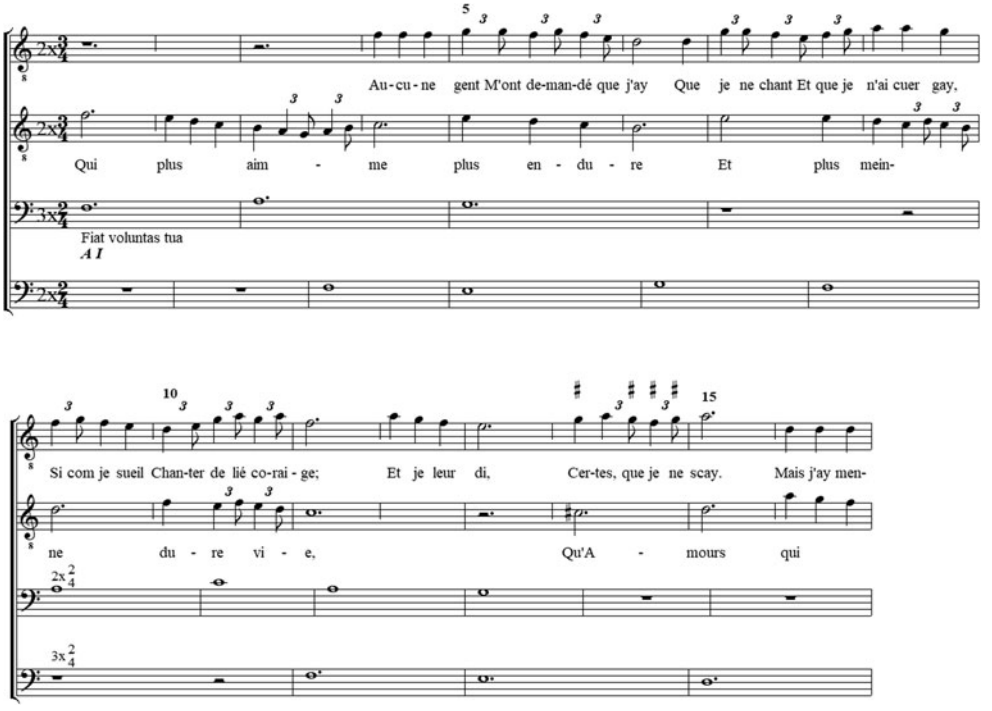
With its retrograde contratenor, Machaut's Motet 5 is an instructive case of metrical incongruity by design. Tying tonal and metrical articulation together reveals quite traditional counterpoint in this motet. What is extraordinary is how Machaut meted out standard directed progressions across three independent streams of metrical reckoning.

Analytical extensions

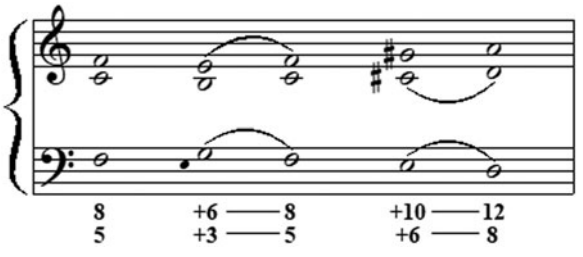
The representation of broad levels of metrical organisation as integral to *contrapunctus* pitch reductions can illuminate music beyond Machaut's works and fourteenth-century motets more generally. While the explicit signing of mensuration as well as complex play with grouping only came about at the end of this century and into the

[68] In his critical notes to Motet 5, Boogaart, *Guillaume de Machaut*, 9:200, prefers B♭ for contrapuntal reasons.

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Example 11a. Score of Machaut's Motet 5, *Talea* I.



Example 11b. Tonal summary of Machaut's Motet 5, *Talea* I.

fifteenth, thirteenth-century polyphony might also be appropriately approached with a view to associating tonal and metrical articulations.[69] Indeed, with *modus* as its surface level, organisation at the *maximodus* and *ultramaximodus* levels only becomes more apparent in this earlier century. The viewpoints and methodology developed here are not limited to chant-based motets. Initial investigation of the coordination between

[69] A helpful précis on colouration practice at the turn of the fifteenth century is Margaret Bent, 'Principles of Mensuration and Coloration: Virtuosity and Anomalies in the Old Hall Manuscript', in *Le notationi della polifonia vocale dei secoli IX–XVII: Antologia–Parte Seconda*, ed. Antonio Delfino (Pisa, forthcoming).

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deep metrical pulses and the *formes fixes* of French chansons, both polyphonic and monophonic, reveals a variety ripe for critical analysis.

As Maw has observed, 'uniformity is clearly not important to Machaut's metrical technique' in his polyphonic songs.[70] Yet our understanding of medieval counterpoint can only be enriched by the systematic representation of its flexible and layered metrical organisation. Dedicated attention to the grouping of tonal articulations at deep levels of metrical architecture, beyond single notated durations, proves a valuable tool for interpreting the complex polyphony of Machaut's motets and beyond.

Manuscript sigla

Mach A: Paris, Bibliothèque Nationale de France, fonds français 1584
Mach B: Paris, Bibliothèque Nationale de France, fonds français 1585
Mach C: Paris, Bibliothèque Nationale de France, fonds français 1586
Mach E: Paris, Bibliothèque Nationale de France, fonds français 9221
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[70] Maw, '"Trespasser mesure"', 97.

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