Contrapuntal Direction and the Diagnosis of Compositional Relationships in Fifteenth-Century Masses[*]

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ABSTRACT: Contrapuntal direction—the principle that certain progressions may only occur through the motion of the contrapuntal voice towards a stable tenor—is a previously unrecognized implication of the teaching of the theorist and composer Johannes Tinctoris. Although Tinctoris's interval successions are commonly the same whichever voice is the tenor, Tinctoris omits a small number of oblique progressions where the tenor would move. Although I will not investigate possible reasons for this omission, examples will show that when the missing progressions occur in repertoire, these can be explained by a reappraisal of the contrapuntal functions of the voices. The results extend Julie Cumming's concept of the "movable module" and demonstrate its presence in music of the 1460s and 1470s. This principle emerges directly from a computer-assisted attempt to connect Tinctoris's counterpoint with late-fifteenth century composition. Through its ability to recognise tenor function within a voice pair, to identify instances where the tenor function may have moved, or to mark voices that do not form a contrapuntal pair, directional analysis is able both to identify faulty analytical assumptions around voice pairing and to act as a validator of general theories of fifteenth-century compositional structure.

Introduction

[0.1] Fifteenth-century *cantus firmus* masses present a complex network of potential contrapuntal relationships. The number of potential voice pairings present in four-voice texture make it difficult to describe composition in terms of the resolutely two-voice counterpoint teaching of the period. Contrapuntal direction—the principle that certain progressions are permitted only when the contrapuntal voice moves obliquely towards a stationary tenor—is a valuable tool in dealing with

this conundrum, providing both a means of eliminating potential contrapuntal mispairings and a means of testing broader theories of polyphonic relationships. In the following, I demonstrate the value of contrapuntal direction to the analysis of cantus-firmus polyphony.

[0.2] The principle of contrapuntal direction emerges by inference from a handful of progressions in the 1477 *De arte contrapuncti* of Johannes Tinctoris (ca. 1435–1511). These progressions, collated from Book I and annotated in **Example 1**, are unusual in that they do not simply illustrate consonance succession but also encode the contrapuntal functions of the voices. This encoding arises from the fact that Tinctoris permits these oblique progressions only when the contrapuntal voice moves and the tenor repeats its note. This is in marked contrast to other progressions from larger to smaller intervals such as fifth to third or octave to fifth (Tinctoris 1477, I, vi, viii), where the motion of the voices can be exchanged: the counterpoint may descend from an existing fifth to create a third against a stable tenor and the tenor may equally ascend to create a third against a stationary counterpoint. I call the effect shown in Example 1 "contrapuntal direction" and the specific examples "directional progressions" since, when formed according to *De arte contrapuncti*, the melodic motion of the contrapuntal voice will always move towards the tenor pitch. As a result, in any well-formed oblique progression from a sixth to a fifth or from a third to a unison, the stationary voice must be the tenor. The reason Tinctoris applied these directional restrictions is unclear, but must arise from a desire to maintain the contrapuntal identity of the tenor function, which he had defined in the *Diffinitorium* as "the foundation of the relationship in any composed song" (Tinctoris ca. 1475, xviii),[1] and had further described in *De arte contrapuncti* as "as holding [*tenens*] the counterpoint, which must be made following it, in some way subordinate to itself" (Tinctoris 1477, I,ii.).[2] The principle of contrapuntal direction is simply a manifestation of this subordination.

[0.3] The diagnostic value of this principle is clear, if at first apparently limited: it can help identify the contrapuntal functions of the two voices singing together. In mass composition, however, this seems of little utility. First, the tenor function is usually identifiable through its traditional home in the tenor part, its presentation in long note values, and its use of known melodic material, often enshrined in the title of the composition. Another means of identifying the tenor seems redundant. Further, direction does not provide an immediate answer to the question posed above as to which voice should be paired with the tenor in contrapuntal analysis in the first place.

[0.4] In fact, the analytical value of contrapuntal direction comes initially from cases where composers seem to break its rules. As the case studies below will show, apparent breaches of contrapuntal direction are most often a result of a mispairing of voices in analysis, making it possible to establish that the relationship between a specified pair of voices is not governed by *De arte contrapuncti* at a given point. More important even than this local diagnostic value, however, is contrapuntal direction's ability to act as a validator of a general theory of contrapuntal relationships; if breaches of direction are a result of mispairing of voices, then a theory of pairings that produces few or no breaches is more likely to be correct.

1. Contrapuntal Background

[1.1] *De arte contrapuncti* is the most authoritative surviving catalogue of fifteenth-century contrapuntal technique. Some of the importance of this text arises from the way that Books II and III examine subjects such as dissonance handling and musical rhetoric that are absent from most teaching material of the period (Luko 2008, 107–112), though here I will concentrate on Book I, which provides the basic consonance succession formulae. Tinctoris organizes Book I of *De arte contrapuncti* in a logical manner that provides a performer singing *super librum* with a set of coordinates to use as a guide to improvisation (Berger 2015, 259–63). An improvising singer, knowing that the present consonance is a sixth and wishing to follow with an octave, may use the list of progressions shown in Example 2 to match the observed motion of the tenor and make the corresponding contrapuntal motion in response. (The example provides an exhaustive list of the ways Tinctoris allows a singer to move from an upper sixth to an octave (1477, I, vii.)). The singer may then extend the improvisation by taking the newly established octave as an opening consonance, selecting a fresh destination interval and repeating the process.

[1.2] Absent from Book I is any theory of large-scale composition. Tinctoris does not connect two-voice counterpoint with composition in three or more voices, other than by implication, to observe that the fourth and, to a much lesser extent, the sixth rely on a third voice for their consonance (Tinctoris 1477, I, v,vii; Canguilhem 2016, 165–67). Basic compositional structures such as cadence are mentioned only in passing: cadences rely on perfect consonance (Tinctoris 1477, I, ii) or are appropriate places for decorative dissonance (Tinctoris 1477, II, v, xxiv). Tinctoris does employ cadences in his illustrations, but a minimal definition of cadence itself is reserved for the *Diffinitorium* (Tinctoris ca. 1475; Schwind 2009, 2–3). Example 2 reflects both these tendencies. The second progression presents the unembellished cadential motion from sixth to octave common to many of the succeeding citations from repertoire, but Tinctoris only remarks that this progression is common, while the third and fourth progressions are rare in two-voice counterpoint. Further, the example seems to embody an unstated principle: similar motion to a perfect consonance is permitted (albeit rarely) when the tenor descends, but not when it ascends.[(3)] Tinctoris, then, does not provide a list of rules for simple counterpoint as in Fuxian first species, but rather satisfies Klaus-Jürgen Sachs's minimal definition of counterpoint as a system for organizing consonance succession (Sachs 1974, 57–60). He does this by seemingly providing all needed progressions within an organizing framework of starting consonance, following consonance and tenor motion.

[1.3] If Tinctoris is to act as a source of contrapuntal rules rather than as a body of contrapuntal data, these rules must be inferred through the analysis of the progressions he supplies. Alexander Morgan has begun this task with his identification of the underlying principles that govern *De arte contrapuncti* (Morgan 2016). Morgan first finds five explicit principles which largely define the ambit within which Tinctoris operates, but also prohibit parallel perfect intervals and impose the restriction on sixth-to-fifth motion that produces the first two progressions of Example 1 (Morgan 2016, 45). He further identifies a set of nine implicit principles that govern which progressions Tinctoris provides and which are not (Morgan 2016, 46). These principles are significant since Morgan seems at first to challenge the notion, previously widespread (Berger 2005, 141–43; Fuller 2002, 498–99), that Tinctoris's set of progressions is exhaustive, noting that *De arte contrapuncti* includes only 768 of 935 notionally available progressions (Morgan 2016, 9–10). The nine implicit principles, however, account for this discrepancy (Morgan 2016, 162–63).

[1.4] Tinctoris tightly restricts motion from the sixth and its compounds. The restricted motion from sixth to fifth forms the fifth of Morgan's explicit principles: "A fifth will sometimes be located below the tenor after the lower sixth if that tenor is not moved" (Tinctoris 1477, I, vii).[(4)] Morgan further notes the restricted range of motion Tinctoris allows from the sixth in all circumstances, identifying it as an implicit contrapuntal principle (Morgan 2016, 46). This restriction may stem from Tinctoris's view of the sixth as a quasi-dissonance in two voices: 'it has more of harshness than sweetness' (Tinctoris 1477, I, vii), and he provides not only the permitted progressions but also an example of good usage. This example, given as **Example 3**, shows sixths moving in parallel and to octaves and tenths. He does allow a general exception, however, for the sequences 5–6–5, 8–6–5 and 5–6–8, as shown in **Example 4**. Tinctoris handles the sixth with unusual care and, when combined with Morgan's insight into the underlying principles at work, this reinforces the conclusion that the forms of Example 1 where the tenor would move are not omitted, but rather excluded.

[1.5] The third-to-unison directional progressions follow the same pattern: an oblique motion from third to unison may proceed only when the tenor repeats its pitch (Tinctoris 1477, I, iv). This instance of the directional principle is less noticeable in *De arte contrapuncti*, however, both since motion from the third is less tightly controlled than motion from the sixth, and also because the voices have the option of moving to a unison by stepwise contrary motion. When combined with the motions from sixth to fifth, however, the combined effect is to make Morgan's fifth explicit principle, the rule that a sixth may only move to a fifth when the tenor repeats its note, seems itself to be a consequence of some deeper underlying principle governing oblique motion from imperfect to perfect consonance.

[1.6] A further curiosity of the limits on third-to-unison progressions is that they are not applied to compound intervals. Tenths may move obliquely to octaves by the motion of either voice. By

contrast, the same restriction applied in motion from sixth to fifth is applied to motion from the thirteenth to the twelfth. If it is surprising that the directional principle varies in compound intervals, the difference is a further suggestion that Tinctoris made these distinctions with care.

[1.7] I do not intend to search here for the underlying principle that motivates these restrictions, but rather look to explore the value of its implications. This examination of the contrapuntal background is necessary, however, since the comprehensive nature of *De arte contrapuncti* is the foundation of my analysis. The usefulness of contrapuntal direction as a diagnostic tool relies on the exhaustive nature of *De arte contrapuncti*. If Tinctoris omits progressions that he finds acceptable, it is unsafe to assign any significance to the absence of the reversed forms of the motions in his teaching (see Example 1). On the other hand, if Tinctoris does provide all possible progressions consistent with his unstated principles of counterpoint, then the exclusion of the oblique motions from sixth to fifth and third to unison where the tenor voice moves must be significant, the more so because the result of the exclusion is to prohibit a set of progressions with the same sounding result as others he permits. Explaining this curious state of contrapuntal affairs is left to the future; here I simply attempt to exploit it.

2. Aims and method

[2.1] The initial aim of my research was to test how well Tinctoris's teaching described the written composition of his contemporaries. Specifically, I looked to measure the counterpoint of six masses based on the *L'homme armé* cantus firmus, all composed by musicians named in the prologue to *De arte contrapuncti*, against the theoretical standard Tinctoris provided. This aim was based on Tinctoris's own assertion that formal composition (*res facta*) depended on the same technique as singing *super librum* (Tinctoris 1477, II, xxi), a point made by theorists as distant as Prosdocimus and Lusitano (Prosdocimus [1412] 1984, 32–33; Canguilhem 2011, 94). While relative definitions of *res facta* and *cantare super librum* have been extensively debated (Bent 1983; Blackburn 1987; Canguilhem 2015), more important here was the attempt to test for a shared basis in the simple counterpoint of Book I of *De arte contrapuncti*.

[2.2] Central to this testing was a simple software tool of my own design (Daly 2020, 69–76). At the heart of this tool, the "contrapuntal sieve," sat an electronic implementation of Book I of *De arte contrapuncti* that reorganized progressions such as those of Example 2. Where an improvising singer might use the example to ask, "Given that I'm singing a sixth and want to sing an octave next, how should I respond to the observed motion of the tenor?," the sieve re-collated the progressions in order to ask, "Given the present interval and the motion of the tenor, what contrapuntal continuations are available?" The sieve then extracted a given pair of voices from a mass movement,[5] one of which was assigned the function of tenor for the purposes of the experiment, and segmented the movement based on a combination of notated values in the designated tenor function modified by Ruth DeFord's concept of compositional *tactus* (DeFord 2015, 82–84). The program then identified an initial consonance and filtered the florid notation of the following segment through the digital counterpoint in order to identify a contrapuntally significant consonance with the tenor. This note then formed a new opening consonance and the process repeated. This basic method is summarized in Examples **5**, **6**, **7**, and **8**.[6]

[2.3] Using this tool required a decision on which voices to analyze and which functions to assign them. As a starting point, I adopted the structural archetype suggested by Sachs: that four-voice texture is built around a tenor-discantus pair based on theoretical models, with other voices added to this structure (Sachs 1974, 126–29). This sweeping standard further appealed because it catered to the simple design of the software, which analyzed a single voice pair from a movement-length sample without the ability to change mid-analysis. I consequently took the discantus and tenor pairs from the movements of all masses in the sample, assumed that the tenor function aligned with the tenor voice part and passed them through the sieve.

[2.4] One important limit on the scope of this analysis remains. The initial analysis below considers only passages where all four voices in the texture are active. This limitation is entirely practical since direction requires a tenor function and in most cases, it is the tenor voice part, presumed

carrier of the tenor function, that first falls silent in passages for reduced forces.[7] If even a general connection between the tenor voice and the tenor function holds, then these passages for reduced forces may have little to say on contrapuntal direction.

[2.5] The results of the initial filtering confirmed that Tinctoris's counterpoint accurately describes written composition while also presenting a number of problems. The contrapuntal sieve was able to "solve" between 95 and 99 percent of progressions identified, varying by composer (Daly 2020, 92–98). Further, the sieve produced two forms of output that made it possible to examine the exceptions to this rule. The first was a simple list of locations in the source where no satisfactory contrapuntal solution could be identified. I refer to such cases as "contrapuntal anomalies." The second was a form of score output that made it possible to identify the cause of each anomaly. **Example 9** shows a short excerpt from the discantus-tenor voice pair taken from Caron's mass, while **Example 10** shows the result of passing this passage through the contrapuntal sieve with the tenor part assigned the tenor function.[8] The inner voices of Example 10 show a candidate contrapuntal reduction while the outer parts reproduce a form of the unfiltered notation. The rests in Example 10 show locations where the software was unable to find a contrapuntal solution based on *De arte contrapuncti*, matching the marked progressions in Example 9. In each case, examining the outer voices of the score at the point of the anomaly makes it clear that the anomaly arises from an apparent breach of the principle of contrapuntal direction: the tenor voice moves obliquely from a sixth to a fifth against a stable contrapuntal voice. Approximately half of all contrapuntal anomalies identified in the initial filtering of the *L'homme armé* masses arise from such directional causes. Of these, the majority arise from sixth-to-fifth motion, with oblique third-to-unison motion much less common.

[2.6] Several potential explanations for the presence of these anomalies are available. A first is that *De arte contrapuncti* imperfectly reflects contemporary contrapuntal practice. Other explanations problematize Sachs's archetype, suggesting that the discantus-tenor pair is not always central to four-voice texture: either the tenor function may have separated from the tenor voice and migrated elsewhere in the texture, or possibly the voices analyzed do not represent a contrapuntal pair as understood and described by Tinctoris.

[2.7] The accuracy with which *De arte contrapuncti* generally describes the discantus-tenor pair suggests that the anomalies do not arise from a widespread failure to follow Tinctoris's teaching. Moreover, the fact that repeating the general analysis with the alto-tenor and bass-tenor pairs substantially increases the number of directional anomalies identified suggests that the discantus-tenor is more likely to match the theory than any other combination of voices (Daly 2020, 141-143). One hypothesis consistent with Tinctoris is to modify Sachs's paradigm such that the discantus-tenor pair is simply the most common pairing of voices, with other combinations also possible. The question then becomes one of identifying how and when these pairings change in complex composition. A perfect solution to this problem would eliminate contrapuntal anomalies altogether and thus confirm Tinctoris's statement that complex composition was built around simple counterpoint.

[2.8] Julie Cumming considered a similar problem in her work on two-part contrapuntal frameworks (Cumming 2013). Cumming draws on Richard Crocker's definition of the two-part framework as a contrapuntal relationship between two voices following a specified set of voice-leading rules (Cumming 2013, 177–79). This framework, potentially including the tenor function, may then migrate around the texture, employing different voice pairs at different times. Both the problem of locating this framework and the contrapuntal definition of the framework itself correspond closely to the direct contrapuntal relationship that I sought to identify within mass textures. While Cumming's primary concern is the relationship between the two-voice framework and the whole rather than the nature of the counterpoint between specific voices, she proposed a number of criteria for identifying a shifting framework within complex composition. Contrapuntal direction has a particularly close interaction with Cumming's methods of locating the two-voice framework, and I will return to this interaction and its implications below.

[2.9] If Cumming and the contrapuntal anomalies identified by the sieve call into question Sachs's compositional archetype, Tinctoris himself potentially casts doubt on the idea of a single structural

contrapuntal pairing. In defining the difference between *res facta* and singing *super librum*, Tinctoris remarks of *res facta* "that all the parts of composed polyphony, be they either three or four or more, are mutually bound to each other, so that the order and law of concords must be observed of any part with respect to each and all . . . rdquo; (Tinctoris 1477, II, xxi).[9] What Tinctoris means by this mutual binding is unclear. At the least, it seems to require that written composition reduce to consonance in all voices, but the "order and law of concords" might equally imply a direct contrapuntal relationship should exist between all voices at once. Tinctoris provides an illustration of unusual length to accompany this statement, though this seems as much geared towards the comparative illustration of three-, four- and five-voice textures (Whittaker 2016, 254–59). Noticeable throughout, however, is that any vertical slice of a semibreve's duration reduces comfortably to consonance. Examining the counterpoint of all four non-tenor voices against the tenor finds only two directional anomalies, suggesting a particular care to avoid these progressions. When considered in the context of Tinctoris's usual compositional practice, these adjacent directional progressions are unusually interesting, and I will return to them in my conclusion.

[2.10] A more straightforward illustration of overall contrapuntal proprieties comes from **Example 11**, an extract from the "Christe" of Okeghem's *Missa L'homme armé*. The box over the second barline marks an apparent contrapuntal heresy. Okeghem, whose reputation for contrapuntal mastery would survive into Zarlino's lifetime (Zarlino [1558] 2010, 243), has committed the basic error of creating parallel fifths between tenor and discantus. In other words, if the tenor and discantus are assumed to form a contrapuntal pair, Okeghem has broken the fourth of the explicit principles derived from Tinctoris by Morgan, the most explicitly-stated contrapuntal rule to appear in *De arte contrapuncti* (Morgan 2016, 29). Comparison with improvised practice shows that such consecutive fifths may be permitted, but only when made between pairs that do not include the "tenor" (Berentsen 2014, 238), and Tinctoris only allows them *quamvis raro*, where the voices either repeat or swap notes (Tinctoris 1477, I, vi.). Accepting a direct contrapuntal relationship between discantus and tenor in this passage requires the simultaneous acceptance of a schoolboy error on Okeghem's part. Further, even when the discantus and tenor are not taken as a direct pairing, the presence of such a progression strongly suggests that full contrapuntal perfection is not required between all voices; the passage only works contrapuntally if the tenor and discantus are not paired at this point and if Tinctoris's injunction merely requires basic consonance. Okeghem's parallel fifths do suggest a basic analytical principle, however: that contrapuntal problems can be the result of misdiagnosed voice pairs. Breaches of contrapuntal direction are more common than parallel fifths and may be harnessed in the same way.

3. Case studies

[3.1] The following cases form a representative sample of directional anomalies identified by testing the early *L'homme armé* masses using the contrapuntal sieve. This repertoire, specifically the masses by Guillaume Du Fay, Johannes Okeghem, Guillaume Faugues, Johannes Regis, Frémin Caron and Antoine Busnoys, appealed as test material due to its prestige, its well-studied history, its association with composers of a restricted time and place, many of whom knew one another, and especially its proximity to *De arte contrapuncti* (Planchart 2003, 348-354). Tinctoris lists the named composers as sources of inspiration and their compositions as models to emulate (Whittaker 2016, 186), and cites many of them both in his treatises (Tinctoris 1473, III, iii.), and in his own *L'homme armé* mass (Dean 2013, 35–39).

[3.2] The first case, **Example 12**, comes from the Sanctus of the *Missa Dum sacrum mysterium/L'homme armé* by Regis. At the beginning of m. 4, as the tenor moves from C to D, it creates a contrapuntal anomaly by moving from a sixth to a fifth against the stationary A in the discantus. The presence of this anomaly suggests either that the tenor voice does not carry the tenor function in this excerpt or that, if it does, its partner is not the discantus. The example provides other reasons to think either might be the case. The tenor shows no sign of citing the *L'homme armé* melody while the bass quotes a slightly embellished version of the phrase associated with the words "L'homme armé doibt on doubter." The descending fifth at the opening of the alto is another characteristic figure of the *L'homme armé* melody, and the alto is another candidate to

bear the tenor function at this point. In fact, the tenor seems the least likely of all four voices to occupy the contrapuntal limelight in this passage. The directional anomaly between tenor and discantus supports these other inferences and suggests a need to look elsewhere for contrapuntal pairings.

[3.3] **Example 13** is taken from the Sanctus of Du Fay's *Missa L'homme armé*. In m. 3, the tenor moves from a D-B sixth to an E-B fifth against the stationary discantus voice. This is a textbook breach of the principle of contrapuntal direction since the discantus and tenor reverse their roles. If Tinctoris provides an accurate representation of the contrapuntal practice of the 1460s and 70s, the passage can only be explained in one of three ways: either the composer has deliberately ignored one of the explicit principles encoded in *De arte contrapuncti*, the tenor voice is not acting as a contrapuntal tenor at this point, or the discantus is not the tenor voice's contrapuntal partner. Unlike the previous example from Regis, there is no obvious statement of the *L'homme armé* melody in this excerpt, though the tenor has recently stated the opening phrase in long note values. The apparent absence of the structural melody combined with all four voices exhibiting similar note values creates the maximum ambiguity in contrapuntal pairings, and so it is a relief at least to gather that the tenor-discantus combination is unlikely. The presence of the imperfect fifth between the voices in m. 3 of the example may also suggest this, though the persistently consonant nature of two-voice counterpoint makes it reasonable to think that the tenor's E would simply be inflected if the two voices were in partnership.

[3.4] The next case provides something that previous examples do not: the *L'homme armé* melody in the tenor. In the last section of his mass, Busnoys's tenor quotes the melody in inversion, which has the effect of transferring the cantus firmus into the bass register. The motion of the tenor against the sustained D in the discantus of **Example 14** represents exactly the progression from sixth to fifth by motion of the tenor that Tinctoris excludes. The entry of the discantus in the second half of m. 3 illustrates the danger of the basic assumption of a contrapuntal relationship between tenor and discantus. Given that the discantus reenters only at the end of the tenor's phrase, there is no reason to believe that the tenor and discantus should form a contrapuntal pair at this point. In fact, there are good reasons to think otherwise. The G *longa* in the tenor marks the end of one phrase of the inverted *L'homme armé* melody, and Busnoys has marked this with a cadence, not between tenor and discantus, but between tenor and alto. The significance of this cadential formula is demonstrated by the way Busnoys terminates the following cantus firmus phrase, which concludes the entire mass, using the same formula. Busnoys employs the same cadential melody, this time with the discantus and alto in their more typical roles (**Example 15**). The only notable difference between the versions lies in the embellishment of the final alto part with neighbor tones.

[3.5] In each of the case studies, contrapuntal direction has identified a potential problem: an assumed pairing is inconsistent with Tinctoris's contrapuntal teaching. The drawback of contrapuntal direction as a diagnostic tool, however, is that it is only available given the presence of a limited number of progressions and in the absence of these there may be no obvious means of examining these pairings. Even when the relevant progressions are present, they serve more to identify incorrect pairings than to find the correct pairs.

Validation and Cadences

[3.6] This disability, however, is only a local one. In theory, if there is a reliable system for identifying contrapuntal pairs then direction can act as a validator: a correct theory should produce many fewer directional anomalies than default assumptions. Some suggestion of this emerged from an attempt to parse the relationship between bass and alto voices with the tenor: these relationships typically produce many more contrapuntal anomalies overall and in particular produced around double the number of directional anomalies (Daly 2020, 141–43). While contrapuntal direction calls into question the primacy of the tenor-discantus relationship, it nonetheless prefers that relationship to its competitors.

[3.7] Busnoys provides a hint to a possible solution to the problem of identifying contrapuntal pairings. His reuse of similar material where contrapuntal and cadential function is simply shifted

between voices suggests a connection between cadential and contrapuntal partnerships. Treating the tenor-alto relationship as the principal contrapuntal pair in Example 14 resolves the directional problem by making the tenor-discantus motion incidental to a cadential partnership that meets Tinctoris's standard. The alto-tenor relationship in Example 14 can be made entirely consistent with Tinctoris's teaching simply by treating the two semiminim B♭s in the alto as passing notes and extending the previous note by a semiminim in each case. Each pair of consecutive intervals then matches a progression from *De arte contrapuncti*.

[3.8] This hint from Busnoys coincides with Cumming's findings: cadence is also one of Cumming's markers of the mobile two-voice framework (Cumming 2013, 188–99). If cadence is a strong marker of contrapuntal relationships, then analysis of cadential voice-pairs should reduce the number of contrapuntal anomalies found. Using the sieve to test a sample of cadentially paired voices thus offers the opportunity to endorse Cumming's finding, reinforced by contrapuntal direction's ability at times to identify contrapuntal function within these voice pairs.

[3.9] Pursuing this line of investigation requires a working definition of cadence. Tinctoris himself is little help here, as his definition of the term *clausula* from the *Diffinitorium* leans on cadence's rhetorical effect rather than its musical construction: "a clausula is a small section of a piece at the end of which there is either a pause or the end of the piece" (Tinctoris ca. 1475, iii.; Schwind 2009, 2-3).[10] Tinctoris seemingly confuses the issue further with his one mention of clausula in *De arte contrapuncti* where he states, "This completion, however, is assumed for every middle or final cadence [clausula] of a piece of music to be regularly effected through a perfect concord, although an imperfect one is also occasionally taken in its place" (Tinctoris 1477, III, v).[11] Tinctoris supports this statement with an illustration that explicitly marks a number of cadences that avoid the creation of perfect consonance (**Example 16**), though the example further supports Tinctoris's previous assertion that the tenor may either ascend or descend to such a "perfection" (Tinctoris 1477, I, vi.). Tinctoris not only lacks an explicit contrapuntal definition of cadence, but his terminology is arguably as confusing as it is helpful, leaving inferences to be gleaned from his examples (Schwind 2009, 85–93).

[3.10] Rather than relying on Tinctoris, Cumming draws her definition from the *De praeceptis artis musicae* of Guilielmus Monachus, collating a pair of examples that provide a basic note-against-note cadential structure otherwise rare before sixteenth-century German theory (Park 1993, 188–91; Cumming 2013, 192–94; Schwind 2009, 105–32). Guilielmus illustrates cadential motion for all voices in a four-voice texture in note-against-note, two-voice terms, stating for example that the cantus will move either from sixth to octave or from third to unison against the tenor. Guilielmus here provides a sound basic definition of cadence in two voices, one which matches the writing of Busnoys at the close of his mass.

[3.11] Following Guilielmus and taking cadence as simply the contrary stepwise motion of two voices from sixth to octave or from third to unison is a considerable over-simplification, since Tinctoris's example suggests that many other forms of cadence may be available. An unusually restrictive definition of cadence, however, allows for stringent examination of the case studies above. Decorative additions, such as the 7–6 suspension commonly found in concluding cadences, or the four-voice patterns that can also be derived from Guilielmus (Cumming 2013, 192), may provide added reassurance but their presence cannot be assumed in all cases.[12]

[3.12] Cadence appears to explain the anomaly in Example 14; can it similarly explain the other case studies? In Example 13, there is a clear cadence between the lower voices in m. 6, reinforced by a suspension. If it is the lower voices that follow Tinctoris, then the relative motion of the tenor and discantus is incidental to the direct contrapuntal relationship between tenor and bass. The extraordinary point here is simply that it seems that in this brief passage, the bass voice provides the likely tenor function while the tenor creates and resolves the suspension in a manner typical of a tenor's contrapuntal partner. Here, analysis based on contrapuntal direction suggests a surprising flexibility in the contrapuntal functions of voices in four-voice texture, at least where the cantus firmus melody is not cited. Once again, a potential contrapuntal difficulty is avoided through an awareness that the problematic progression is not part of a direct contrapuntal pairing.

[3.13] Example 12 also provides a flexible cadential solution. A cadence occurs between the upper voices at exactly the point of the contrapuntal anomaly and a further cadence between alto and bass immediately follows the next barline. The tenor is involved in neither of these cadences, reinforcing the earlier impression of its secondary importance at this point. Happily, the extract from Okeghem's "Christe" given in Example 11 also admits a solution in cadential terms. Measure 4 shows a cadence on C for the outer voices, once again with a suggestive suspension. This relationship between discantus and bass implies that the relative motion of the discantus and tenor is incidental, since the discantus is tied to the lower voice. Both passages reinforce the impression of the polyphonic complex as a constantly changing network of contrapuntal partnerships.

[3.14] This focus on cadential partnership is justified by the results of broader surveying. Testing a representative selection of phrases from the *L'homme armé* masses, amounting to the equivalent of a mass movement for each of the six composers and curated for the clear nature of their cadential relationships as discussed above, enormously reduced the overall number of contrapuntal anomalies as a proportion of progressions and effectively eliminated directional progressions in particular (Daly 2020, 262–67). Okeghem's cadential sample returned only two anomalies, both a result of unusual dissonance handling between discantus and tenor in the coda that concludes the Gloria (page 103 of Plamenac's 1959 edition of the mass). The samples of Busnoys, Regis and Du Fay revealed no anomalies at all and Faugues showed a single non-directional anomaly. Regis is particularly striking in this regard, since the initial discantus-tenor sample identified him as the second most eccentric of the six composers, after Caron. While Tinctoris may have felt cause to attack the mensural practice of Okeghem, Busnoys, Faugues and others (Tinctoris 1473, III,iii), along with their dissonance handling (Tinctoris 1477, II, xxxiii–xxxiv), their pure contrapuntal consonance succession aligns almost perfectly with his teaching.

[3.15] Caron proves to be the exception to this compliance with Tinctoris's teaching, and his cadential sample is revealing in a different way. The 187 progressions of this sample show nine anomalies, of which only one is directional. The remaining eight, however, are eccentric progressions of a type that rarely occurs in the work of other composers, such as oblique fifths to unison and similar ascending motion to perfect consonance (Daly 2020, 268–69). In Caron's case, the decreasing number of directional anomalies accompanied by the significant number of other anomalies suggests something unusual: an actual difference in contrapuntal technique. Caron's counterpoint appears more permissive than Tinctoris's and merits more detailed exploration.

[3.16] In each of the cases studies above, cadential pairing resolves the immediate issue identified by contrapuntal analysis. Contrapuntal direction plays a key role in identifying this solution through the validation provided by the elimination of directional issues in the broader cadential survey. Directional analysis makes it possible to see the initial anomalies as a reflection of the complex weave of shifting relationships within fifteenth-century polyphony.

4. Extending directional principles

[4.1] To this point, I have applied contrapuntal direction solely on the basis of a handful of contrapuntal progressions. The restrictions around these progressions, however, must be the residue of some unstated underlying principle: Tinctoris seems determined to preserve the contrapuntal identity of the tenor. While there is room for further exploration of the importance of this sense of contrapuntal identity, awareness of such a principle suggests that it may be possible to identify other manifestations of contrapuntal direction. In particular, I would like to draw a parallel with a similarly managed element of contrapuntal design, dissonance handling.

[4.2] *De arte contrapuncti* differs from most contemporary counterpoint treatises by providing some guidance on how to handle dissonance (Berger 2009, 15–21). Book II describes all the dissonances within Tinctoris's ambit in much the way that Book I described consonances. Between chapters 26 and 33 of Book II, Tinctoris provides principles for the introduction of dissonance into florid composition, most of which consist of describing against which parts of a tenor note a dissonance may be introduced in various mensurations and proportions (Blackburn 1987, 242–44).

[4.3] Tinctoris's teaching is once again reflected in compositional practice. Dissonance handling in the early *L'homme armé* masses inevitably requires either preparation or resolution against a stationary tenor.[13] **Example 17** shows some of the typical forms of these dissonances, first in suspension and subsequently by passing or neighbor motion. **Example 18** shows these forms of dissonance in an excerpt from Guillaume Faugues's mass. The case of suspended dissonance is particularly interesting for its close correspondence to the sixth-to-fifth progression; combined with the tenor's function as the source of all resolution, it is tempting to think that the restriction arises from the sense that an imperfect sixth in some way resolves to a perfect fifth.

[4.4] More important is the idea that dissonance handling itself may have directional implications. If a contrapuntal partner must resolve against the tenor in the way that dissonant sevenths resolve to pre-cadential sixths in several of these examples, then any dissonance created by the motion of the tenor against a stationary voice argues that the two voices are not in the kind of direct contrapuntal relationship described in *De arte contrapuncti*.

[4.5] **Example 19** provides a convenient illustration of how the various manifestations of contrapuntal direction can combine to guide analysis. In the following extract from Regis's *Missa Dum sacrum mysterium/L'homme armé*, the contrapuntal sieve found three anomalies in the tenor-discantus pairing, accounting for three quarters of the anomalies in the entire Kyrie. First the progression from third to unison between tenor and discantus in m. 6 creates a typical directional anomaly. Further, in m. 8 the tenor is suspended against all three other voices in a way that would be extraordinary if it were the focus of resolution. A similar, though briefer, suspension occurs at the start of m. 13. Three contrapuntal anomalies, two inferred from dissonant motion of the tenor, suggest something unusual is at work in this passage.

[4.6] In this case, directional analysis reinforces the findings of previous research. Sean Gallagher has identified that, in addition to quoting the text of the antiphon *Michael praepositus paradisi*, the tenor part also quotes its melody in this excerpt (Gallagher 2010, 65). At the same time, the other voices in the texture move in longer note values while the alto descends into the tenor's usual range and adopts the stepwise descent towards a cadential D; this is typical of the tenor in this mass, where the cantus firmus is often transposed down a fourth from its usual cadential focus on G. In short, the alto behaves more like a tenor than the tenor does. The alto is already closely associated with the tenor in this mass through the frequent semi-canonic relationship between the two voices, so a transfer of the contrapuntal tenor function to the alto part while the tenor sings *Michael praepositus paradisi* seems natural. Such a transfer would justify the curious tenor-discantus progression by implying instead a direct contrapuntal relationship between alto and discantus. The strong cadence between the upper voices at the conclusion of the excerpt reinforces this inference. Contrapuntal direction confirms Gallagher's insight, showing specifically that anomalies may arise through incorrect assumptions about contrapuntal pairings caused by the exchange of contrapuntal functions between voices.

[4.7] Simply placing the tenor function in the alto to provide an alto-discantus pairing in this passage leads, however, to an even greater contrapuntal problem. Consecutive fifths occur between the upper voices from mm. 4–5, strongly suggesting that the upper voices, as with the earlier Okeghem example, also do not constitute a direct contrapuntal pair at this point. If the alto carries the tenor function as I have just suggested, then the consecutive fifths suggest in turn that the alto is not paired with the discantus throughout.

[4.8] Once again, a possible cadence comes to the analytical rescue. Just as the excerpt concludes with an alto-discantus cadence, there is an almost equally clear cadence between the tenor and alto voices in m. 9, where the tenor prepares and resolves a suspension against the alto; the tenor's role as a contrapuntal response to the alto justifies the suspension that previously seemed so strange. This 2–3 suspension is simply the complement to the more common 7–6 pre-cadential suspension that occurs when the counterpoint sits above the tenor function. A tenor-alto pairing solves the consecutive fifths but faces a different problem: from mm. 3–4, the alto provides a textbook example of a directional anomaly, moving from an F-D sixth to a G-D fifth in a manner inconsistent with its apparent function as a contrapuntal tenor.

[4.9] Is there one last cadence to find? I would argue for an alto-bass cadence at the beginning of m. 5. The two voices move in the typical manner from sixth to octave by contrary stepwise motion, only without any of the typical decoration, implying that the progression may not designed to be heard as a cadence in the same way as the alto-tenor in m. 9 and the alto-discantus at the conclusion. Cadential inferences of this sort require further testing across substantial corpora, but it is notable that the alto-bass pairing changing to an alto-tenor pairing in m. 5 is free of contrapuntal problems, directional or otherwise. What seems unavoidable is that further testing of these cadential relationships will use contrapuntal direction as a key part of the assessment.

Conclusion

[5.1] It seems fitting to allow Tinctoris himself the last word on contrapuntal direction. Curiously, Tinctoris's attitude can first be inferred from his approach to composing for two voices in his own *L'homme armé* mass. Writing for a reduced ensemble in the early *L'homme armé* masses tends to take the form of a series of duets for any two-voice combination of discantus, alto and bassus with possibly a conclusion for all three voices. Such writing may take up an entire section such as in Tinctoris's "Christe" and its equivalent in Busnoys's mass, or act as an introduction to a four-voice passage, as in the same section of Du Fay's mass. Further, these passages, whether imitative like Busnoys's or not as with Du Fay, are typically built from chains of imperfect consonances that largely avoid note-against-note fifths (Daly 2020, 153–70). A curious characteristic of these duets is that they tend to create fifths by syncopation, using oblique motion from sixth to fifth to create an otherwise rare sonority. This reliance on oblique motion has the potential to create directional progressions when moving obliquely between syncopated parallel imperfect intervals. When the voices exchange roles in creating this oblique motion, as happens in Du Fay's "Christe" (**Example 20**), in the absence of a tenor voice, an apparent directional paradox occurs.[(14)]

[5.2] **Example 21** shows a section of the "Christe" of Tinctoris's own *L'homme armé* mass, a work with a complex reception and a corrupt transmission in its unique surviving source (Zazulia 2018; Dean 2013). The "Christe," fortunately, is not subject to this corruption and a directional analysis reveals differences from many equivalent passages in the early *L'homme armé repertoire*.

[5.3] Tinctoris seems at first to respect the generic features of duet writing. His "Christe" is unusual in involving the tenor in the duets but otherwise all seems normal: the opening tenor-bass phrase (not shown in the example) is in large part an embellished chain of parallel sixths while the following upper voice duet relies just as heavily on thirds. What is remarkable is Tinctoris's care in avoiding the sort of directional contradictions present in Example 20. The two opening duets are both entirely free of directional anomalies, regardless of which voice in the duet is assigned the tenor function for the purposes of the analysis. At the very least, Tinctoris seems to have taken unusual care to avoid a problematic progression that routinely appears in the music of other composers.

[5.4] More interesting is that directional anomalies do arise in later duet pairs. These, however, only ever arise in one orientation within a given phrase, identifying each duet phrase as a highly embellished example of two-voice writing following Book I of *De arte contrapuncti*. One such anomaly arises from mm. 2–3 of Example 21 when the bass is read as the tenor function against the alto; another occurs between discantus and tenor in mm. 8 as the tenor moves from sixth to fifth against the stationary G of the discantus and another occurs between tenor and bass in both mm. 13 and 14 if the tenor is assigned its usual function, as the tenor moves obliquely from third to unison with the lower voice, though disguising this motion in each case with a passing note. These progressions identify the alto, discantus and bass as carrying the tenor function in turn. In the last case, the bass makes the matter obvious by citing a phrase of the *L'homme armé* melody almost without embellishment, making it plausible to read the earlier alto and discantus entries as embellished cantus firmus phrases as well. Tinctoris seems here to be playing with compositional form, shifting contrapuntal functions between voices and creating a structure that resembles a typical two-voice duet while in fact adhering to his own strict definition of contrapuntal propriety. This aspect of pursuing theoretical discourse by compositional means, of "composing in theory" as

Emily Zazulia has described it (Zazulia 2018), becomes perceptible here only through an awareness of directional principles.

[5.5] Despite an unusual strictness apparent in his two-voice writing, Tinctoris retains the capacity to surprise. An important case comes from the five-voice example that forms part of *De arte contrapuncti* II, xxi. Using the sieve to examine the relationship between the tenor and each other voice returns only two anomalies, both directional. One, between the second contratenor part and the tenor, which seems to be a secondary relationship given the apparent cadential partnership between tenor and *supremum* shown in **Example 22**. More striking is the clear directional anomaly as the tenor moves from B to C against the G of the supremum at almost the same point of the example. In purely directional terms, this passage is only correct counterpoint if the tenor function resides in the supremum. It requires almost an act of will to allow this possibility since the two voices seem to move in ways typical of tenor and counterpuntal voice, but the possibility cannot be excluded on the counterpoint alone in a passage that Adam Whittaker argues demonstrates the mobility of the tenor function (Whittaker 2016, 254–55). Tinctoris seems to have taken great care to avoid these sixth-to-fifth progressions where possible. In allowing two of these progressions side by side, in effect doubly declaring that the tenor does not provide the tenor function to either supremum or contratenor secundus, Tinctoris is implicitly making a point about the structure of his composition.

[5.6] This last example and the "Christe" of Tinctoris's *Missa L'homme armé* point to both the benefits and challenges of using contrapuntal direction in analysis. On the local level, the principle may only be intermittently useful: analysis of a given phrase or passage depends largely on a small number of contrapuntal progressions whose presence or absence may simply be fortuitous. Similarly, the absence of directional anomalies in the opening two duets of the "Christe" may not be significant, though even on this scale contrapuntal direction is able to contradict an analytical assumption by finding progressions inconsistent with a specific contrapuntal pairing or orientation. As the sample size increases, however, consistent patterns of contrapuntal behavior become telling. As the "Christe" continues, Tinctoris writes counterpoint that implies that a specific voice holds the tenor function within any given phrase. The longer this pattern continues, the more likely this is to be by design. Further, contrapuntal direction can at times act as a marker of contrapuntal function, even where the pairing of voices is not in doubt. When taken across a sizeable body of repertoire, contrapuntal direction's ability to test a theory of compositional construction by assessing the theory's ability to eliminate directional anomalies provides a theoretical proving ground for fresh understandings of fifteenth-century compositional method.

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Footnotes

* Note on musical examples and sources: All musical examples taken from the *L'homme armé* repertoire were set from manuscript sources and are shown with measure numbers referring only to that specific example. References to modern editions are provided using the measuring for the given edition for those who wish to examine excerpts in their wider context. Note values, barring and numbering may vary in these reference editions. All editorial inflections such as leading notes and possible *mi contra fa* resolutions have been omitted. Text underlay does not influence this analysis and has thus been omitted for clarity. Progression formulae are shown with the tenor voice in white notes and the contrapuntal response in black noteheads throughout. Reference to Tinctoris's treatises is by title, book (where applicable) and chapter only so readers may consult their edition or translation of choice. My principal source for *De arte contrapuncti* is the online edition curated by Ronald Woodley, Jeffrey J. Dean and David Lewis at http://earlymusictheory.org/Tinctoris/texts/. Translations of *De arte contrapuncti* are taken from this source. NB: I use this edition's numbering of Book II of *De arte contrapuncti* which differs from other editions that do not renumber chapter vii bis as chapter 8.
Return to text

1. "Tenor est cujusque cantus compositi fundamentum relationis."
Return to text

2. "Porro cantum primo institutum, supra vel infra quem contrapunctus efficitur, proprie 'tenorem' appellamus, tanquam ipsum contrapunctum, qui secundum eum fieri debet, subditum sibi quodammodo tenentem."
Return to text

3. The same principle appears, for example, in motions from third to fifth in *De arte contrapuncti* I, iv.
Return to text

4. "Quinta post sextam inferiorem infra tenorem nonnunquam collocabitur si tenor ipse non moveatur."
Return to text

5. Third and fourth voices were retained but used only for testing the consonance of fourths in the voice pair under analysis.
Return to text

6. The software is publicly available for download at https://github.com/TimDaly-counterpoint/Contrapuntal-sieve.

7. Faugues's mass is the exception here, since the alto is canonically derived from the tenor, leading at times to clear three-voice writing with a tenor function when the alto falls silent.

8. For ease of discussion, this and all subsequent examples from repertoire are numbered with the first given measure as 1. Numbering in modern editions will vary according to the editorial practice of the given edition. The numbering in accompanying references follows that of the specific edition cited.

9. ". . . quod omnes partes reifacte, sive tres sive quattuor sive plures sint, sibi mutuo obligentur, ita quod ordo lexque concordantiarum cuiuslibet partis erga singulas et omnes observari debeat."

10. "Clausula est cujuslibet partis cantus particula in fine cujus vel quies generalis vel perfectio reperitur."

11. "Sumitur autem hic perfectio pro cuiusque cantus media seu finali clausula per concordantiam perfectam regulariter efficienda, quamvis et interdum loco eius assumatur imperfecta . . ."

12. It is perhaps notable that the four-voice archetype that Cumming derives from Guilielmus's two-voice formulae matches the cadential formula with which Busnoys concludes every movement of his mass.

13. I am aware of only a single case in the six masses where the tenor strikes a purely-note-against-note dissonance against another voice, near the close of the Gloria in Caron's mass (Sherr 2009, 472, m. 184). The fact that this tenor minim sounds against dissonant minims in two other voices is so unusual that I am convinced that this represents a corrupt transmission, albeit one that—given its presence in both surviving sources—must have been introduced early in the piece's history.

14. Partly on the basis of cases like that in Example 20 where the duet shows a different directional orientations in quick succession, I have argued elsewhere that duet writing of this sort lacks a tenor function, at least in the traditional sense of a structural reference that is the focus of all resolution. See Daly 2020, 153–70, and Daly 2021. An extended article on this topic is in preparation.

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