Accidentals in the Mid-Fifteenth Century

A Computer-Aided Study of the

Buxheim Organ Book and its Concordances

by

Frauke Jürgensen

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Abstract

The Buxheim Organ Book, the largest fifteenth-century manuscript of keyboard tablature, has never before been examined as a whole in light of *musica ficta* issues, although it contains far more accidentals than any contemporaneous source in mensural notation. Although tablature has been used by various scholars to examine accidentals in sixteenth-century music, studies of fifteenth-century accidentals have focussed on theoretical evidence and small groups of pieces from mensural sources. The author uses the Buxheim Organ Book to extend the investigations of accidentals in tablature back into the fifteenth century, combining the large data set provided by this manuscript with a statistical approach modelled on that of Thomas Brothers's smaller-scale study of the chansons of Binchois. Specialised computer programs are introduced, which detect musical structures relevant to the analysis of Renaissance music such as different types of cadential voice leading. These programs function as extensions to David Huron's Humdrum Toolkit. With these tools, signing practises in the intabulations are statistically compared with all of the concordances of the models. Conclusions are suggested pertaining to issues of signature accidental transmission, partial signatures, mode, and *musica ficta*, which can be used as a contextual backdrop for the analysis of individual pieces. The evidence provided by the accidentals in Buxheim and its concordances draws a clear picture of how a group of fifteenth-century musicians added accidentals to polyphonic music. For the first time, this study provides us with principles and guidelines for *musica ficta*-decisions based on actual practice.

Résumé analytique

Le Livre d'orgue de Buxheim, la plus volumineuse collection manuscrite de tablature qui nous provienne du XVe siècle, n'aura bénéficié, à date, d'aucune étude de son ensemble en ce qui a trait à la *musica ficta*. Ceci, en dépit du fait qu'il comporte le plus grand nombre d'altérations accidentelles, comparé à toute autre source en notation proportionnelle de la même époque. Bien que les tablatures du XVIe siècle aient fait l'objet d'investigations de la part de plusieurs chercheurs afin de discerner la présence des altérations accidentelles, cette recherche ne s'est pas étendue au XVe siècle selon les mêmes critères : elle se rapporte le plus souvent à des bases théoriques et à des petits regroupements de pièces provenant de sources en notation proportionnelle. L'auteur de cette thèse se sert donc du Livre d'orgue de Buxheim pour élargir le champ d'observation des altérations accidentelles dans la notation en tablature, étude qui comprendra maintenant le XVe sicle. L'ensemble important de données provenant de ce manuscrit est soumis à une approche statistique rappelant celle de Thomas Brothers (lequel s'applique à un échantillon de chansons de Gilles Binchois). Des logiciels informatiques spécialisés serviront à détecter les structures musicales pertinentes dans l'analyse de la musique de la Renaissance telles, par exemple, la conduite des voix sur les points cadentiels. Ces logiciels sont élaborés sur le Humdrum Toolkit de David Huron. Il est possible, par ces moyens, de comparer les armatures des mises en tablature avec celles des modèles sur lesquels ces mises en tablature sont fondées. On peut extraire de ce processus un ensemble de conclusions qui aideront à définir comment les armatures étaient transmises, de même que la transmission des armatures partielles, des modes, et de la *musica ficta*. Cet ensemble de conclusions pourra ensuite être utilisé comme toile de fond pour l'analyse de pices individuelles. Des modalités utiles à l'interprétation moderne des

pièces sont également proposées. Elles sont fondées sur les habitudes et pratiques les plus souvent relevées dans les mises en tablature du Livre d'orgue de Buxheim en ce qui a trait aux altérations accidentelles et aux armatures. Pour la première fois, nous pouvouns prendre nos décisions de *musica ficta* en suivant des principes tirées directement des pratiques d'un groupe de musiciens de l'époque.

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Conventions of Naming and Labelling

Throughout this dissertation, the following conventions of naming and labelling are used:

- When three voices are shown in an example, they are named (from top to bottom) Superius, Contratenor, and Tenor
- Where the octave is relevant, it is denoted by the use of upper- and lower-case letters and apostrophes: C–B, c–b, (c' = middle C) c'–b', c"–b".
- Calculations are performed to a precision of five decimal places, and rounded in the text to one or two decimal places.
- Modes are referred to by the Greek names associated with the eight-mode system. Unless otherwise specified, "dorian" is understood to refer to both members of that complementary pair (dorian/hypodorian), etc.
- In keeping with modern use and in avoidance of cumbersome constructions, the term *musica ficta* is taken to apply to all accidentals and chromatic alterations, whether or not they in fact involve stepping outside the gamut.
- The term "model" is used to refer to the set of concordances of the mensural version of a piece intabulated in Buxheim.

List of Figures

List of Tables

Table of Contents

Chapter 1

Introduction and Survey of Literature

Compiled between ca. 1450 and ca. 1470, the *Buxheim Organ Book* (München, Bayerische Staatsbibliothek, Mus. 3725, hereafter Buxheim) is the largest surviving collection of fifteenth-century keyboard music. Its place of origin is unknown—it was discovered in the nineteenth century in the South German monastery of Buxheim. It contains sets of pedagogical improvisation exercises (*fundamenta*) by the organist Conrad Paumann, freely-composed *præambula* (among the first of their kind), and settings of plainchant and monophonic songs. The largest number of pieces, however, are intabulations—keyboard adaptations—of polyphonic vocal music, predominantly German and French.[1] In this dissertation, I aim to answer questions of performance and notational practice relating to signature and internally-signed accidentals (commonly if somewhat misleadingly referred to as *musica ficta*), mode, and temperament.

Buxheim has not been examined extensively by modern scholars. The only major studies that examine the contents of the whole manuscript are by Eileen Southern [Southern, 1963], Robert Sutherland Lord [Lord, 1960], and Hans Zöbeley [Zöbeley, 1964]. Several studies focus on individual pieces. For example, David Fallows compares ornamental variants found in various versions of Du Fay's *Par le regard*, including two versions from Buxheim [Fallows, 1990, 80 ff.]. Mitzi Joanne Williamson [Williamson, 1962] compares various versions of Binchois's *Je loe amours*, of which seven can be found in Buxheim. Carole Terry [Terry, 1976] analyses selected works, and Leanne Fazio [Fazio, 1990] looks at *Veni creator* settings, including those found

[1] There is considerable debate surrounding the actual performing forces of this music (see for example [Fallows, 1983] and [Brown, 1976b]). My use of the term *vocal music*, in contrast to keyboard music or intabulation, is not intended to imply that the music in question was only sung.

in Buxheim.

The *Buxheim Organ Book* contains a very large number of pieces drawn from several different national repertories, yet no one has ever examined it as a whole in light of performance practice issues. There are 261 separate pieces in Buxheim.[2] 95 of these are intabulations of known chansons, Lieder, or motets, and another 78 are tenatively classified as intabulations, pending discovery of a polyphonic model. Lord counts 114 German incipits, 52 French incipits (including pieces by Du Fay, Binchois, Frye, Bedingham, and Morton), and 41 Latin incipits. Several pieces have Italian incipits; two pieces entitled *O rosa bella* are in fact based on Dunstable's setting. Composers from several generations are represented: from Ciconia (d. 1411) and Bartolomeo Bruolo, through Wolkenstein and Dunstable, to Du Fay, Binchois, and Jehan Puyllois (d. 1478). Eileen Southern points out that, as far as we can tell, no Buxheim composer was alive after 1478. Busnoys and Ockeghem "are conspicuously absent" [Southern, 1963, p. 44]. Many of the models for these intabulations survive in more than one source. Several of them are present in more than one intabulation. Published inventories disagree as to the exact numbers and types of pieces; the numbering system and categorisation used in this dissertation can be found in my own inventory (p. 214 ff.). This rich collection of such a varied repertoire seems to have been assembled mostly by one person. The manuscript is in several layers: the first eight fascicles are the work of a single scribe, and Southern identifies nine other, later scribes in the ninth fascicle [Southern, 1963, p. 10].

I will examine the set of conventions governing the interpretation of the pitches of notated music, including implications for the interpretation of partial signatures and mode or tonal system.

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[2] To arrive at this number, I counted each *præambulum* and *bonus tactus* as a seperate piece, but grouped all other parts of the *Fundamentum organizandi* Nos. 231–235 together.

1.1. The Problems of Accidental Inflections

Some of the more difficult problems of fifteenth-century performance practice concern the application of accidentals in notated music. While almost everyone would agree that there were unwritten conventions for adding unnotated accidentals, there are several different schools of thought on what types of situations allow for such additions, and to what extent these additions are required or optional. Do we "correct" all diminished fifths and augmented fourths, or *mi contra fa* situations? Say that rounding out the top of a melodic line (*una nota super la semper est canendum fa*) causes a vertical problem. If we must choose between "correcting" a vertical or a horizontal interval, which do we prioritise? Should we add accidentals only at cadences, or any time a sixth goes to an octave? Similarly, should every cadence be adjusted, or only some cadences? Notated accidentals represent another facet of the same problem, since we are not always sure just how to interpret them. How long does a notated accidental last, and should it sometimes be applied "retroactively" to earlier occurrences of the same pitch? Often, a piece is transmitted in multiple sources, with different accidentals in each. How do we explain these differences? In addition, the fifteenth-century musical landscape consists of varied repertories, each of which may very well have its own, slightly different set of conventions. These parallel practises are also subject to changes over time.

1.1.1. Earlier Research

Many scholars have investigated these questions, but their research has generally examined later repertories, such as Thomas Noblitt's study of Obrecht [Noblitt, 1982], Peter Urquhart's [Urquhart, 1993] and Anthony Newcomb's [Newcomb, 1997] studies of post-Josquin composers, Howard Mayer Brown's [Brown, 1976a] [Brown, 1984] and Robert Toft's [Toft, 1992] studies of sixteenth-century lute tablatures,

and Michele Fromson's [Fromson, 1991] examination of mid-sixteenth-century cadential structure in light of more general studies by Bernhard Meier and Karol Berger [Berger, 1987]. Margaret Bent, while drawing on theorists as far back as Prosdocimo in 1412 and earlier, is primarily concerned with polyphony ca. 1350 and ca. 1500 ([Bent, 1972], [Bent, 1984], and [Bent, 1996]). Even Urquhart's excellent study of Busnoys and Ockeghem concerns repertoire later than that found in Buxheim [Urquhart, 1997]. Andrew Hughes studies accidentals transmitted in manusucripts from 1350–1450, focussing predominantly on a repertory earlier than that contained in Buxheim [Hughes, 1972]. Thomas Brothers's work on the fifteenth-century chanson repertory ([Brothers, 1997a] and [Brothers, 2000]) are the major studies concerned with the repertory contemporaneous with Buxheim.

The studies mentioned above approach the problem in various ways. Berger, Bent and others draw primarily on contemporaneous theorists for their evidence, whereas Noblitt, Brothers, and Urquhart focus on the accidentals transmitted in the pieces themselves. Brown and Toft use tablature to shed light on the pieces, studying the specific problems and advantages associated with tablature notation. I will now discuss those scholars whose work is most relevant to this dissertation: Urquhart, Brothers, Fromson, Brown, and Toft.

Urquhart critiques various editorial approaches to *musica ficta*: the choice always boils down to privileging a harmonic or a melodic concern; previous approaches have tended to favour the score-based, harmonic approach, rather than considering that the singer, having only his own part of the music and his ears, might have tended to correct melodic problems before harmonic problems. In support of the horizontal approach, Urquhart returns to Tinctoris:

> ...so that a *fa* against a *mi* may not happen in a perfect concord, occasionally it is necessary to use a tritone. Then, to signify where b [B♭] normally ought to be sung in order to avoid the tritone, but where *mi* must be sung, I believe that the sign of hard h, that is, square h,

must be prefaced, as is proven here. [Tinctoris, 1976, p. 13]

He points out that many, including Karol Berger and Margaret Bent, have taken this as advice to the singer, that vertical intervals should be corrected before horizontal ones; if one has to chose between singing a melodic tritone and singing a vertical diminished fifth *mi–fa*, one should pick the melodic tritone. Urquhart suggests that the advice is in fact aimed at the composer or scribe: the singer's natural, normal tendency would be to correct the melodic tritone, causing a harmonic diminished fifth. If you (the composer or scribe) really want that vertical perfect fifth, you need to mark ("preface") the natural sign, indicating to the singer that he should go against his instincts here [Urquhart, 1993, pp. 29–30]. In a later article, he finds that thirty-one of eighty-four vertical diminished fifths in Busnoys's chansons would cause "linear or harmonic problems" if they had been corrected to perfect fifths, leading him to suggest that such corrections were not normal practice [Urquhart, 1997, p. 475].

In an article on accidentals in Binchois, Brothers also advises editors to be very cautious when adding accidentals to make a piece conform to common theoretical prescriptions—some evidence suggests that composers might have "enjoyed the possibility of going beyond the simple formulas of the discant treatises, [and] found good reason to contradict those simple formulas" [Brothers, 2000, p. 252]. (Along with Urquhart, Brothers takes the theorists' advice as being directed at composers rather than performers.) He suggests that a more detailed examination of the actual notated pieces can help to establish guidelines for unnotated performance practices. To develop a method, he builds on Karol Berger's categorisation of accidentals into "conventional" (performed whether notated or not) and "unconventional" (performed only if notated). To Berger, a conventional accidental is one that is theoretically prescribed. Brothers refines this concept by pointing out that convention also depends on the ease with which a performer can recognise a

"conventional" situation, and that theoretical treatises are not universal or complete [Brothers, 2000, p. 253]. He studies accidentals in Binchois chansons that are transmitted in multiple manuscripts by dividing internally-signed accidentals into categories based on function. In particular, he hopes to find a correlation between the function of an accidental, and how it is transmitted—if a particular type of "conventional" accidental appears notated very consistently, and another type appears only sporadically, that may imply something about performance practices. For example, he finds that his type 2 accidentals, "top tone" (rounding out a melodic contour, mostly by using B♭ in the superius) are signed very consistently, whereas type 1 accidentals, "propinquity" (harmonically-based adjustments of thirds and sixths leading to fifths and octaves or leading to evaded cadences) are signed very inconsistently. He concludes that "the variants have nothing to do with a performance practice that was sometimes made explicit and sometimes left implicit" [Brothers, 2000, p. 270], and that ease of recognition had little to do with how consistently an accidental was signed: perhaps "top notes" were signed consistently because they were considered particularly important, whereas cadences were usually left unsigned because either the convention was so strong that an inflection was obvious, or the composer actually preferred an uninflected sound. Selectivity might have played a role: perhaps "propinquity" inflections are signed inconsistently because they were used more selectively than "top note" inflections, suggesting that a modern editor should be more cautious when adding them [Brothers, 2000, p. 272]. In his book, *Chromatic Beauty in the Late Medieval Chanson*, he goes even further, taking as a point of departure a fairly literal interpretation of the notated accidentals (and lack thereof), to see if and how one can make sense of the "diverse written record" [Brothers, 1997a, p. x] without adopting a universal set of conventions. He argues that modern scholars often make editorial and analytic decisions that are biased through the *a priori* assumption of a set of supposedly universal

conventions, which, he argues, might not be so universal, after all. Since I modelled my methodology on Brothers's function categories and statistical approach, his work will be discussed in greater detail later.

Fromson [Fromson, 1991] compares Meier's and Berger's approaches to analysis in an attempt to find a consistent way of identifying and classifying cadences. Cadential categorisation is relevant to the question of *musica ficta* in that one has to know if a cadence is present, to what pitch it is, how strong it is, and to what degree presence or absence of signed inflections influences the identity and strength of a cadence.

Brown [Brown, 1984] examines *musica ficta* in lute intabulations of chansons by Arcadelt and Sandrin by sixteenth-century French court lutenists. He finds that leading-tones at verse-end cadences are always raised, whereas internal cadences and other 6–8-progressions do not always consist of a major sixth going to an octave. He also finds that tritones and diminished fifths are always corrected, following the accidentals of the vocal models, and always giving priority to melodic concerns over harmonic concerns. In diminutions, he finds that accidentals seem arbitrary and not connected to the rules. Altogether, he concludes that even here, there is considerable room for variation in treatment of *musica ficta*. Another scholar who finds a wide range of practices is Toft [Toft, 1992], who examines lute intabulations in an attempt to establish guidelines rather than hard-and-fast rules. He argues that sensitivity to the specific context (in terms of the piece, and in terms of the performance situation) should guide one's decisions.

A point held in common by these scholars is that rather than attempting to find precise, universally-applicable solutions to the problems of *musica ficta*, rather than trying to establish a single correct text of a piece, we should accept that there is a range of possiblities. Within this range, we should try to narrow down practices belonging to specific repertories at specific times.

1.1.2. Buxheim's Usefulness for Investigating Accidentals

What makes Buxheim, in particular, so useful for investigating accidentals? In her 1963 dissertation, Southern limited her discussion of *ficta* issues to this short paragraph, frustrated by inconsistencies in the transmission of accidentals:

> The task of trying to compare the intabulations with their models with regard to *musica ficta* proves to be an unrewarding one, chiefly because of the laxity of the scribes in inserting accidentals.[. . .]Not only are scale degrees sometimes expressly inflected differently in the intabulations and in their models, but differences in inflection occur even in corresponding passages in the various arrangements of a single piece. By and large, chromatic alterations appear more often in the intabulations than in the models. [Southern, 1963, p. 101]

My work will show that she gave up hope too soon. While her observations regarding the accidentals are certainly correct, we can exploit these inconsistencies of transmission to find patterns suggestive of various unwritten performance conventions.

Many people, including Brown and Toft, have mentioned the potential usefulness of intabulations for determining the range of practices of a possible performance. Tablature notations use letter or number symbols (referring to finger positions or note-names) rather than conventional notes to indicate pitch, and accidentals are shown through use of a single distinct symbol rather than through placement of a sharp or flat beside a pitch. Intabulations, in general, tend to have more accidentals than their vocal models. For these reasons, these scholars think that intabulations can be a more reliable guide to the pitches that were actually performed. These studies focus on the sixteenth-century lute repertoire; however, the Old German organ tablature notation used in Buxheim is similarly useful, and has been unexamined for these issues.

The type of tablature used in Buxheim consists of two separate types of notation. The upper voice, or right hand, is given on a staff, as in vocal music. The lower voices, or left hand, are given in letter notation, vertically aligned with the upper

voice.

1.1.2.1. Tablature Considered Conceptually

Before we go on, the process of intabulation itself is worth examining, to understand the conceptual purpose of this notation and provide further support to the idea that (at least in the left hand) the scribes wrote, more or less, the pitches they expected to hear.

In an interesting article, Theodor Göllner describes some samples of notation found in the manuscript W5094, which he interprets as examples of intermediate stages of notation between mensural notation and organ tablature [Göllner, 1967, p. 171]. The first of these examples shows three notational stages of an anonymous *Ave maris stella* [Göllner, 1967, Abb. 1 and 1a, facing p. 176]. The first stage is in normal mensural notation. In the second stage, the three voices have been placed roughly below each other, on three staves, and all breves have been split up into semibreves (the final note remains a long). The next stage involves the precise vertical alignment of the three chains of semibreves into three rows of letters (like the letters normally used for the lower voices in organ tablature). A final fragment has the semi-breve chain of the third (the lowest) voice written on an eight-line staff, provided with clefs in the manner of tablature (F, c, g, d). Together, Göllner sees these stages as showing the translation of the piece first into a notation where the semibreve is the determining value, and then into a notation where the notes (or letters) no longer refer to pitches *per se*, but to the position of the fingers on the keyboard. Thence the clef-shape peculiar to tablature: the clefs refer directly to keys, and are thus in the same shape as the letters used for the lower voices [Göllner, 1967, pp. 174–175]. Göllner's second example shows Du Fay's chanson, *Ce jour le doibt*, in a type of score notation. The superius is on a staff by itself, in void notation. The tenor and contratenor are together on a second staff, the

tenor in void notation, and the contratenor in black notation, allowing us to see which voice is which, even when the parts overlap. The notation differs in two ways from normal mensural notation. First, as in the fragments discussed above, the semibreve is the determining value; that is, instead of dividing a breve into two or three semibreves depending on the context, an imperfect breve (this piece is in Circle) is consistently written as the sum of two semibreves, and perfect breves from the mensural original have been transcribed as dotted breves. Second, as in the tablature notation used in Buxheim, there are vertical lines, which in this case encompass regular measures of three semibreves. Unlike the contextually-determined durations of mensural notation, durations in this score are seen in terms of the semibreve [Göllner, 1967, pp. 173–174].

Hans Zöbeley has some complaints about the format of Bertha Wallner's edition of Buxheim, in which the tablature has been transcribed into a three-staff score format. He feels that this format obscures the nature of tablature as derived from the process of playing, the keyboard attack, which he sees as essentially vertical [Zöbeley, 1964, pp. 46–50]. In light of Göllner's examples, I propose a different theory about the conceptual purpose behind the use of tablature. In Wallner's score format, the horizontal aspect of the music is very easy to follow. However, it is somewhat difficult to play from the score, since the two lower voices overlap frequently, and the vertical left hand intervals (which determine fingering) are hard to see. The score format of *Ce jour le doibt* in W5094, on the other hand, is very easy to play from: left hand intervals are readily apparent. However, the voice-leading is much harder to see, since the two lower voices share a staff. We can tell that the scribe cares about differentiating between the voices, since he notated one in void, and the other in black notation. Buxheim's three-voice *fundamenta* are further evidence for the importance of showing voice-leading: since they are all about playing counterpoint around a tenor *cantus firmus*, the student really

needs to be able to distinguish the tenor from the contratenor. I would argue that tablature is a compromise between the two needs, ease of fingering and ease of following voices. The two lower voices are in close proximity to each other, aligned so that the vertical intervals are read easily, yet each voice has horizontal continuity by being written on one line. It is much easier to read a vertical interval from this closely-spaced letter notation, even if it appears upside-down (such as when the contratenor, notated below the tenor, has a higher pitch than the tenor), than from two separate staves.[3] Thus, the need of the organist to see simultaneities is accommodated, while the essentially polyphonic nature of the pieces is preserved. The tactile nature of the tablature reading process—from the eyes directly to the fingers—supports the idea that scribes will tend to be fairly precise when notating pitches. [4]

1.1.2.2. Organ Tablature and Accidentals

To investigate accidentals, I compare the intabulations with all available sources of their models, and (in several cases) with other Buxheim versions of the same piece. These cases of multiple intabulations are especially useful, because they allow us to see how the same situation was interpreted differently on several different occasions in the same manuscript, and usually by the same scribe; in other words, what he saw as a range of possibilities. Since the body of pieces is so large, I use computer tools (described in Chapter 2) to make statistical observations about the behaviour

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[3] That organists had no problem with this visual inversion can be seen from Hans Buchner's early-sixteenth-century description of the order in which to write down voices when converting a vocal piece to tablature: the relative importance of the voice, rather than its average tessitura, determines its position relative to the other voices (he proposes the order Discantus, Bassus, Altus, Tenor, other voices) [Buchner, 1974, p. 16].

[4] Since modern keyboard players are trained to follow voice-leading through stem-direction, a closer modern approximation of this keyboard tablature would be two staves, with the lower voices notated on the lower staff in accordance with normal modern keyboard practice.

of accidentals in situations modelled on Brothers's function categories. I expand on his method by also considering the transmission of signature accidentals.

Comparing models with intabulations shows that the pitches of the lower voices, including signature accidentals, tend to be respected, perhaps suggesting that the inflections added in these lower voices should be seen as a complete indication of what was played. However, sometimes, a signature flat is transcribed into the intabulation in all except one or two occurrences of the affected pitch. We can examine such situations to see if there is a reasonable explanation of these aberrations.

As mentioned at the beginning of Section 1.1.2, the most commonly advanced argument for the potential usefulness of tablature for investigating questions of *musica ficta* is that the pitch notation employs single distinct symbols for chromatically-altered pitches, encouraging the scribe to notate specifically the pitch he wants to hear; whereas in staff notation, he has two different symbols in combination, and might very easily neglect to add a sharp or flat. In Old German organ tablature, this applies only to the left-hand voices, since the right hand is notated on a staff, and chromatic alterations in the right hand are indicated by *additions* to note-symbols rather than *distinct* note-symbols (Figure 1). [5]

Figure 2 shows the symbols available for indicating chromatic alterations in the left hand.

Although the symbols for sharp notes simply have a loop added to the letter, the symbol for B♭ is a distinct letter from the symbol for B♮, and the symbols for other flats are actually the sharps of the notes below: only the context can tell us if a given note is, for example, D♯ or E♭.

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[5] Another mid-fifteenth-century tablature source (which shares many concordances with Buxheim) is the Lochamer Liederbuch. It contains both mensural and tablature notation. Throughout, the pieces in tablature notation have many accidentals, and the pieces in mensural notation have almost none.

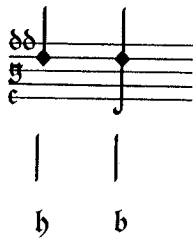

Figure 1. Left-hand B and B♭ (letters below staff), right-hand B and B♭ (notes on staff)

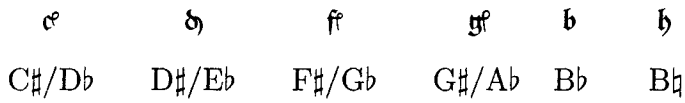

Figure 2. Symbols for chromatic alterations in the left hand

If the scribe is indeed more careful about notating exact pitches in tablature, we would expect, on average, to find more accidentals in the lower voices of the Buxheim pieces than in the lower voices of the models. A calculation of the average number of accidentals contained in a Buxheim intabulation, as compared with the average number of accidentals contained in a model chanson, will show if this is true.

Since there are no signature accidentals in Buxheim, the intabulators had to reproduce signature flats from the models as internally-signed flats. The accuracy of reflection of the models' signatures will be examined in detail in Chapter 3. However, in general, it can be said that if Buxheim shows *more* flats on average than the models do on average, when the models' signature flats are included in the counting, then Buxheim is more reliable than the models in transmitting signature accidentals. Not only that, but Buxheim provides more information on added accidentals, as well.

There are 60 titles that have concordances both in Buxheim and elsewhere. Averages for total accidentals were calculated as follows:

1. For each title, a sum of accidentals was calculated for all Buxheim versions together. For example, *Par le regard* has two Buxheim intabulations: no. 30 has 16 sharps, and no. 31 has 8 sharps, for a total of 24 sharps. This sum was divided by the number of Buxheim versions, giving an average number of accidentals for that piece *within* Buxheim. 24/2 gives an average of 12 sharps for *Par le regard* in Buxheim.
2. These averages were themselves averaged, to give an average number of accidentals across *all Buxheim titles that have known models.*
3. For each model, a sum of accidentals was calculated for all concordances. The sum was divided by the number of concordances of the model, giving an average number of accidentals for that title *in the model.* Note that *all* accidentals were included, whether they resulted from a signature or from an internal sharp or flat.
4. These averages were also averaged, giving an average number of accidentals across *all models.*

This procedure—comparing the average behaviour of each title in Buxheim to the average behaviour of each title in the models—allows us to see how the notation of accidentals in Buxheim compares to the notation of accidentals in other manuscripts, without making decisions as to which of the other manuscripts is the most authoritative for each piece.[6]

Table 1 shows the average number of accidentals in the models compared to Buxheim. Numbers in boldface show the relative amounts of accidentals in Buxheim and the models most vividly.

---

[6] The concordance in Tr89 of Du Fay's *Se la face ay pale* has been discarded in the calculations of these figures, because of its extremely irregular signature sharp.

	Tenor	Contra	Both	Superius	All Voices
Models					
Flats	3.66	2.47	**6.13**	**2.81**	8.94
Sharps	0.24	0.04	**0.28**	**1.19**	1.47
Totals	3.89	2.51	**6.40**	4.01	**10.41**
Buxheim	pieces	with	models		
Flats	6.67	3.77	**10.43**	**2.69**	13.12
Sharps	2.21	1.73	**3.94**	**2.00**	5.95
Totals	8.88	5.50	**14.38**	4.69	**19.07**
Buxheim	pieces	without	known	models	
Flats	5.40	2.59	8.00	**2.10**	10.09
Sharps	1.81	1.58	3.40	3.07	6.47
Totals	7.22	4.17	11.39	5.17	16.56

Table 1. Average accidentals per piece

The superius-figures should be interpreted cautiously. Since the Buxheim versions are often heavily ornamented, there are far more notes in Buxheim available to accumulate accidentals, and most of them are very short notes. The Buxheim scribes seem reluctant to attach accidentals to note-values shorter than a transcibed quarter note (minim) in the right hand, meaning that most of these extra notes have no accidentals. Nevertheless, when both sharps and flats are considered, the superius of Buxheim exhibits slightly more accidentals on average than the models (4.69:4.01).

Buxheim shows a significantly higher concentration of lower-voice accidentals (14.38:6.40, or over twice as many, in pieces with models), suggesting that the pitch notation is truly more careful in this tablature than in the staff-notation concordances. The number of left-hand sharps (3.94, compared with 0.28 in the models) is particularly exciting: it promises many raised fourth degrees at cadences, which will be examined in Chapter 5.[7] Given Eileen Southern's reservations about

[7] Some Buxheim intabulations are truncated; for example, three of the seven *Je loe amours* give only the first few measures of the piece. A few of the encoded models have missing pages, thus also representing only part of the piece. The inclusion of the whole piece, i.e. the opportunity for

the inconsistency of the alterations in Buxheim [Southern, 1963, p. 101], we will also want to see which pieces in this flat-riddled Buxheim Organ Book freely intermingle altered and non-altered B's and E's in the left hand—can these be explained through raised double leading tones at cadences, for example?

Why do Buxheim pieces with no known models show fewer accidentals, in particular flats, than Buxheim pieces with models? In Chapter 3, we will try to answer this question by examining which combinations of final and usual flats are most common in each group of Buxheim pieces.

Another interesting situation arises when an intabulation has been transposed from the model's pitch level. For instance, in the case of a piece transposed up a fourth, F♮s in the model should correspond to B♭s in the intabulation. However, this does not usually seem to be the case: the B's are often natural, either to be flattened by convention, or to represent F♯-inflections (also by convention) in the model. The performer had to decide which set of conventions was the more important in a given situation. We can use those B♭s that have been added in Buxheim to determine what sort of clues the intabulator thought the performer needed to make his decision. Transpositions and corresponding accidentals also provide valuable clues as to questions of mode.

The comparative freedom of many of the intabulations as compared to their models might at first appear problematic. On the whole, the phrase lengths and principal cadences correspond, but sometimes it is difficult to identify analogous situations between models and intabulations. In general, the tenor is very similar, the contratenor is completely different, and the superius varies widely between following the model exactly and merely sharing a similar beginning and basic contour.

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having lots of accidentals, is more common for the models, thus giving the models a bit of an unfair advantage in the counting of total accidentals. Since Buxheim has more accidentals even *with* this handicap, we may ignore it in the presentation of these data.

If the relationship is too loose for a direct comparison, the very changes made could be revealing, such as if a "problematic" *ficta* situation were avoided by being re-composed. In this study, rather than comparing the intabulations and their models measure-by-measure, I will assemble a general statistical picture, against which such unusual situations can be compared with an understanding of the intabulators' own priorities.

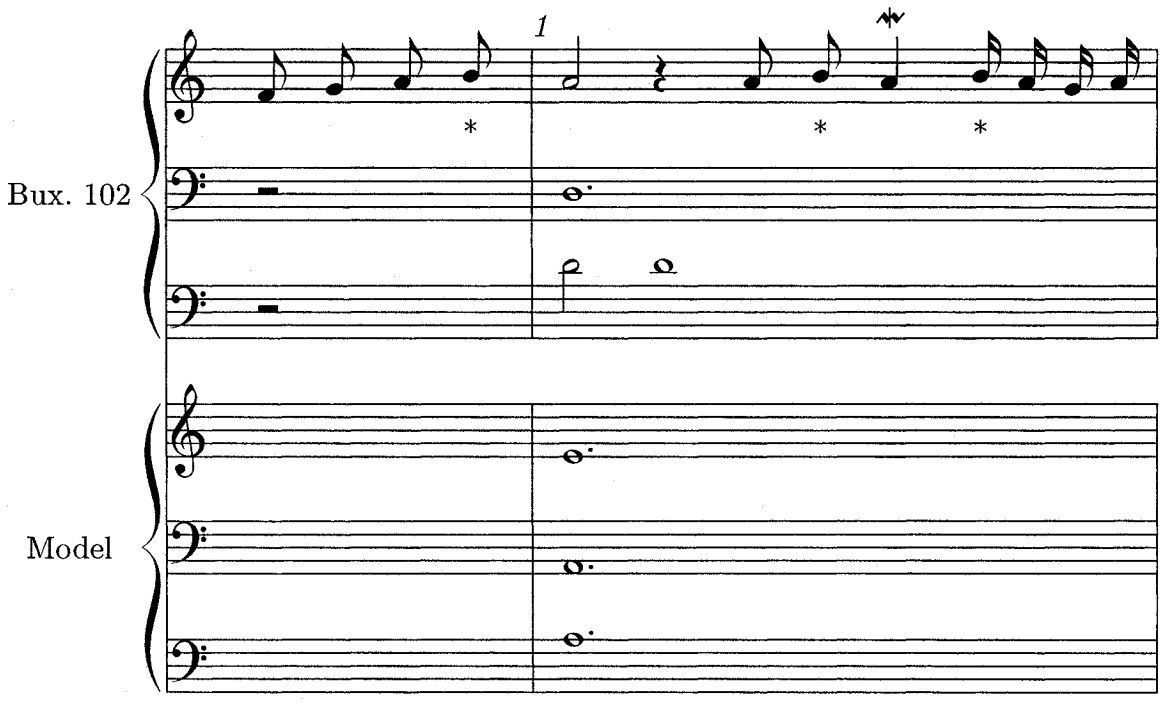
Cadences raise a large group of questions that are addressed in Chapter 5. How are cadential and non-cadential 6th-to-8va progressions distinguished? What factors contribute to the perceived strength of a cadence? Are leading tones regularly raised? How standard is a "double leading-tone"? Are "double-leading-tone" voice-leading situations regularly sharped? Do non-cadential 6–8 and 3–5 progressions receive raised leading tones? On A and D, are "phrygian" or "dorian" cadential progressions privileged? Does raising the leading-tone in an incomplete cadence (where one of the structural voices does not resolve normally) strengthen its cadence-ness? Can cadential ornaments help us know which cadences the intabulator thought were important? Buxheim can help provide some answers, if only by the sheer number of accidentals that are waiting to be counted.

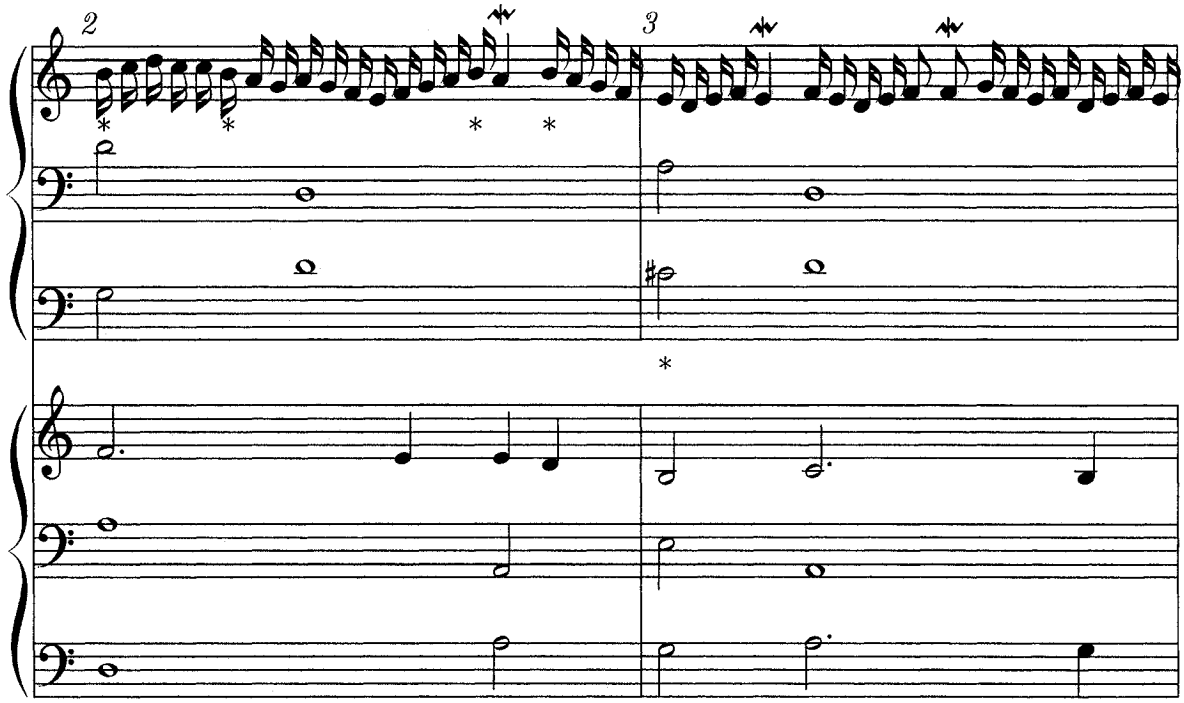
As briefly described above, Brothers offers a useful model for the categorisation of notated accidentals by their function. Such categorisation is needed for any type of statistical investigation. A similar system can be used to count accidentals in Buxheim intabulations and in surviving versions of their models. One difficulty with Brothers's model is that any single accidental can only be placed into one category. In the case of an accidental that could serve multiple functions, the person who is counting must decide which of the functions is most important. This pre-interpretation might distort the statistical results. I will refine this model to account for accidentals with multiple functions. A further elaboration of Brothers's categories and my refinements can be found in Chapter 4.

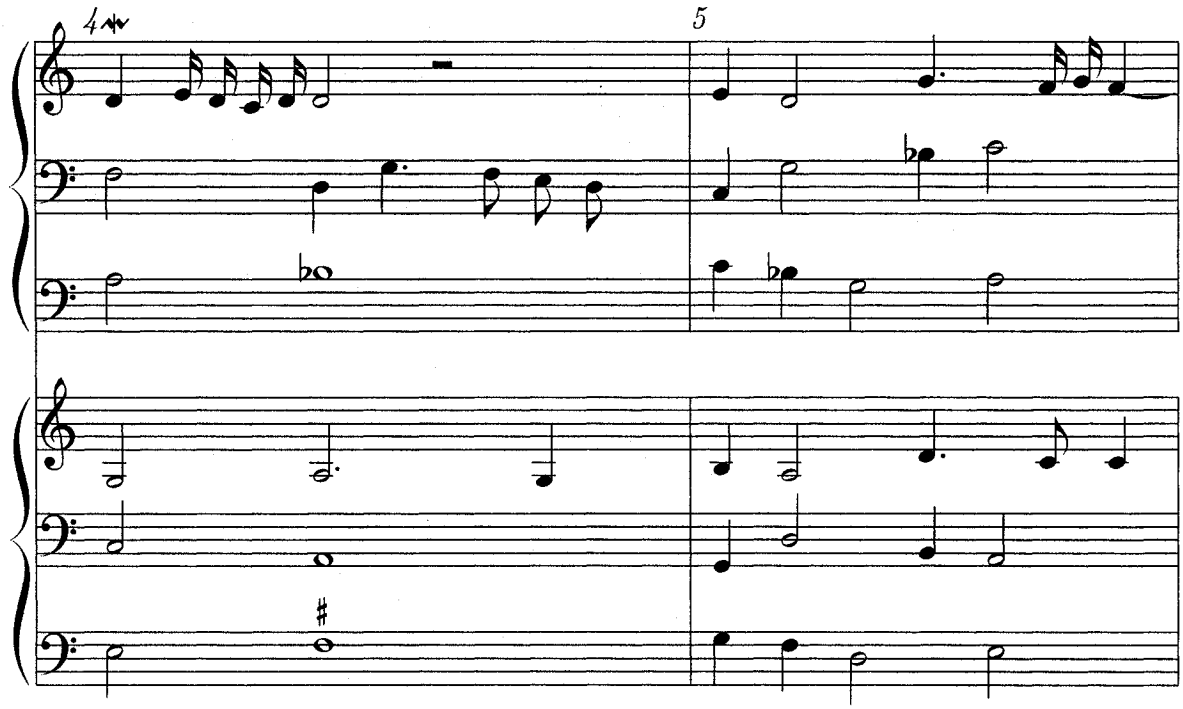
1.1.3. Illustration of *musica ficta* questions

To illustrate some of the questions posed above, I will briefly examine the accidentals in Binchois's *Esclave puist yl devenir* and its Buxheim intabulation (Figure 3, model after [Hanen, 1983]). *Esclave* survives in five sources: EscA, EscB, MuEm, RU1411, and Stras (now lost) [Fallows, 1999, p. 153]. There is no signature in any source, and the final is D. There are two pieces in Buxheim entitled *Esclaphe*: Nos. 101 and 102. Fallows suggests that No. 101, while it begins similarly to the chanson, is actually a different piece, perhaps very loosely based on the other. A closer examination shows this to be true.

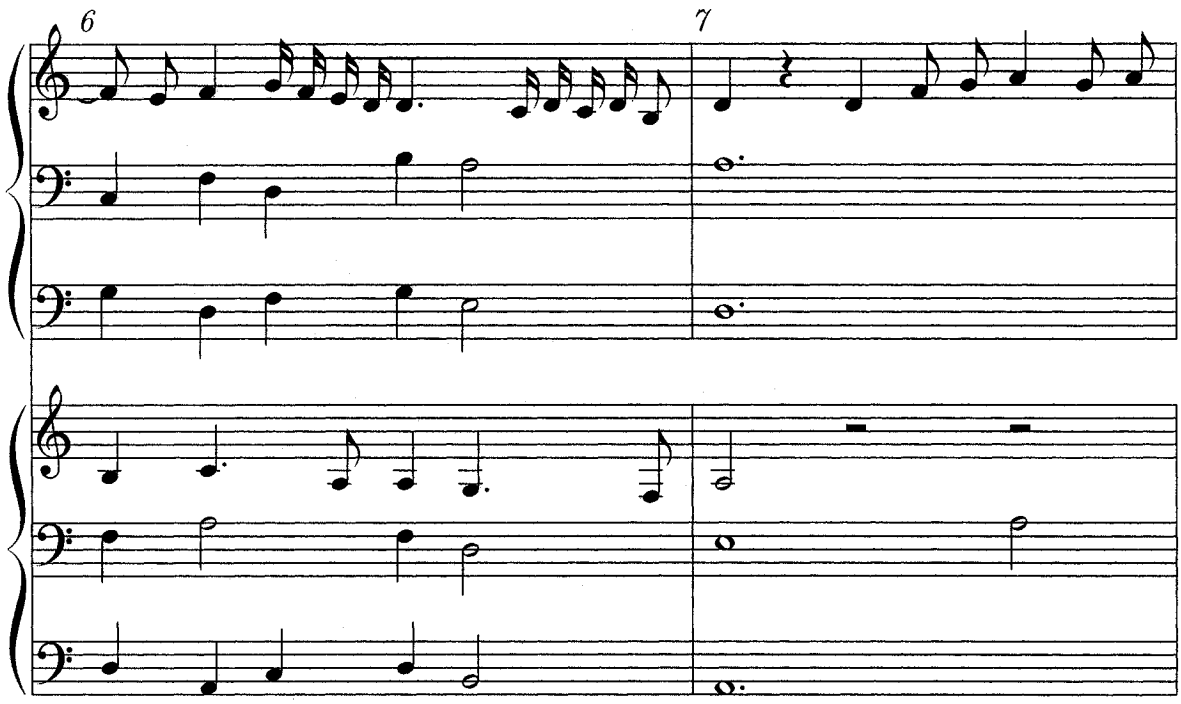
Figure 3. Binchois: *Esclave puist yl devenir*







Hanen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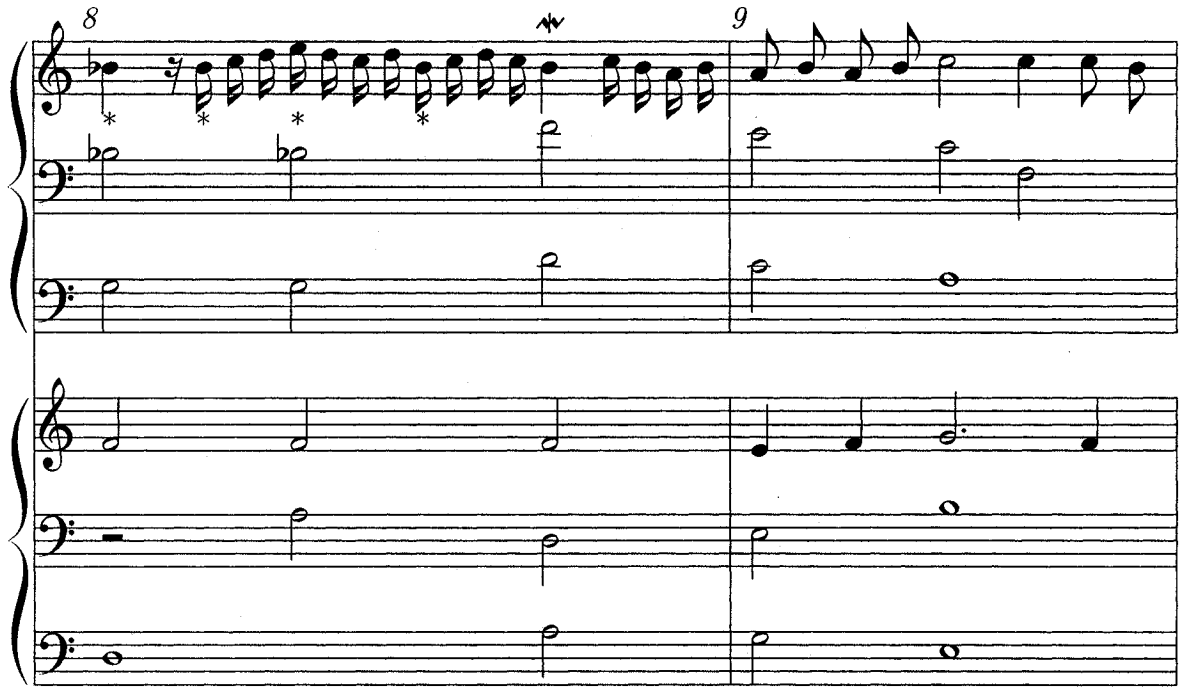
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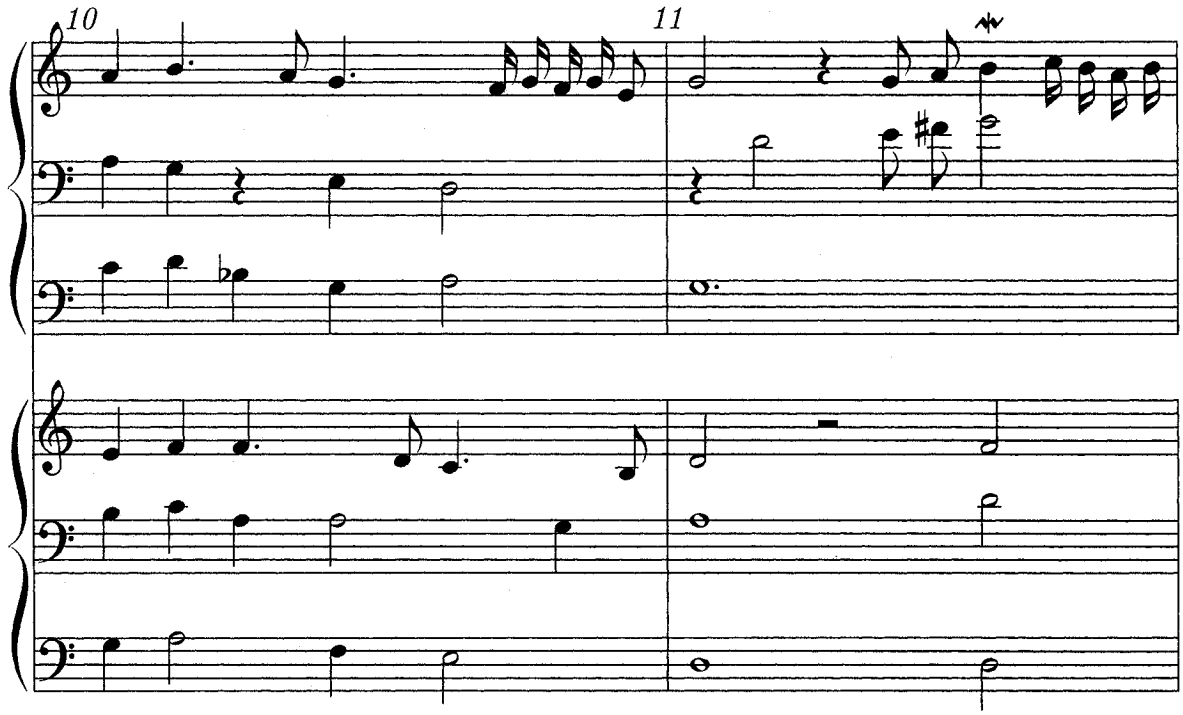
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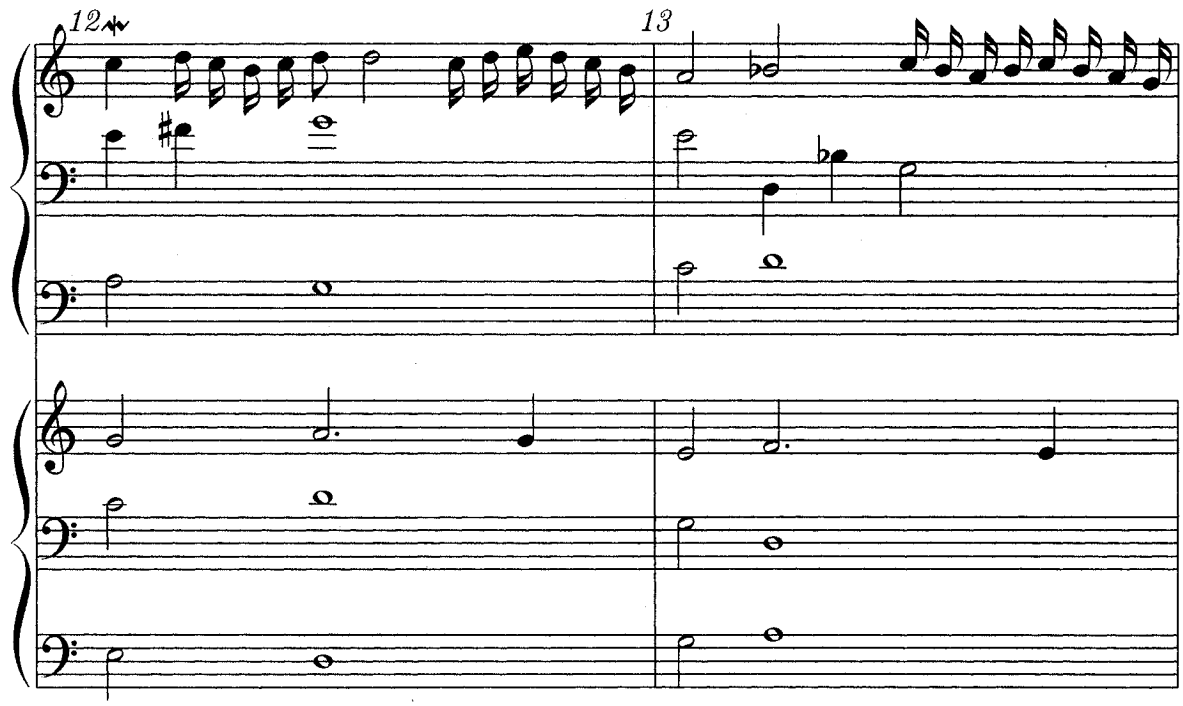
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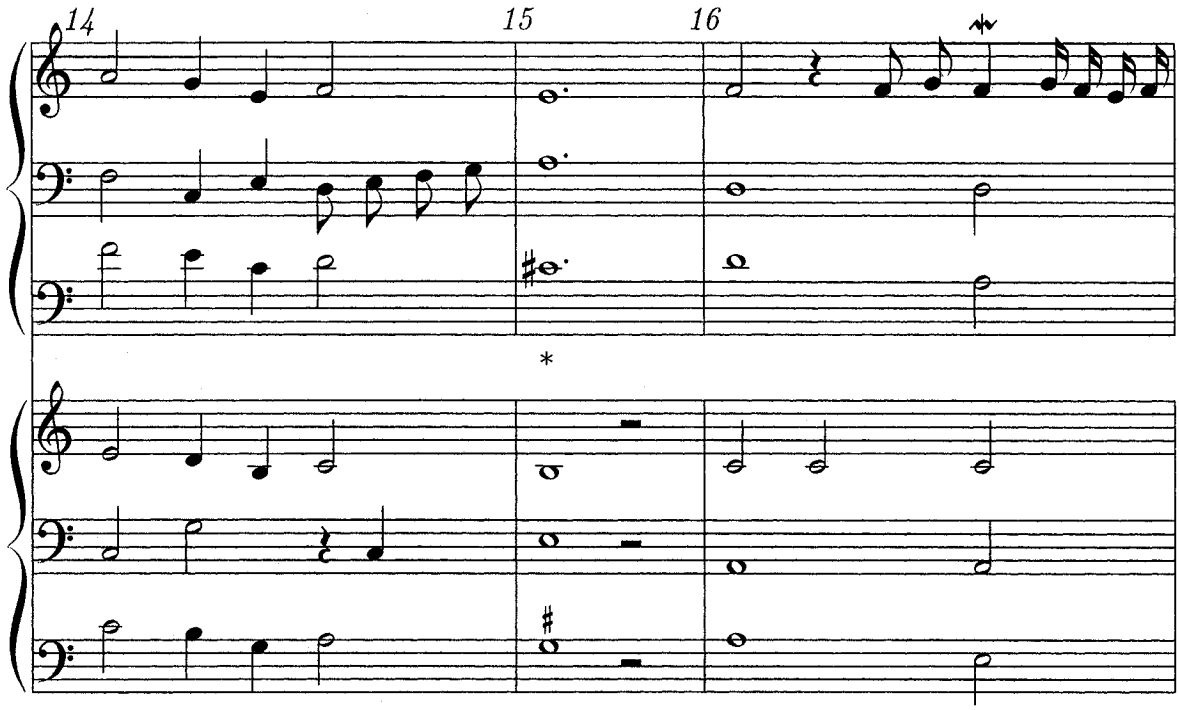
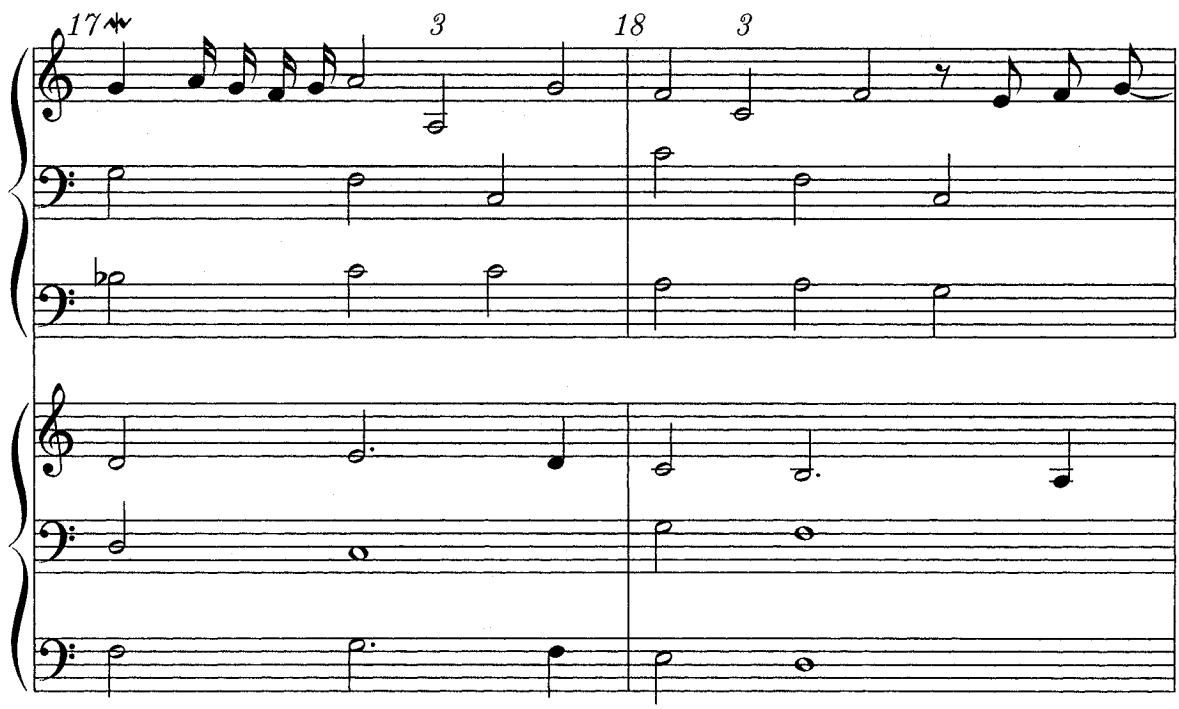
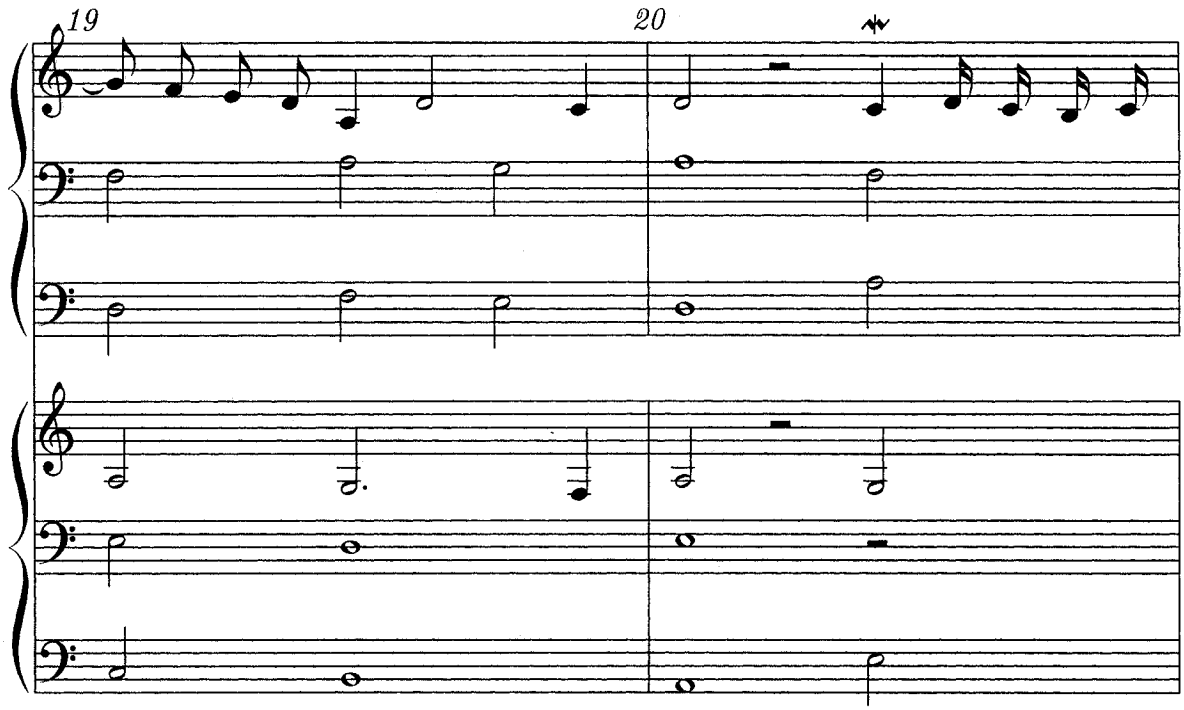


Hanen

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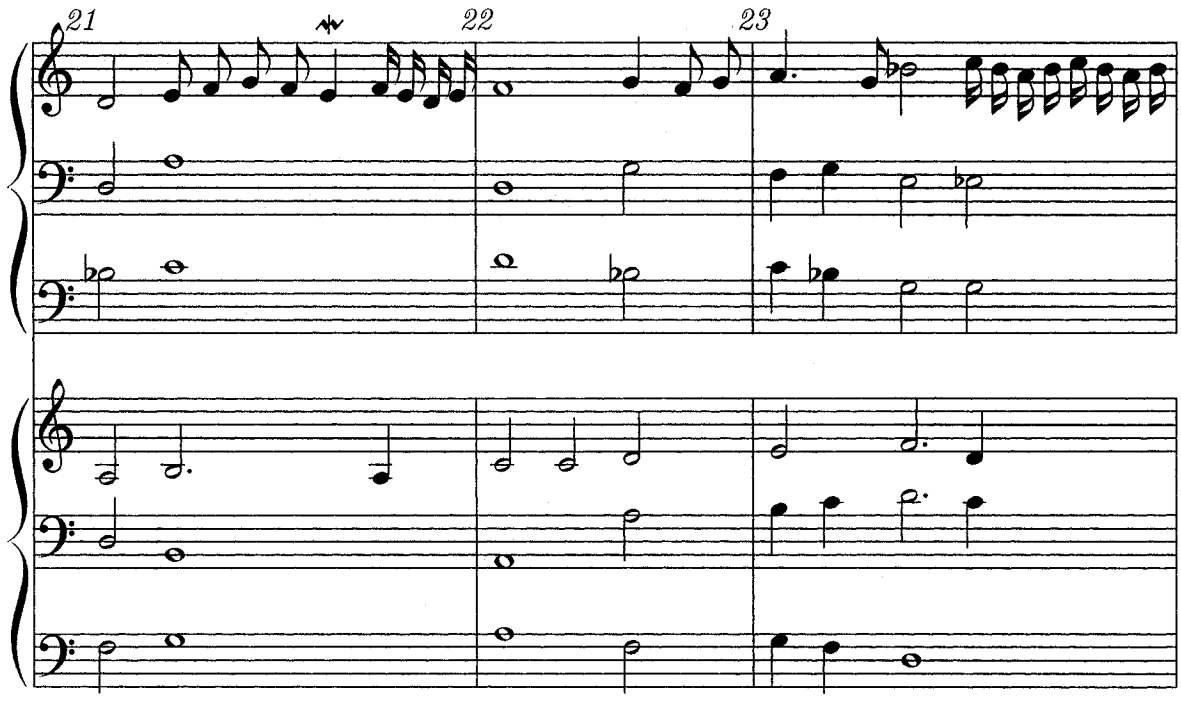
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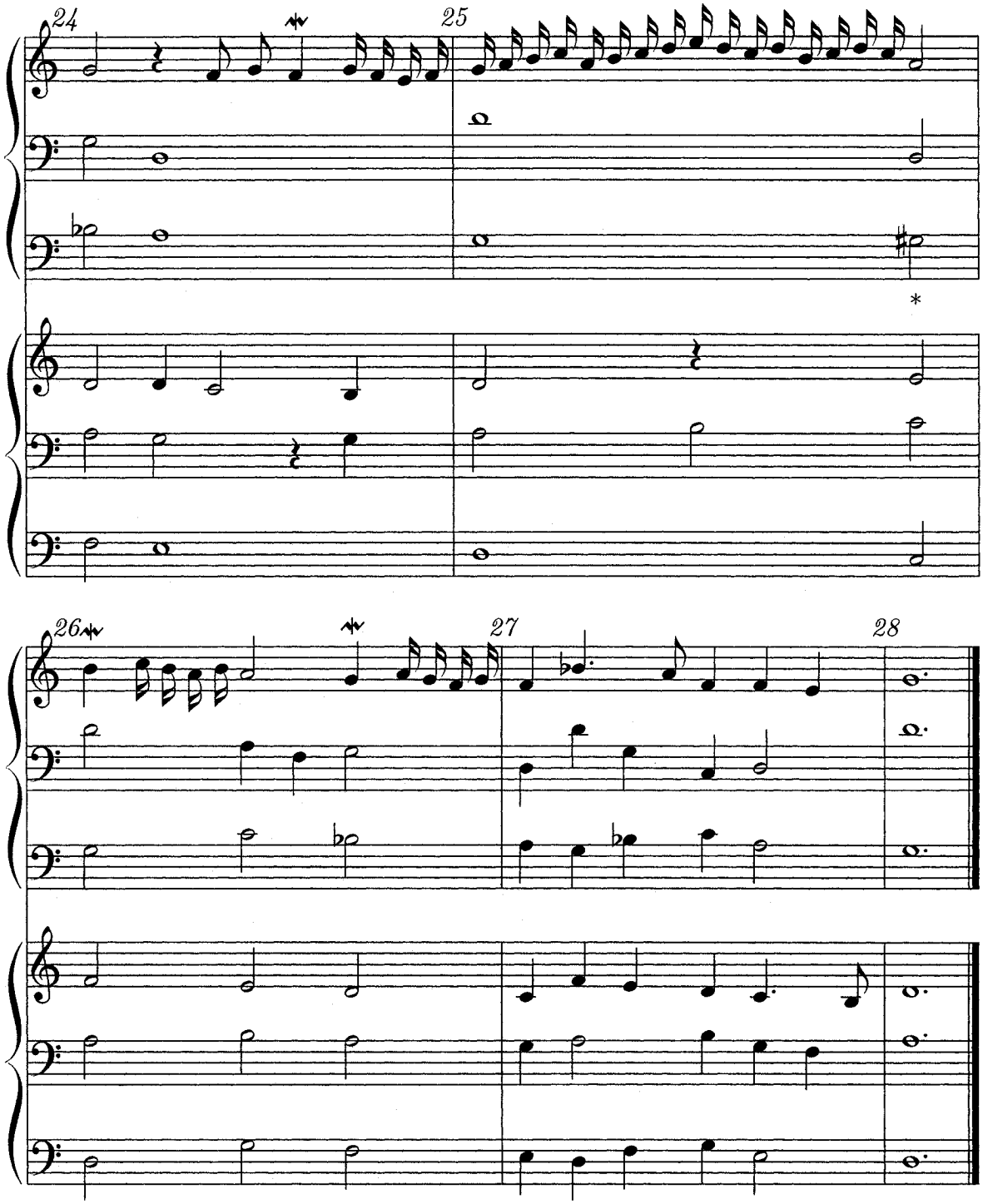

The Buxheim intabulation has been transposed up a fourth; thus, one would expect B♭s everywhere, to correspond to the F's of the model. In the tenor and contratenor, almost all B's are flat. The only exception is a B♮ in the contratenor in m. 6, which cannot be explained (as a transposed F♯) by any of Brothers's

function categories—it would simply seem to be a mistake. In her edition of EscA [Hanen, 1983], Martha Hanen suggests raising the F of the A–f sixth in m. 4 of the model, to go to the following G–g octave ("propinquity"), although this is not a cadence (when defined as a 6–8 progression of two voices). In the intabulation, this inflection is expressly avoided: the model's A–f to G–g becomes d–b♭ to c–c', perhaps implying that one should not raise the leading tone when the progression is not cadential.

There are three inflected notes in the Buxheim tenor (in the following discussion, notes under discussion are labelled with an asterisk under the corresponding staff). A "raised third" (Brothers's function 1.5) at the medial cadence (m. 15) corresponds to Hanen's editorial suggestion. Two sharps (mm. 3 and 25) would fall under Brothers's propinquity function 1.7, "evaded cadence". Finding more of these inflections, as well as more of the deliberately-uninflected propinquity situations described above, might support Brothers's idea that a performer or composer could be very selective in the application of certain functions, but perhaps not others.

The superius is the most interesting part. Again, one would expect B♭ throughout, to correspond to the model's F. However, the first signed B♭ appears in m. 8. No B's shorter than a quarter note (in the transcription) have been flatted. If one examines the superius for linear concerns, all previous B's could be flatted in one of three categories: forming part of a tritone outline (Brothers's category 5 "necessity", one occurrence in the pick-up measure), existing as upper neighbour to A or as top note of an outline (Brothers's category 2 "top note", four occurrences in mm. 1 and 2), or as a passing-note in a diminution in close proximity to another B that might be flatted (Brothers's category 4, "miscellaneous", two occurrences in m. 2). The first signed B♭ (m. 8) is in a rising passage that continues past the B♭; there is no real melodic reason to flat it, but the contratenor also has a B♭. None of the B's in the following ornamented passage are flatted, but avoiding melodic

tritones would involve flatting the E that is the peak of the passage, and consequently many of the B's that follow it. Other situations in the piece are similar. As noted earlier, fast notes in Buxheim do not tend to have signed accidentals. If the piece were not transposed, one might interpret the lack of B♭s in the superius to mean that Buxheim performers were happy to leave many "melodic concerns" uncorrected. However, since the B's should be flat just to correspond to the F's of the model, the opposite is implied: the intabulator thought that the melodic clues for flatting the B's were obvious enough that the flats were not necessary—most of them are exactly of the sort that Urquhart suggests Tinctoris thinks are automatic. We could conclude from this that B♭s should be added by the performer to correct melodic problems.

Already, examining a single piece suggests some interesting conclusions. However, only by a statistical analysis of a large repertory can we get a secure idea of what the norms of actual pratice of the Buxheim intabulators were.

1.2. Conclusion

The principal value of the Buxheim Organ Book lies in its sheer size and breadth of repertoire. Various repertories spanning several generations are brought together: originally-vocal pieces and keyboard pieces; French, German, English, and Italian pieces; sacred and secular pieces; and pre-composed pieces and pieces intended as examples of improvisation. This gives us hundreds of examples of interpretation from more-or-less the same time and place. Most of the recent studies on fifteenth-century performance practice issues focus on very small groups of pieces. While many interesting questions are posed and intriguing answers are suggested, the small sample groups force a certain degree of caution.

I will examine the transmission of accidentals in Buxheim and all its concordances to establish the priorities of the Buxheim intabulators: to which conventions did they subscribe? What attitudes towards tonal system, cadential hierarchy, and accidentals can be discerned?

To find accidental-signing patterns, I use a statistical approach modelled on that of Brothers. The very large number of pieces and potential *ficta*-situations to be analysed suggested the use of computer tools. David Huron's Humdrum Toolkit (described in Chapter 2) provides many programs for the manipulation of musical data; to complement these, I have written several programs for the identification of specific contrapuntal structures in Renaissance counterpoint.

With this analysis of the large repertoire contained in Buxheim, I hope to provide a clearer set of guidelines on what Renaissance musicians did—and how they arrived at their decisions.

Chapter 2
Method

2.1. The Humdrum Toolkit and Kern Representation

Since the number of pieces in Buxheim and its concordances is very large (there are a total of 496 data files, including 228 concordances; some of the *funadmenta* are split into several files), and the examination tasks involved are repetitive in nature, I chose to use a set of computer analysis tools to process the pieces and assemble the resulting data into a database for analysis. The Humdrum Toolkit was developed during the 1990s by David Huron *et al.* at Ohio State University.[8] In this section, I describe the encoding used to represent music for this Toolkit, some ways in which questions can be posed, and the limitations of the Toolkit for this type of study. As will become clear, the original notation of the pieces—in particular the questions about the irregular transmission of the accidentals that makes them so interesting—causes problems, my solutions to which I will explain below.

[8] The Humdrum syntax (including the most standard representations) and use of the Toolkit are described in [Huron, 2002].

2.2. The Kern Representation

Under Humdrum, music can be represented in any number of ways, depending on what information one is interested in. All these possible representations are similar, in that the data are stored in parallel columns called spines, where columns represent concurrent events in time, and rows represent consecutive events in time. For example, in one of the most common representations, `**kern`, each voice of a polyphonic work would be placed in a spine, which progress together down the page to reflect the passage of time. Each event in a voice is represented by a "data token" that can indicate duration, pitch, and various other details such as articulation marks and phrasings. Other representations can be used to indicate other sorts of information. For example, the `**semits` representation records semitone distance from middle C rather than pitch, `**deg` records scale degrees, `**fret` records tablature for fretted instruments, and `**harm` records Roman numeral analysis. These and several other representations are considered more-or-less standard, and some of the tools are dedicated to converting between them or processing them specifically, but one can make up a representation for any type of information one chooses, for example, fingerings, dance steps, sackbut slide positions, and even the point in one's score when the organ-bellows operators decide they've had enough of those interminable *fundamenta* and nip out for a beer. This is to say that unlike in a standard music notation programme, one is not limited by what the software developers think one should be able to represent: if an event can be represented, it can be processed.

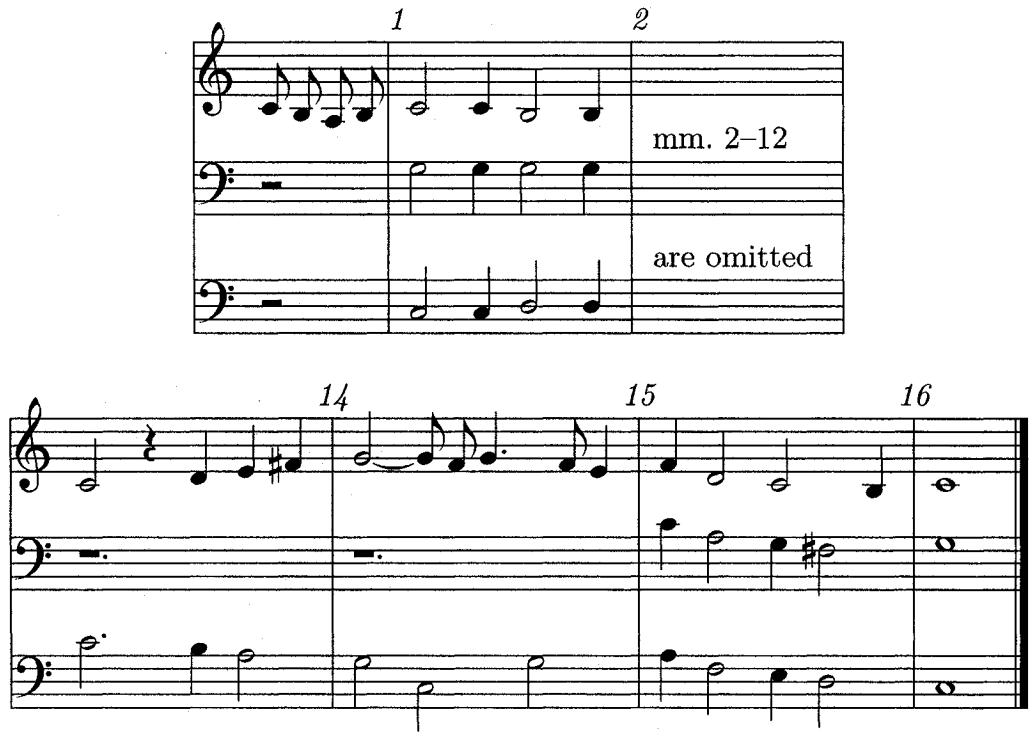

Figure 4. Buxheim No. 25: *Min hertz das hatt sich ser gefrowet* (excerpts)

Figure 4 and Figure 5 show how a simple Buxheim piece might be encoded in the `**kern` representation. After explaining the basic features of the syntax, I will point out the problems specific to our analytical tasks. The note values have been halved in relation to the notation of Buxheim, so that a semibreve is always a half note (as in Wallner's edition), an imperfect breve can be represented by `1` (a whole note), and a long by `0` (a double whole note; the longest value available under `**kern`). Pieces from vocal notation have been encoded in the same way, at the level of "semibreve = half note".

```
!!!ONM: 25
!!!OLT: Min hertz...
!!!COM: anon.
**kern    **kern    **kern
*tenor    *contra   *sup
*clefF4   *clefF4   *clefG2
*k[]      *k[]      *k[]
%*M3/2     *M3/2     *M3/2
*C:       *C:       *C:
2r        2r        8c
.         .         8B
.         .         8A
.         .         8B
=1        =1        =1
2C        2G        2c
4C        4G        4c
2D        2G        2B
4D        4G        4B
=2        =2        =2
(Measures 2–12 have been omitted)
=13       =13       =13
2.c       1.r       2c
.         .         4r
4B        .         4d
2A        .         4e
.         .         4f#
=14       =14       =14
2G        1.r       [2g
2C        .         8g]
.         .         8f
.         .         4.g
2G        .         .
.         .         8f
.         .         4e
=15       =15       =15
4A        4c        4f
2F        2A        2d
4E        4G        2c
2D        2F#       .
.         .         4B
=16       =16       =16
1C        1G        1c
==        ==        ==
*-        *-        *-
```

Lines beginning with `!!!` are comments. Here, they indicate the piece number (25), title and composer (anonymous). Other comments (not shown here) are used to list manuscript, date, mensuration, final, *et al.*, and are useful for assembling inventories or isolating which group of pieces is to be searched.

Asterisks indicate information that helps the Toolkit process the various spines. Double-asterisk lines are "exclusive", meaning that only one of these can be in effect in a given spine at a given time. In this case, `**kern` indicates that the `**kern` representation is being used. Single-asterisk lines are "tandem", meaning that several of these can be in effect at once. For example, in the left-most column, the spine name (`*tenor`), the clef (`*clefF4`), the key signature (`*k[]`, meaning none), and the key (`*C:`, referring to the final) all apply to the whole column.

Barlines are indicated by an equals sign, followed by the measure number. These let me refer quickly between score (of the transcription) and representation, and do not affect the analyses in any way.

Notes are indicated by a combination of number and letter. At the beginning, the tenor and contra both have a half-note rest (`2r`), while the superius has four eighth notes. The octave above middle C is indicated by lower-case letters (and each higher octave by adding more letters: `cc`, `ccc`), and the octave below middle C is indicated by upper-case letters (and each lower octave by more letters:`CC`,`CCC`). The periods in the tenor and contra during the second to fourth eighth notes indicated that nothing new is happening in the tenor and contra: the rest is still in effect.

There are F♯s in measures 13 and 15. A double sharp would be `F##`, and a flat is shown by a minus sign: `B-`,`B--`, or even `B---`.

In measure 14, the two G's in the superius are tied using square brackets. In the same measure, the contra has a dotted whole rest: `1.r` (the period between number and letter indicates the dot).

The doubled equals sign after measure 16 represents a double bar line, and the `*-` at the end of each column indicates the end of each spine.

Figure 5. Buxheim No. 25, encoded (excerpts)

No symbol has any significance beyond the one the computer understands; thus, I can define the metre designation `3/2` as the mensuration "circle" and the key designation `C:` as referring to pieces with a C final rather than in C major, and, for example, search all my files to find all C-final pieces that are in "circle". I could have used a different interpretation (e.g. `*final`) to designate the final, but some of the Tools require a key to be indicated, and for our purposes it does not matter if the symbol actually refers to a key or a final (none of the combinations of Tools used will attach any sort of functional-harmonic implication to the key indication). For ligatures, we can use rounded brackets, the `**kern` symbol usually used for slurs.

2.3. Representing Manuscript Accidentals

Next, consider the following extract of a polyphonic chanson (Binchois's *Qui veut mesdire*, as found in the Reina Codex.

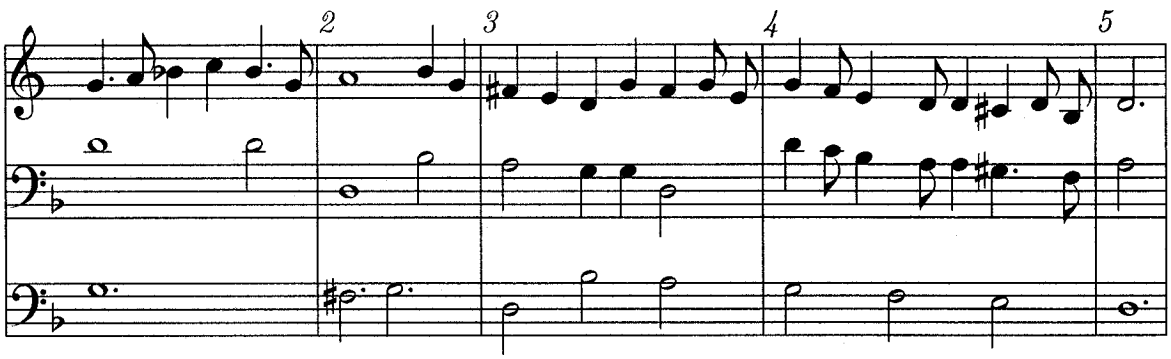

Figure 6. Binchois: *Qui veut mesdire* mm. 1–5,
Reina f. 101'–102

Note that the tenor has a B♭ in measure 3, and the contratenor has one in measure 2, and a second in measure 4. For the Toolkit to perform some of its operations (such as calculating melodic intervals), all the accidentals must be signed beside each note they apply to, regardless of whether or not they are already indicated by the signature at the beginning (here, tenor and contratenor both have a signature flat). Thus, for counting manuscript accidentals, we need to indicate if an accidental is marked because of the signature, or because it is internally signed. An `S` beside the accidental indicates that the accidental is from the signature, and an `I`, that it is internal. Thus, a redundantly signed accidental would be marked `SI`.

Here is the beginning of *Qui veut mesdire*, with added indications for accidental types:

```
**kern **kern **kern
*tenor *contra *sup
*k[b-] *k[b-] *k[]
=1      =1      =1
1.G     1d      4.g
.       .       8a
.       .       4b-I
.       .       4cc
.       2d      4.b
.       .       8g
=2      =2      =2
2.F#I   1D      1a
2.G     .       .
.       2b-S    4b
.       .       4g
=3      =3      =3
2D      2A      4f#I
.       .       4e
2B-S    4G      4d
.       4G      4g
2A      2D      4f
.       .       8g
.       .       8e
=4      =4      4=
2G      4d      4g
.       8c      8f
.       4B-S    4e
2F      .       .
.       8A      8d
.       4A      4d
2E      4.G#I   4c#I
.       .       8d
.       8F      8B
=5      =5      =5
1.D     2A      2.d
.       4A      .
.       4A      2.r
.       2A      .
=6      =6      =6
*-      *-      *-
```

Figure 7. Binchois: *Qui veut mesdire* mm. 1–5, with accidental markers

2.4. Other Issues of Manuscript Representation

For a study involving among other things the interpretation of scribal peculiarities, there are other useful pieces of information (in addition to different types of accidentals). As mentioned earlier, the slur symbols of `**kern` can be re-interpreted as ligatures. I devised another interpretation, called `**fol`, to contain other details of notation related to the manuscripts. It contains mainly folio numbers and line breaks, which can be relevant in a dicussion of the duration of accidentals.

Often, a manuscript is damaged or illegible in places. `**kern` already provides a symbol (the letter x) for editorial uncertainty, but it is better to have a little more information when evaluating the reliability of the data. Therefore, each dubious note is marked with an `x`, and the `**fol` spine contains a brief comment explaining the nature of the problem. Common annotations found here are "blob", "missing", and "probably third too high". Notes of uncertain rhythmic value (such as longs at the ends of sections) are also labelled, as are instances of creative editorial interpretation of incompetent mensural practice.

Occasionally, an editorial difficulty applies to the whole piece. For example, a signature might be missing on one system only, or the contratenor might be in the wrong clef. In such situations, the necessary correction has been made, but the situation has been annotated in a global comment near the beginning of the file. In the process of running tests, then, such annotations can be gathered and consulted if necessary.

2.5. Data Entry

Most of the pieces were entered into the computer using a MIDI keyboard, and converted to Humdrum format using a MIDI-to-Humdrum conversion program written by Ian Knopke. Sufficient copies were made of each file for all concordances, and then all manuscript variants, `S/I` indicators for the accidentals, manuscript errors, *et al.* were entered by hand, from photographic reproductions of the manuscripts (including Buxheim). The entire process took nearly a year and a half to complete, and yielded 496 data files (including the 228 concordances). [9]

Only those concordances which shared at least superius and tenor in common with Buxheim were included, and at least a few measures of both voices had to be intact. Thus, concordances in which only one voice survives were discarded, as were single-voice incipits. Other settings of the same tenor were similarly discarded, with the exception of a few settings from Loch (where it is hard to tell if they are concordant intabulations of the same polyphonic setting, or different settings entirely).

---

[9] Humdrum allows us to show alternate readings of a passage (such as manuscript concordances) by letting us split a spine of data into several spines, which can rejoin later. Strophic passage initiators (`*strophe`) and strophic passage terminators (`*S-`) are used to show that several concurrent spines (splitting from a common spine) represent several alternative paths through the passage. Each of the alternative spines receives its own label (for our purposes, the manuscript name), and its own strophe end indicator (`*S/fin`). Unfortunately, at this time, only one spine at a time can be split into strophes, and strophic passages cannot be nested. For this reason, each concordance of a piece has to be put into a separate file.

2.6. Asking a Question in Humdrum

After all the pieces have been entered, we can ask our questions. Individual Humdrum Tools are invoked from the Shell command line—just like (and in combination with) regular UNIX commands. Each Tool by itself has a simple function, such as translating all the pitches into semitone-distances from middle C, translating the `**kern` spines into spines of melodic intervals, or lists of harmonic intervals. Other Tools allow the user to pull out only those data that are of interest.

To show how one can combine these Tools, we will go through the steps of answering a fairly simple question: "How many B's that are top tones in a melody have signed flats?". All UNIX and Humdrum commands go through input files line by line, treating each line as a "data record". This means that a search tool finds those lines that have the desired set of circumstances. Therefore, the data need to be arranged in such a way that all the information required to answer a particular query needs to appear on one line.

First, we pull out one voice from the two-voice occasional motet *Noodle-Piece*[10] (in this case, the rather noodly superius), using the extract command.

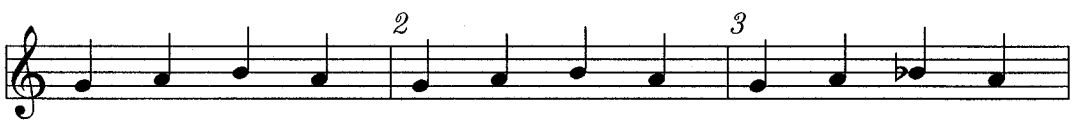

Figure 8. *Noodle-Piece*: superius

[10] The occasion of its composition being the writing of this chapter. The tenor goes like this: `b a g a b a g a b- a g a.`

```
**kern
*sup
*G:
=1
4g
4a
4b
4a
=2
4g
4a
4b
4a
=3
4g
4a
4b-
4a
==
*-
```

```
extract -i '*sup' noodlepiece > temp1
```

(from the file "noodlepiece", pull out the spine with the interpretation *sup and put it in a file called "temp1")

Figure 9. Extract the superius of *Noodle-Piece*

Then, we need to convert the **kern data into a useful format. As it stands, we could find B's easily enough, but we would not know how they were approached or departed from. The deg command changes the data to scale degrees (the **deg interpretation)—very helpfully, deg indicates the direction of approach by a symbol beside the number: v means "from above", and ^ means "from below".

```
**deg
*sup
*G:
=1
1
^2
^3
v2
=2
v1
^2
^3
v2
=3
v1
^2
^3-
v2
==
*-
```

```
deg temp1 > temp2
```

(translate the spine in "temp1" to scale degrees, and put it in a file "temp2")

Or, both steps in one:

```
extract -i '*sup' noodlepiece tee temp1 | deg > temp2
```

(pull out the `*sup` spine, put it in "temp1", and also send it to the `deg` command and put the result in "temp2")

Figure 10. *Noodle-Piece* converted to scale degrees

Now, we could reassemble the `**kern` spine and the `**deg` spine, and look for B's again. Along with finding the B's, we would learn how each B was approached.

```
**kern **deg
*sup    *sup
*G:     *G:
=1      =1
4g      1
4a      ^2
4b      ^3
4a      v2
=2      =2
4g      v1
4a      ^2
4b      ^3
4a      v2
=3      =3
4g      v1
4a      ^2
4b-     ^3-
4a      v2
==      ==
*-      *-
```

```
assemble temp1 temp2 > temp3
```

(put "temp1" and "temp2" in parallel spines)

Searching for B's would return

```
4b      ^3
4b      ^3
4b-     ^3
```

Figure 11. *Noodle-Piece*, pitches and scale degrees

Since, as mentioned earlier, a search finds only things that are together on one line, we learn only how the note was approached, not how it was left. Thus, we also need to know how the note after each B was approached. We can do this using the context command. An option allows us to specify how many successive records we want to see on each line.

```
**deg
*sup
*G:
=1 1
1 ^2
^2 ^3
^3 v2
v2 =2
=2 v1
v1 ^2
^2 ^3
^3 v2
v2 =3
=3 v1
v1 ^2
^2 ^3-
^3- v2
v2 ==
.
*-
```

For each note, we want to know the direction of approach for the following line as well, so we ask for two records to be placed side by side.

```
context -n 2 temp3
```

We can also concatenate this with the previous command:

```
assemble temp1 temp2 | context -n 2
```

Figure 12. Successive scale degrees of *Noodle-Piece* on each line

Now, we reassemble the **kern and contexted **deg spines. Then, we search for B's that are approached from below (^), and that approach the next note from above (v).

```
**kern  **deg
*sup    *sup
*G:     *G:
=1      =1 1
4g      1 ^2
4a      ^2 ^3
4b      ^3 v2
4a      v2 =2
=2      =2 v1
4g      v1 ^2
4a      ^2 ^3
4b      ^3 v2
4a      v2 =3
=3      =3 v1
4g      v1 ^2
4a      ^2 ^3-
4b-     ^3- v2
4a      v2 ==
==      .
*-      *-
```

We want to find any characters, followed by a `b`, followed eventually by `^` , followed eventually by `v`:

```
grep '.*b.*^.*v'
```

This will return

```
4b      ^3 v2
4b      ^3 v2
4b-     ^3 v2.
```

We can also ask the search to count the number of occurrences, rather than listing them:

```
grep -c '.*b.*^.*v'
```

which returns three top-tone B's. Then, we can ask it to count only B♭s that are top tones:

```
grep -c '.*b-.*^.*v'
```

and we find out that one of the three top-tone B's has a flat.

Figure 13. *Noodle-Piece*, pitches and successive scale degrees

This is a very simplified example; in most cases, a considerable amount of editing would have to be done to eliminate unwanted information, such as barlines, comments, or unnecessary components of the note information. This is usually done with a stream editor—the UNIX sed or Humdrum humsed command—which non-interactively edits a file according to instructions provided in the command line or in a template file. For example, in our noodle-piece above, we did not really need to know about the rhythms in the `**kern` spine or the scale degrees in the `**deg` spine. In this example, it did not make a difference, but we could have used a stream editor to remove all the numbers.

In the following example, the presence of the numbers does make a difference. The noodle-piece has been translated into semitone-distance from middle C. On the right, the rhythms are still present, and the resulting numbers are absurd (the 4s representing quarter-note values are adjacent to the semitones, making it appear that the notes are 47 or 49 semitones above middle C, for example); on the left, the

rhythms were removed before the translation to semitones.

```
**semits   **semits
*sup       *sup
*G:        *G:
=1         =
47         7
49         9
411        11
49         9
=2         =
47         7
49         9
411        11
49         9
=3         =
47         7
49         9
410        10
49         9
==         ==
*-         *-
```

`semits noodlesuperius`

versus

`humsed 's/[0-9]//' noodlesuperius | semits`

(replace all elements of the set [0–9]—all digits—with nothing, and translate the result to semitones)

If we have a long, complicated sequence of commands that we need to use many times, we can put them all in a file that can be invoked as a program, a "shell script".

Figure 14. *Noodle-Piece* translated into semitones

Data entry is very time-consuming; however, once it is accomplished, Humdrum questions themselves can be run very quickly. Furthermore, the representation scheme developed is very comprehensive, containing details of line breaks, scribal errors, as well as the pitches, rhythms and accidentals relevant to this study. This means that the data are ready and waiting for new sets of questions.

2.7. The New Tools CADFIND and PHRASEFIND

Many of our questions regarding *musica ficta* compare events at cadential progressions to events at cadences of varying degrees of significance. For example, we might ask if a leading-tone is raised more often at phrase-ending cadences than at mid-phrase sixth-to-octave progressions, or if final cadences receive more added sharps than medial cadences. At first, I attempted to label manually the cadences in the pieces, assigning a value based on how strong I felt the cadence was. This was not only enormously time-consuming, but problematic, because the factors influencing my decision of a cadence's importance were hard to quantify. Accordingly, I decided to automate both the identification of cadential progressions and the identification of factors influencing the perceived importance of a cadence.

2.8. Defining Cadences

We need to have a working definition of cadences before we can start counting or ranking them. At its most basic, a cadence is a 6–8 or 3–1 (10–8) interval progression, involving two voices (hereafter referred to as the structural voices), usually the superius and tenor. Most frequently, this progression is decorated with a 7–6 (or 2–3) suspension, and the top voice often has one of several stereotypical ornamental patterns.

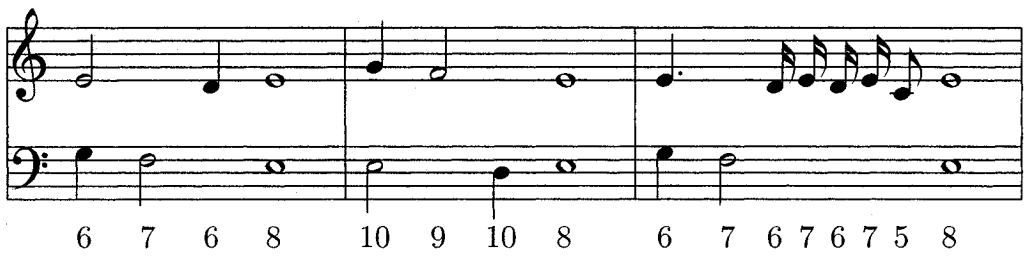

Figure 15. Basic cadential structures; common superius ornament

Various types of voice-leading in the third voice provide further opportunities for differentiation. At the surface level, form in chansons is determined predominantly by the poetic structure of the text, with each line usually corresponding to a musical phrase. Often, the superius rests after each phrase. This gives us three convenient groups of cadences: final cadences (which do not normally contain thirds), mid-point or medial cadences (in ballades and rondeaux), and cadences of individual phrases. Further, we have many situations of phrase-internal cadential-style voice-leading which do not seem to serve any form-articulating cadential purpose.

Dennis Slavin has investigated the correlation of form and cadential structure in the chansons of Binchois. He found that in his early songs, Binchois consistently differentiates between types of voice-leading at mid-point and final cadences;

specifically, he favours contratenor octave-leap cadences for the final cadences, and reserves them for cadences to the same pitch as the final [Slavin, 1992, pp. 350 and 353]. In later pieces, he shifted to using "incomplete" cadences, in which the cadential sonority includes a third, for the mid-point cadences [Slavin, 1992, p. 359]. To Slavin, this development is fundamental. At first, Binchois is arbitrarily imposing a hierarchy on voice-leading types that are used interchangeably by his contemporaries, establishing contrast between mid-point and final cadences, and contrast between cadences on different pitches [Slavin, 1992, p. 353]. Then, he begins to use cadence types that are inherently unequal in weight—"position within the cadential hierarchy no longer is determined by context" [Slavin, 1992, p. 360]. In general, Slavin finds that this precise concern with cadential hierarchy is peculiar to Binchois.

Transferring Slavin's approach—counting voice-leading types—directly to Buxheim would at first seem problematic. After all, most of the voice-leading differences are likely to be found in the contratenor, which is most frequently altered or rewritten entirely. Nevertheless, we can study the resulting voice-leading patterns, and see how they differ, and if any changes are made consistently. This would, of course, tell us more about the concerns of the intabulator than of the composers. Observations about favoured voice-leading types in Buxheim and the concordances (discussed in relation to their accidental-signing patterns) are discussed in Chapter 5.

2.9. CADFIND

The cadence identifier (CADFIND) locates all expanding sixth-to-octave (or 13–15) and collapsing third-to-unison (or 10–8) progressions between all pairs of voices. It identifies such progressions even through obscuring ornaments.

On the surface, this task is very simple: (1) we check if a sixth (or third) between two voices is (2) followed by a simultaneously-attacked octave (or unison) between the same pair of voices. To avoid identifying octaves approached by similar or oblique motion as cadences, we check that (3) the bottom (or top) structural voice of the cadence has fallen by a step.

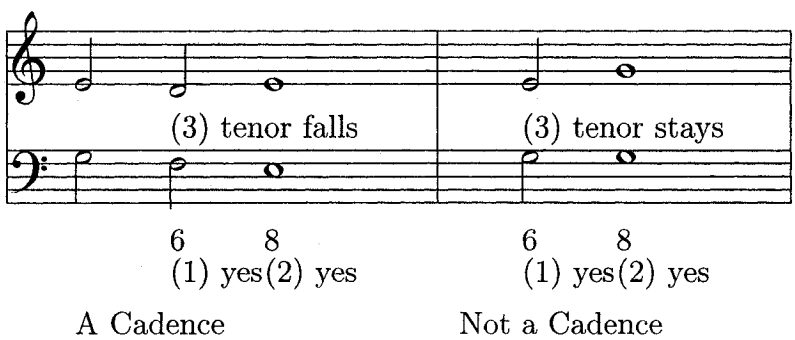

Figure 16. Finding a simple 6–8 progression

Unfortunately, in one of the most common melodic ornaments in 15th-century music, the Landini cadence, the simultaneity immediately preceding the cadential octave is a fifth instead of a sixth (Figure 17).

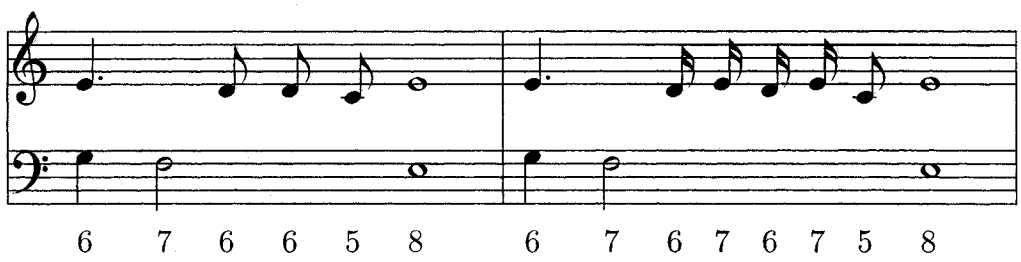

Figure 17. A Landini cadence, where the octave is approached from a fifth

Thus, our search algorithm needs to be a little more sophisticated. CADFIND accomplishes its task in three steps. The following examples show the process of identifying an expanding 6–8 progression between tenor and superius, where we expect the tenor to step $\hat{2}$–$\hat{1}$ and the superius to step (through ornaments) $\hat{7}$–$\hat{8}$.

1. Was there ever a sixth above the current tenor note? If a sixth is found, its existence is "remembered" until the tenor note changes (Figure 18). In this way, even if the interval immediately preceding the octave is a fifth, the underlying 6–8 progression will be identified.

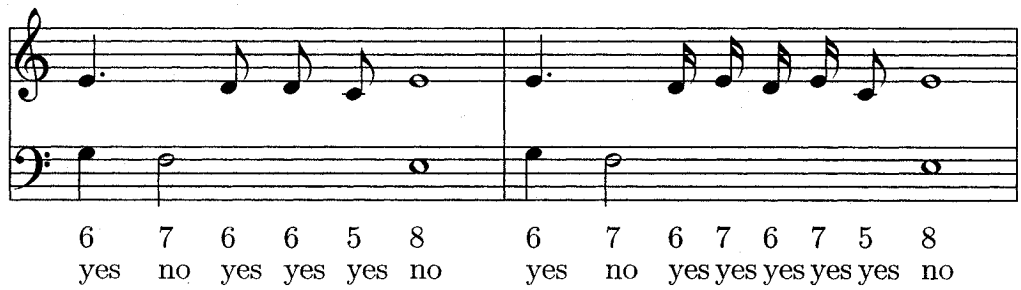

Figure 18. Once a sixth is found above the tenor, it is remembered

2. Does the tenor fall by a second at the end of its current note (Figure 19)?
3. Do both voices arrive simultaneously on an octave?

A *simultaneous* arrival is required in order to eliminate 9–8 (2–1) suspensions, such as in the three-voice Figure 21, where the contratenor and superius collapse

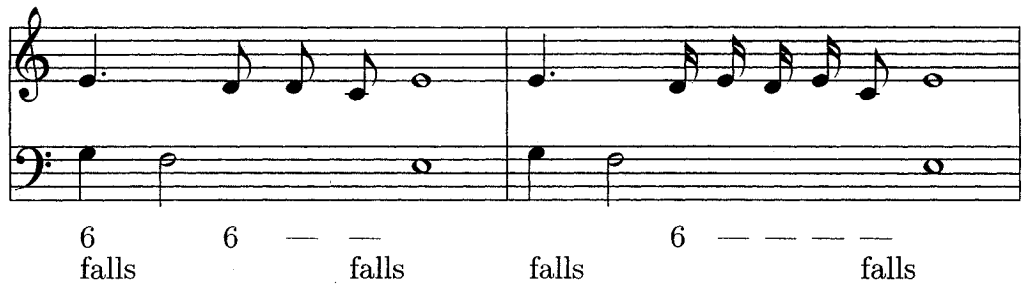

Figure 19. We check if the tenor falls by a second

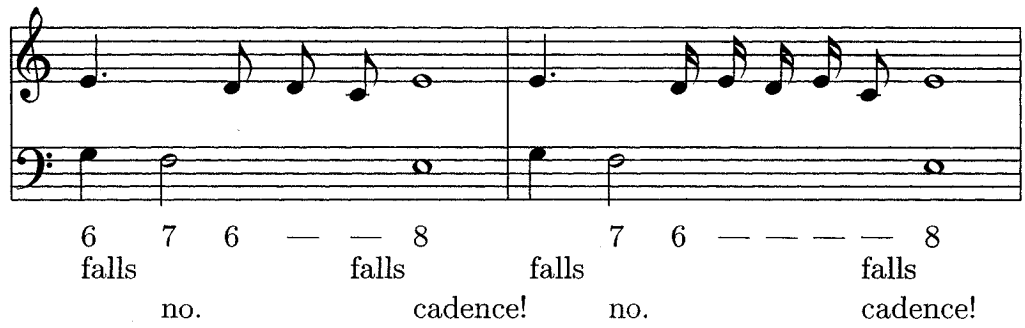

Figure 20. We check if both voices arrive together on an octave

from a third to a unison. The down-stepping voice (the superius) arrives on the octave *after* the other voice has reached the same pitch, therefore it is not a cadence.

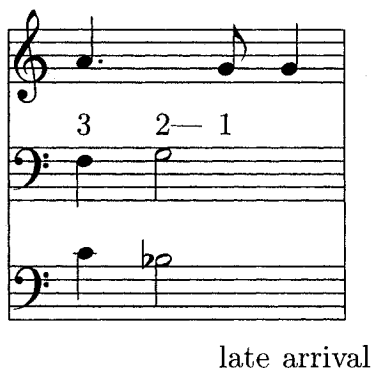

Figure 21. 9–8 suspension, not cadential progression

By insisting on a simultaneous arrival on the cadential note, we also eliminate cadential progressions with anticipations. In Figure 22, the 6–8 is *not* identified as

a cadential progression, because the upper voice arrived on an E before the lower voice (CADFIND does not know that the superius E has been rearticulated; it only knows that there was a E in the superius [the anticipation] and there is still a E in the superius [the cadential arrival]).

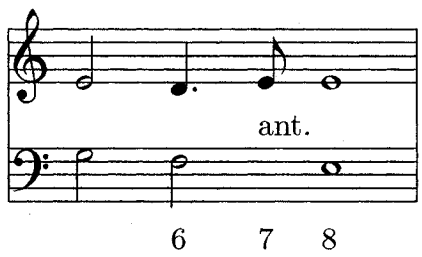

Figure 22. Cadential progression with anticipation

This is not a problem, since the anticipation is not a common ornament in this music. A comparison of results from CADFIND first including and then eliminating anticipations turned up exactly *two* cadences with anticipations. These two cadences were then simply labelled by hand.

CADFIND produces a spine `**cad`, which contains labels that identify the voice pair involved in each cadence, and the type of cadence. For example, `TS6` identifies a tenor–superius sixth-to-octave cadence, and `CS3` identifies a contratenor–superius third-to-unison cadence. This spine is then assembled with the original file, so that the cadential label always appears beside the point of cadential arrival.

2.10. PHRASEFIND

While all these progressions could strictly speaking be labelled cadences, we need to identify factors contributing to a cadential hierarchy, to help us distinguish between cadential progressions that occur in the middle of phrases, and those that mark the ends of phrases or of major sections of a piece.

The phrase parser (PHRASEFIND) examines the context of each of the cadential progressions identified by CADFIND for factors conceivably influencing the perceived strength of the cadence. The program therefore works under the assumption that cadences are the most reliable marker for identifying phrase-endings in non-texted music. It produces a spine **phr that lists at each cadence a value for each cadential-strength-influencing factor.

PHRASEFIND identifies:

1. the scale degree of the cadential arrival in relation to the final;
    - this test returns a value from 1–7, for each scale degree
    - an arrival on the final is considered strongest
    - an arrival on the fifth is also generally quite strong
    - an arrival anywhere else is weaker
2. the type of voice-leading in the third voice at the cadence (Figure 23)
    - eight categories of voice-leading are recognised and labelled 0–7
3. the relationship of the third voice to the note of cadential arrival (Figure 24)
    - this test returns 1–7 (the degree *in relation* to the cadential note)
    - the third example shows typical voice-leading for a phrygian cadence, which could occur on E, A (with B♭), or even D (with E♭).
4. the presence of an unusually long note in a structural voice at the cadential arrival;

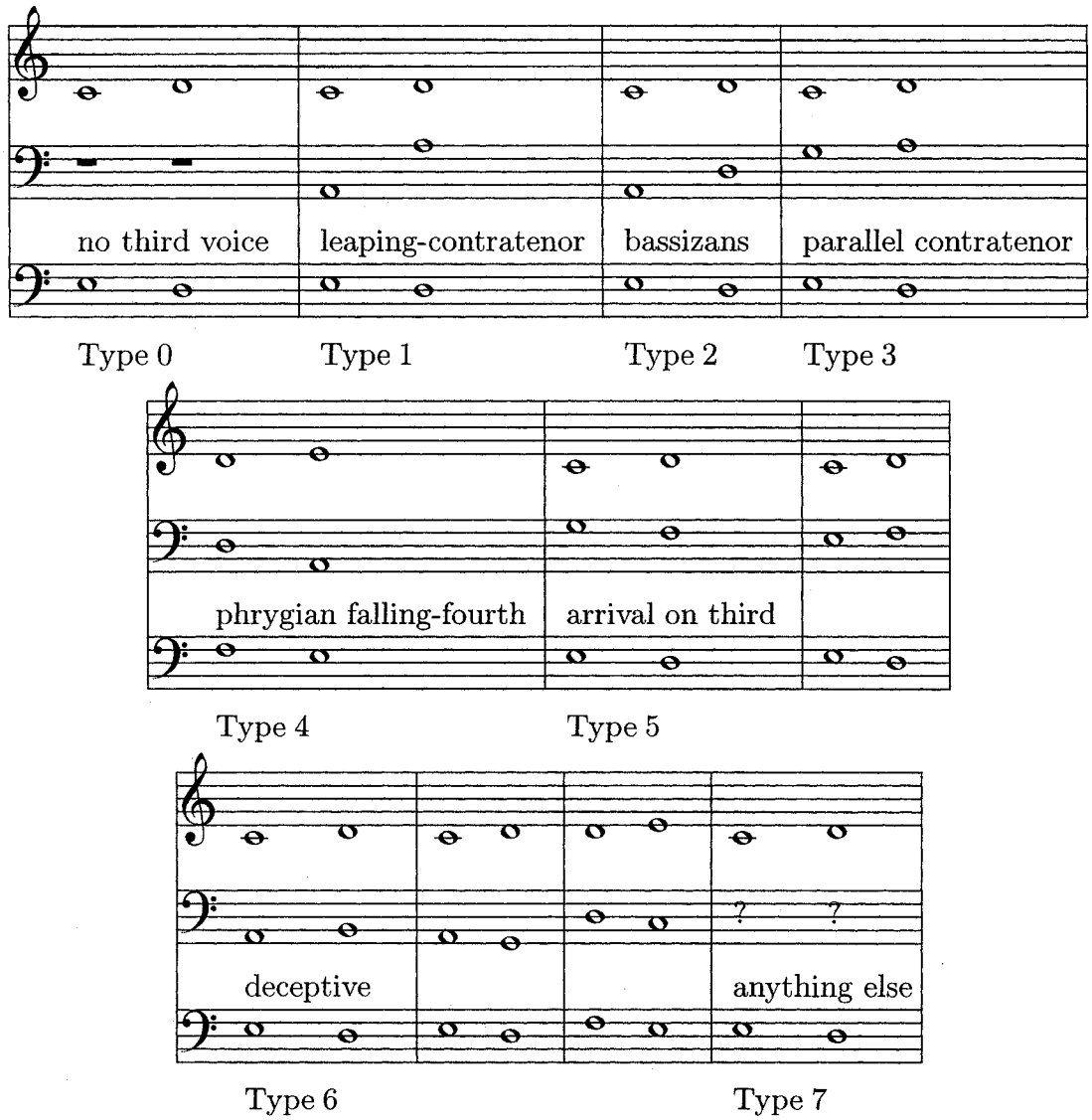

Figure 23. Eight categories of cadential voice-leading

- a *long note* is defined as a note which is one value larger than the average rhythmic value in that voice rounded up to the nearest whole value; thus, if the average value fell in between a minim and a semibreve, it would be rounded up to a semibreve, and an imperfect breve would be considered a *long note*
- returns 0 (no long note), 1 (long note in one structural voice), or 2 (long note in both structural voices)

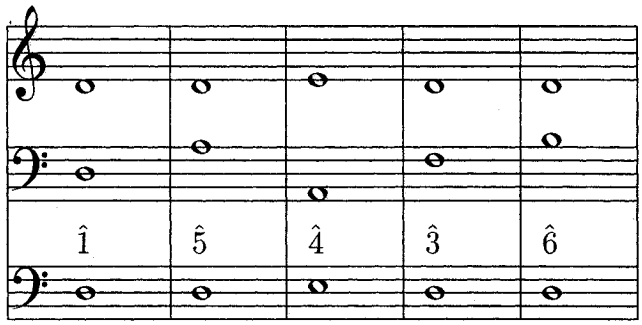

Figure 24. Relative arrival pitch of the third voice, with approximate strength

5. the presence of a rest in a structural voice after the cadential arrival;
    - returns 0 (no rests), 1 (rest in one structural voice), or 2 (rest in both structural voices)
    - each voice is tracked after the cadence until it has changed note
6. the metric position of the arrival
    - a simple test revealed that 59% of cadential progressions (in pieces with only one mensuration throughout) appear at the beginning of a mensural unit (imperfect breve in C, perfect breve in O).
    - returns 0 (cadence is not at beginning of breve) or 1 (cadence is at beginning of breve)

The results of each test are listed in order in the `**phr` spine. For example (Figure 25), a TS 6–8 cadence (TS6 in the `**cad` spine) on the third scale degree (3), with a leaping contratenor (type 1, arrival on 5) with a long note in the superius (1), no rests in any voice (0), and at the beginning of the breve (1) would be represented as 3/1/5/1/0/1. This representation allows us to give different weight to each of these elements, as we find it necessary.

Once we have assembled this spine beside the original piece and the `**cad` spine, we can begin to correlate these cadential feature labels with our searches for sharps

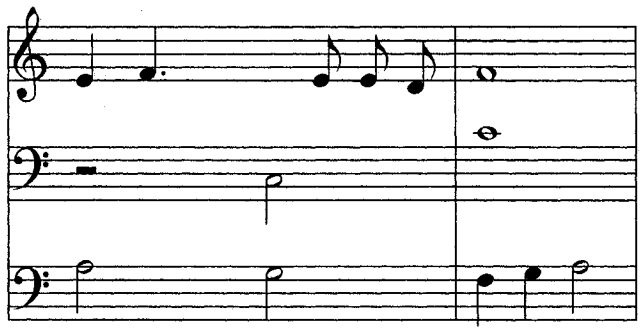

Figure 25. Tenor-superius cadence in a D-piece, labelled 3/1/5/1/0/1

and flats. In this study, no attempt is made to assign relative weights to these features before the fact. Instead, they are compared individually against internal accidentals to find relationships. The results of such comparisons (for example, which cadential strength features consistently appear with the greatest numbers of sharp leading tones) will eventually lead us to a better understanding of cadential hierarchy.

2.11. Future Refinements

Other computer-aided studies of Renaissance music ([Trowbridge, 1986], [Mendel, 1969], [Curry, 1969], [Lockwood, 1970b], [Lockwood, 1970a], [Patrick, 1974], and [Patrick and Strickler, 1978], for example), have not incorporated the identification of specific contrapuntal structures as potentially complex as ornamented cadences. However, some problems remain with the present method and with the data used for this study. These problems are listed below, along with future avenues for refinement.

1. Currently, the search routines are limited to three voices, and data exceeding these three was simply discarded, since four-voice pieces are exceedingly rare in the Buxheim repertoire. This was done for programming ease, and will need to be corrected to allow for the analysis of other repertoire.
2. The PHRASEFIND program currently has difficulties with pieces having multiple finals (*fundamenta*, since *clausulæ* to different pitches are a major component, and each *fundamentum* is encoded as a single piece), and pieces having multiple mensurations. The latter problem will need to be corrected for the program to work well with repertoire such as Mass movements, where mensuration changes are fairly common.
3. A certain amount of guesswork had to take place when transcribing and entering the messier sources (such as Schedel), perhaps prejudicing the data. This cannot be avoided.
4. There is a small amount of corruption in the computer data, due to errors made during input. I attempted to fix as many of these errors as possible, but some are bound to remain. The conclusions made remain valid; even more so, since they tend to depend on strong rates of signing, and the rates of signing

would be weakened slightly by the effect of these errors.

5. This whole study relies on the premise that the concordances of Buxheim constitute a decently-representative sample of the range of notational practice in the fifteenth century. Since nearly 100 manuscripts are represented, including most of the central chansonniers and the largest peripheral collections, this seems a reasonable assumption. These manuscripts run the whole range of available types of sources, from presentation manuscripts and ceiling paintings, through amateur collections of questionable musical reliability (such as Schedel), to theoretical examples and working manuscripts with corrections. At the moment, questions of scribal competence, manuscript filiation, and ligature clumping are touched on only to explain individual statistical anomalies; a future refinement of this analytical method would see the incorporation of these details into the model itself.
6. At the moment, CADFIND finds only regular cadential structures. A future implementation would allow for the identification of incomplete cadences (in which one structural voice does not arrive on the octave or unison) or common medial cadence structures. Identification of specific cadential ornaments could be added to PHRASEFIND.
7. Assignment of relative weights to the cadential strength identifiers labelled by PHRASEFIND would be arbitrary at best; therefore, I limit myself to commenting whether or not a given identifier appears related to the number of times accidentals appear in certain situations. In a collaborative poster presented at the Conference in Interdisciplinary Musicology 2005 (CIM05, held at Université de Montréal), Ian Knopke and I used these cadential labels in conjunction with decision-tree algorithms to identify possible sets of rules underlying an intuitive labelling of cadences as "strong", "medium", or "weak". Although the results obtained are preliminary, this avenue of investigation promises to help

reveal how we prioritise cadential features in our understanding of cadential hierarchy (this issue was alluded to in Section 2.10).

The algorithms described in this chapter represent a new direction in the analysis of early music: by automating the identification of more complex structures such as ornamented cadences, it becomes possible to perform involved analytical tasks (that would usually be reserved for a small group of favoured pieces) quickly on a large repertory. In the following chapters, we will see how powerful such tools can be when applied to the questions of signatures and *musica ficta*.

Chapter 3

Signatures: the Final/Signature Combination

What do signature accidentals mean? The debate on this question, and in particular on the significance of partial signatures in fifteenth-century music, is extensive.

One possibility is that they exist simply to indicate the notes most frequently receiving a flat during performance—a shorthand for large numbers of internal accidentals caused for harmonic or melodic reasons. Another possiblity is that they indicate a transposition of a mode (assuming that modes are accepted to apply to mid-fifteenth-century polyphony). If the first of these possibilities is correct, the problem of partial signatures is *not* a problem: if the superius needs fewer flats than the tenor, we write fewer flats in the signature. Edward Lowinsky argues, for example, that the presence of fewer flats in the superius facilitates raising of leading tones on certain cadential pitches [Lowinsky, 1945].

If the second possibility applies, however, we *do* have a few questions that need to be answered. First, does mode apply to (non-*cantus firmus*) polyphony? We do not know if a composer picked a mode as part of his pre-compositional decision-making process, but fifteenth-century theorists who comment on the issue seem to take it for granted that a composition can be assigned to a mode.

Since musicians had no other vocabulary for talking about these matters, let us take them at their word, and think about what a partial signature might mean, with the assumption that mode *is* real (*pace* [Powers, 1992]). If a signature is *always* an indicator of modal or systemic transposition, then partial (conflicting) signatures mean that we can have a piece with different voices in completely different modes or hexachordal systems. This view is espoused by Richard Hoppin, who notes that the separation by a fifth of the ranges of voices with signatures differing by one

flat corresponded to difference of one flat caused by transposing a mode by a fifth [Hoppin, 1953, p. 203]. Moreover, it would mean that the same piece can be in different modes in different manuscripts.

However, the only authors to comment on the question of mode and polyphony seem to assume that a piece is in one mode and one mode only. According to Tinctoris, we determine the mode of the whole piece from that of the tenor [Tinctoris, 1976, p. 25], and Ramos is particularly insistent that added voices must conform to the mode of the *cantus firmus* [Ramos de Pareja, 1901, p. 72]. Pieces such as Du Fay's *Nuper rosarum flores* with two transpositions of the same mode occurring thanks to a canon must be considered as oddities, conceptually speaking.[11]

Thus: if signatures are merely indicators of convenience for the performer (i.e. "which notes do we flatten most often?"), we would expect all voices of a piece to have their signatures transmitted with a similar degree of inconsistency in other concordances, according to the tastes of the individual scribes. If, on the other hand, signatures indicate transposition in *all* the voices, we would expect all voices to have similar signatures in all concordances, since all the voices of a piece ought to belong to the same modal pair. However, partial signatures are common, and the signature of the tenor is more consistently transmitted than the other voices.

There is a third possibility: Tinctoris tells us that we can know the mode of a given piece from the characteristics of its tenor, in particular its range, final, and species of fourth and fifth (this is the definition of mode to which we will adhere in the following discussion). He is not speaking of a *cantus firmus* composition here, but of a secular chanson—Du Fay's *Le serviteur*: "there is no doubt that the question [of the mode of superius and contratenor] must be answered from the tenor in particular just as in general, and it will be fitting to reply, when asked, in

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[11] For a discussion of this piece in light of this problem, see [Carpenter, 1973].

a similar way about other situations of a tone [Tinctoris, 1976, p. 25]". Perhaps, then, if the tenor has a special significance recognised by contemporaneous musicians even when it is not carrying a *cantus firmus*, the tenor signature should be taken more seriously than that of the other voices. This leads to a combined solution: the tenor's signature indicates a transposition (of mode or of hexachord system) and the signatures of the other voices indicate the most commonly used flats. Karol Berger argues for this position: he cites theorists including Tinctoris and Ornithoparcus to show that a signature indicates transposition of a mode (except in the case of modes 5 and 6, which may occur with B♭) [Berger, 1987, p. 59], and that this is only true for the "mode-defining" voice (usually the tenor) [Berger, 1987, p. 69]. In support of this, he cites Hothby and Aaron as the only theorists to comment on the issue of partial signatures, pointing out Hothby's pragmatic addition of a signature flat in the lower voice of a two-voice example simply to correct *mi contra fa*, and Aaron's criticism of the practice [Berger, 1987, pp. 66-68]. In summary, he sees the function of partial signatures as an "automatic insurance against vertical imperfect fifths" and, somewhat incidentally, as a provider of automatic raised leading tones [Berger, 1987, p. 69].

If it were true that the "mode-defining" tenor's signature is to be taken more seriously than that of other voices, we would expect the tenor's signature to be transmitted much more consistently than that of the other voices—which is indeed the case.[12]

Graeme Boone tends to discount the idea of modal transposition in relation to fifteenth-century secular song. Boone categorises Du Fay's chansons into four tonalities based exclusively on final (C, D, F, and G), for example regarding G-pieces

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[12] Margaret Bent challenges both Hoppin and Lowinsky for interpreting signatures as prescriptive: she argues that taking signatures as "weakly prescriptive" and "easily overruled by contrapuntal necessity" will go a long way towards reconciling different sides of the debate [Judd, 1998, p. 36].

with flats as colourful variants of G-pieces without flats rather than as transpositions of D-dorian [Boone, 1997, p. 84]. Leo Treitler, analysing the same repertoire, argues for tonalities also based on C, D, F, and G (derived primarily from their component species of fourth and fifth), in which tonalities may be transposed once (except the twice-transposed *Le serviteur*, which we shall encounter frequently in the next three chapters)[Treitler, 1965, pp. 163 ff.]. In particular, he argues for "the full membership of a C-tonality" (which is not transposed G) [Treitler, 1965, p. 163]. His stance towards partial signatures is that they might indicate the difference between, for example, a G-tonality with flats (signatures of ♭,♭,– in the three voices from bottom to top) and a D-tonality transposed to G (which would have signatures of ♭,♭,♭); however, he is troubled by the variations in transmission of these signatures, since the same piece can appear with each of these combinations in different sources (effectively undermining his argument)[Treitler, 1965, pp. 165–166].

In this chapter, I will investigate the combinations of final and signatures transmitted in the concordances of the Buxheim Organ Book, to see what these pieces suggest about the issue of mode and modal transposition. Then, I will look at the accidentals in the Buxheim intabulations: since there are no signatures in tablature, a signature accidental must be transmitted by being converted into internal accidentals. The extent to which this occurs can tell us something about how prescriptive a signature accidental was, and under what circumstances it could be cancelled. Many Buxheim intabulations are transposed in relation to their models, and examining the levels of transposition and accidentals used can shed light on the question of modal transposition.

In the discussion that follows, modes will be considered in pairs, that is, authentic and plagal will be referred to by the authentic label. Each pair shares its final and species of fifth and fourth; for both authentic and plagal, the same signature would apply. Modes on C and A will be considered as transpositions of other modes

(according to their species as caused by the signatures) rather than as ionian or aeolian.[13] We shall see that this acknowledgement of modal transposition is borne out by the behaviour of these pieces in Buxheim and its concordances (see especially Sections 3.2.2, 3.3, and 3.5).

[13] Tinctoris gives C as an irregular final for the dorian, lydian, and mixolydian modes, and A as an irregular final for the phrygian modes [Tinctoris, 1976].

3.1. Signatures in the Concordances

Table 2 contains a list of all finals found in all concordances of the models, together with their signatures.

	Final	Tenor	Contra	Superius	Total Number	
C-lydian	C	—	—	—	25	25
C-mixolydian	C	♭	—	—	4	17
	C	♭	♭	—	7	
	C	♭	♭	♭	6	
C-dorian	C	♭	♭♭	♭	1	14
	C	♭♭	♭♭	—	1	
	C	♭♭	♭♭	♭	6	
	C	♭♭	♭♭	♭♭	6	
D-dorian	D	—	—	—	13	13
E-phrygian	E	—	—	—	1	1
F-lydian	F	—	—	—	26	26
	F	♭	—	—	8	34
	F	♭	♭	—	18	
	F	♭	♭	♭	8	
G-lydian	G	♯	—,♯	♯	1	1
G-mixolydian	G	—	—	—	32	32
G-dorian	G	—	♭	—	1	47
	G	♭	—	—	11	
	G	♭	♭	—	20	
	G	♭	♭	♭	14	
	G	♭♭	♭♭	—	1	
A-dorian	A	—	—	—	2	2
				Total:	212	

Table 2. Final/signature combination in model concordances

In Table 3, the totals from the rightmost column of Table 2 are broken into the concordances of the models, to show the amount of variation among signatures for any one piece. For example, No. 106 (*Entrepris*, in boldface) can be found in three places: it is transmitted as a C-final piece both with flats (C-dorian) and without flats (C-lydian), as well as a G-final piece without flats (G-mixolydian).

	Final	Tenor	Contra	Superius	Total	Model X Number of Occurences
C-lydian	C	—	—	—	26	5, 8, 40X4, 44, 75X3, 83X6, **106**, 109, 111, 117X3, 127, 227, 249aX2
C-mixolydian	C	♭	—	—	4	11, 16, 83, 116
	C	♭	♭	—	7	11, 44, 83, 116X2, 127X2
	C	♭	♭	♭	6	11X3, 16X2, 111
C-dorian	C	♭	♭♭	♭	1	11
	C	♭♭	♭♭	—	1	11
	C	♭♭	♭♭	♭	6	11X2, **106X2**, 117X2
	C	♭♭	♭♭	♭♭	6	11X6
D-dorian	D	—	—	—	13	7, 10, 21, 32, 66, 74X4, 102X4
E-phrygian	E	—	—	—	1	146
F-lydian	F	—	—	—	26	23X2, 37, 124X4, 159X12, 161, 230, 250X5
	F	♭	—	—	8	38, 63, 124, 125, 159X2, 250X2
	F	♭	♭	—	18	59X5, 124X8, 159X2, 161, 250X2
	F	♭	♭	♭	8	59X2, 63, 159, 161, 250X3
G-lydian	G	♯	–,♯	♯	1	83
G-mixolydian	G	—	—	—	31	3X3, 12, 30X3, 39, 43, 61X2, 103, **106X2**, 225X3, 229X2, 246X2, 249X3, 252X3, 257X4
G-dorian	G	—	♭	—	1	43
	G	♭	—	—	11	19, 30, 39, 43X2, 143X2, 252X3, 257
	G	♭	♭	—	20	122, 128, 143, 252X2, 257X7, 30X3, 39X3, 61, 62
	G	♭	♭	♭	14	257X2, 30X4, 39X7, 3
	G	♭♭	♭♭	—	1	39
A-dorian	A	—	—	—	2	237X2
					Total:	212

Table 3. Final/signature combination by models

C-final pieces fall into three groups. The largest group has no signature flats (C-lydian). The second largest group has one signature flat in one or more voices (C-mixolydian). The third group (C-dorian) has two flats in the lower two voices, and none to two flats in the superius. The three pieces comprising this third group have among them four occurences in the first group and five in the second group. They are No. 11 (*Le serviteur*), No. 106 (*Entrepris suis par grant lyesse*), and No. 117 (*A son plaisir volentiers serviroye*).

F-final pieces occur in two main groups: no flats at all, and flats in the lower voices, with ♭,♭,– being the most common configuration. 22 of the 26 –,–,– occurences also appear with signature flats in other manuscripts. The addition of a flat to an F piece does not really signify a change of mode; rather, it is a repair tool for tritones, and the problem of F-pieces is as old as modal assignment itself. I am not surprised, therefore, to find that these pieces are transmitted freely with or without the flat. However, I ask: do the manuscripts that do not transmit signature flats in concordances of Buxheim pieces transmit more internal accidentals to supply the tritone repair? The answer to this question is *no*. The only occurence of a large number of internally-signed B♭s in any F: –,–,– piece is in the superius of No. 250 (*Le souvenir*) in Lab, where 60% of B's have a flat.

Among G-final pieces, there are two types: pieces without signatures (G-mixolydian), and pieces with a single signature flat in the lower two voices (with or without a superius flat, G-dorian). Nearly half the –,–,– occurences are transmitted also as ♭,♭,–. As before, does this mean that these pieces can be performed (or are composed) in two different modes, or is the lack of flats in some manuscripts attributable to a different cause? From the figures above, it is impossible to know if an inconsistency of transmission is general, or if there are certain manuscripts that show particular patterns of signature accidental omission, perhaps allowing us to eliminate some of the more problematic pieces listed above.

Do mansucripts from certain regions tend more to the transmission of signature flats? When transcribing, one gets the general impression that French and Italian sources are, on average, more reliable than those of German or Eastern European origin, in terms of freedom from gross mensural errors and mistaken clefs, and in terms of general scribal competence.[14] We might expect these manuscripts to

[14] There are some notable exceptions, such as the Glogauer Liederbuch. Toft reports that sixteenth-century German tablatures tend to have fewer accidentals than others, and attributes this to a

be similarly unreliable when transmitting modal indicators, such as signatures or internal accidentals intended to substitute for signatures.

A breakdown of final/signature combination by the rough area of origin of the manuscript (where known), shown in Table 4, reveals a pattern:

	Final	Tenor	Contra	Superius	Total	unknown	German/ Eastern European	French/ Italian
C-lydian	C	—	—	—	26	3	15	8
C-mixolydian	C	♭	—	—	4		1	3
	C	♭	♭	—	7	1	1	5
	C	♭	♭	♭	6	1		5
C-dorian	C	♭	♭♭	♭	1			1
	C	♭♭	♭♭	—	1		1	
	C	♭♭	♭♭	♭	6			6
	C	♭♭	♭♭	♭♭	6			6
D-dorian	D	—	—	—	13		8	5
E-phrygian	E	—	—	—	1		1	
F-lydian	F	—	—	—	26	2	14	10
	F	♭	—	—	8	1		7
	F	♭	♭	—	18	2	1	15
	F	♭	♭	♭	8	1	1	6
G-lydian	G	♯	—,♯	♯	1		1	
G-mixolydian	G	—	—	—	31	3	19	9
G-dorian	G	—	♭	—	1			1
	G	♭	—	—	11		6	5
	G	♭	♭	—	20		2	18
	G	♭	♭	♭	14			14
	G	♭♭	♭♭	—	1		1	
A-dorian	A	—	—	—	2		2	
				Total:	212	14	74	124

Table 4. Final/signature combination and rough manuscript origin

C- and F-final pieces only very rarely receive signature accidentals in manuscripts of German or Eastern European origin. These exceptions occur in Trent 90, Trent 92, and MuEm, which are all among the more reliable sources.

G-final pieces receive signature accidentals in German or Eastern European manuscripts somewhat more frequently, although still not as frequently as in French

difference in performance taste [Toft, 1992]. This does not seem to be the case in the fifteenth century, as we saw in Section 1.1.2.2..

and Italian manuscripts. Again, these occur in the various Trents and in MuEm, with one occurrence in Loch. This suggests that G has a strong identity as the final of two different modes (dorian/mixolydian) in keeping with standard modal theory; in other words, that G does not represent one single G-tonality with added coloristic flats (as suggested by Boone [Boone, 1997, p. 83]).[15]

However, a problem remains: seven of eleven G-dorian pieces are also transmitted as mixolydian. We need to ascertain if these pieces actually appear to exist in two separate modes side-by-side, or of we can assume that the transmission of the signatures was unreliable, and the pieces should in fact be read as dorian.

For four of these seven pieces, the mixolydian sources are in the German group (three of *De madame*, three of *O gloriosa regina* [the fourth is in Per431], one *Or me veult*[16]), or in the unknown group (one *O rosa bella* [Dunstaple]): the mixolydian readings are in sources that are generally unreliable in notational practice.

The other three G-pieces with dorian/mixolydian dual transmission also have mixolydian readings in French/Italian sources. No. 30 (*Par le regard*) is transmitted as mixolydian in three of eleven sources; two of these three are French. No. 61 (*Puis que m'amour*) is transmitted in three sources; the only dorian source is Tr88. The last dual piece is the strangest: No. 252 (*Tout a par moy*) is mixolydian in three of eight sources, all of which are French or Italian (Wolf, F2356, and Col, all of which transmit plenty of signature accidentals in other pieces).

Altogether, slightly over half the mixolydian occurences of these seven pieces (9/17) are in German manuscripts. Seven of these nine German transmissions are in manuscripts that do not transmit signature flats for any Buxheim pieces, making

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[15] As shown above, C-dorian is quite rare. All of the three pieces are transmitted lacking these flats in some manuscripts; in the case of the latter two, the transmission without flats occurs in German manuscripts.

[16] Oddly, this piece occurs three times in MuEm: twice in two voices with a tenor flat, and once in three voices with no flats

them appear untrustworthy in terms of signatures. Viewed another way, only 9 of the 47 G-dorian occurences of all pieces are in German manuscripts (the Trents and MuEm). That is to say, pieces that are G-dorian in French or Italian manuscripts are usually G-mixolydian in German manuscripts. Since the manuscripts with G-mixolydian transmissions of otherwise G-dorian pieces tend not to have any signature flats at all, I argue against a dual-mode existence for these pieces; rather, that they were understood to be G-dorian by the scribes, and the corresponding signature understood (in which case the notation would seem to function more as a memory aid to a known piece than as a prescription for learning a new one).

The coincidence of unreliability in terms of basic notational procedures with the lack of transmission of signatures allows us to take the signatures transmitted in French/Italian sources more seriously when deciding to which group a piece should properly belong.[17]

Using the tenor as a guide, we can make a simplified list of final/signature combinations available in the models. Each of the fifty-three models is assigned to one of these combinations (Table 5), based on which final/signature combination it appears with most regularly. If there is an ambiguity, preference is given to those manuscripts that appear generally more reliable in transmitting signature accidentals. As Brothers observes, accidentals tend to be lost during transmission [Brothers, 2000, pp. 273–274]; thus, a piece will usually be placed in the category with the highest number of signature flats. An exception to this rule is made for No. 83 (*Se la face ay pale*), which has far more C-lydian than C-mixolydian concordances, and has one very strange G-lydian concordance (Tr89)—comparisons with the intabulations may tell us if this exception is justified. No. 127 (*Mille bon jours*) has been moved to the C-dorian category on account of its great number of

[17] The only piece for which this is a problem is *Tout a par moy*.

internal E♭s. We shall see if these two exceptional categorisations are confirmed by Buxheim.

	Final	Tenor	Contra	Superius	Pieces
C-lydian	C	—	—	—	5, 8, 40, 75, 83, 109, 111, 227, 249a
C-mixolydian	C	♭	♭	—	16, 44, 116
C-dorian	C	♭♭	♭♭	♭	11, 106, 117, 127
D-dorian	D	—	—	—	7, 10, 21, 32, 66, 74, 102
E-phrygian	E	—	—	—	146
F-lydian	F	—	—	—	23, 37, 230
	F	♭	♭	—	38, 59, 63, 124, 125, 159, 161, 250
G-mixolydian	G	—	—	—	12, 103, 106, 225, 229, 246, 249
G-dorian	G	♭	♭	—	3, 19, 30, 39, 43, 61, 62, 122, 128, 143, 252, 257
A-phrygian or dorian	A	—	—	—	146, 237
				Total:	53

Table 5. Standardised final/signature combination

Our purpose in comparing these "standardised" final/signature combinations to their reflection in Buxheim is twofold:

1. We can see how consistently the signatures are reflected in Buxheim. Where does Buxheim fall on the signature-transmission spectrum? Are some final/signature combinations reflected more consistently than others?
2. We can use the results of this comparison to assign possible final/signature combinations to Buxheim intabulations that lack models. Later, we can use these new classifications in our investigations of modal behaviour and *musica ficta*.

3.2. Reflection of Signature Accidentals in Buxheim

In this section, we will compare the standardised signatures of the models to the Buxheim intabulations. How well do the internal accidentals of Buxheim correspond to, or "reflect", the standardised signatures of the models? For each intabulation, the internal flats are translated into a "perceived signature". Can Buxheim be considered reliable in terms of transmitting signatures? Could Buxheim be used to predict the final/signature combinations of its models?

In Table 6, Table 7, Table 8, Table 9, and Table 10, "Piece" refers to the number of the first Buxheim concordance of that title; in this way, all Buxheim concordances of the same title can be found together. For example, Buxheim No. 158 is listed as a subsidiary of Piece No. 40, its concordance within Buxheim. "Model FSC" refers to the standardised final/signature combinations of Table 5.

Indication that a piece is transposed can be found both in the "Bux Final" column, and in the "Notes" column.

Each of the three sets of two numbers separated by a slash represents one of the three voices. The sets of two numbers (x/y) indicate what proportion of all B's/E's in that voice have a flat. For example, if a tenor part of a piece has six B's, four of which are flat, and ten E's, two of which are flat, x/y will be 0.67/0.2. N/A indicates an absence of data for that voice (either the voice doesn't exist, or it has none of the pitches in question); in comparisons, this is not considered to conflict with the models' standardised signature for that voice.

'Bux "Sig."' is a perceived-signature assignment for that Buxheim intabulation, and "Match" contains a comment as to how well it corresponds to the model's simplified final/signature combination. The last column is for indicating transpositions, as well as other comments.

In assigning perceived signatures to Buxheim, in general, if more than half the occurrences of a B or E are flat, this pitch is assigned a signature flat. If there are sufficient E's to merit an E signature flat, but less than half the B's are flat, a signature B-flat is nevertheless assigned, and this fact is commented upon in the last column, by referring to the putative signature assignment as "weak". In order to be considered a good match (shown in the "Match" column), the lower two voices must match the model's signature. The terms "close" and "less (close)" are used in the "Match" column when the match is quite weak (the signature assignment was "weak"), or when the perceived signature puts the piece into a closely-related group (e.g. C-lydian [–,–,–] instead of C-mixolydian [♭,♭,–]). The superius is allowed more flexibility, on account of the scribe's greater reluctance to use accidentals in the superius (which was discussed in Section 1.1.2.2.).

In general, the reliability of Buxheim in reflecting the models' final/signature combinations is quite good. The number of "yes" and "close" designations (45, or 72%) far outweighs the number of outright "no" designations (8, or 11%). This indicates that Buxheim is far more reliable in the transmission of signature accidentals (internally transmitted in Buxheim, of course) than most other German/Eastern European manuscripts, and is at least as reliable as the major French/Italian manuscripts.[18]

When there is a discrepancy between the perceived signature in Buxheim and the standardised signature of the model, it is almost always in the favour of more signature flats in Buxheim. This suggests that intabulations lacking models can be assigned to final/signature combinations based on their behaviour in Buxheim

[18] We do not know from what sources the Buxheim intabulators drew their material (if these were notated sources at all): either the sources had far more signature flats than the usual German/Eastern European sources, or the intabulators were adding many flats, suggesting an understanding of the mode of a piece independent of the written record.

Piece	Bux No.	Model FSC	Bux Final	Tenor B/E	Contra B/E	Superius B/E	Bux "Sig."	Match	Notes
5	5	C: –,–,–	G	0.5/0	0.38/0	0/0	♭,–,–	close	transposed
8	8	C: –,–,–	C	0/0	0/0	0/0	–,–,–	yes	
40	40	C: –,–,–	C	0.10/0	0/0	0/0	–,–,–	yes	
	158		C	0.03/0	0/0	0/0	–,–,–	yes	
75	75	C: –,–,–	G	0.91/0	0.67/0	0.02/0	♭,♭,–	no	transposed, G-dorian
109	109	C: –,–,–	C	0/0	0/0	0/0	–,–,–	yes	
111	111	C: –,–,–	C	0.37/0.14	0.5/0.33	0.04/0.09	–,♭,–	close	
227	227	C: –,–,–	C	0/0	0/0	0/0	–,–,–	yes	
249a	249a	C: –,–,–	C	0.17/0	0.67/0.07	0/0	–,♭,–	close	
16	16	C: ♭,♭,–	C	0.87/0	0.89/0.07	0.02/0	♭,♭,–	yes	
	17		C	1/0	0.67/0.1	0.01/0	♭,♭,–	yes	
	18		G	0/0	0/0	0/0	–,–,–	yes	transposed
	168		C	1/0	1/0.25	0/0	♭,♭,–	yes	
	169		C	N/A	1/0	0.17/0	N/A,♭,–	yes	
	170		C	1/0	1/0	0.04/0	♭,♭,–	yes	
	202		G	0/0	N/A	0/0	–,N/A,–	yes	transposed
44	44	C: ♭,♭,–	G	0/0	0/0	0/0	–,–,–	yes	transposed
83	83	C: ♭,♭,–	C	0/0	0/0	0/0	–,–,–	less	
	255		C	0.08/0	0/0	0.01/0	–,–,–	less	
116	116	C: ♭,♭,–	G	0/0	0/0	0/0	–,–,–	yes	transposed
11	11	C: ♭♭,♭♭,♭	C	0.5/0.42	0.25/0.11	0.11/0.07	♭,–,–	no	does show some tendency
	226		C	0.69/1	0.9/1	0.21/0.19	♭♭,♭♭,–	yes	
106	106	C: ♭♭,♭♭,♭	C	0.78/0.92	N/A	0.16/0.17	♭♭,N/A,–	yes	
117	117	C: ♭♭,♭♭,♭	D	0/0	0/0	0/0	–,–,–	yes	transposed
127	127	C: ♭,♭,–	G	1/0.17	0.69/0	0.19/0	♭,♭,–	*yes*	transposed, G-dorian

Table 6. Signature of model as reflected in Buxheim, C-pieces

with a good degree of reliability; for example, based on this behaviour, we would not expect to find a new G-dorian concordance for a piece that is G-mixolydian in Buxheim.

A cautionary note about the precision of the numbers, which must be taken with a grain of salt: The reflection of any given signature accidental is rarely complete

Piece	Bux No.	Model FSC	Bux Final	Tenor B/E	Contra B/E	Superius B/E	Bux "Sig."	Match	Notes
7	7	D: –,–,–	D	0/0	0/0	0/0	–,–,–	yes	
10	10	D: –,–,–	C	0.83/1	1/1	0.2/0.14	♭♭,♭♭,–	yes	transposed
21	21	D: –,–,–	D	0.33/0	0/0	0.09/0	–,–,–	yes	
32	32	D: –,–,–	D	0/0	0.14/0	0/0	–,–,–	yes	
	33		D	0/0	0/0	0/0	–,–,–	yes	
	34		D	0/0	0/0	0/0	–,–,–	yes	
66	66	D: –,–,–	D	0/0	0/0	0/0	–,–,–	yes	
74	74	D: –,–,–	C	0.29/1	0.57/0	0/0.02	♭♭,♭,–	close	transposed, tenor B♭ a bit weak
102	102	D: –,–,–	G	1/0	0.8/0.1	0.5/0	♭,♭,♭	yes	transposed

Table 7. Signature of model as reflected in Buxheim, D-pieces

(1 in a B/E column). This is to be expected, since there might frequently be "corrections" of the accidental (at cadences or for tritone reasons). In fact, a closer investigation of pieces with "weak" signature accidentals shows that most of the "missing" flats can be explained in this way. For example: if there are two B's in a contratenor, one B♭, and one B♮ which happens to be at a double-leading-tone cadence to F (where we might expect a B♮), the strength of reflection will only be 0.5. Thus, signatures that show a great amount of deviation from the established patterns need to be confirmed by individual examination of the constituent B's and/or E's.

However, some final/signature combinations are reflected more reliably than others. I will discuss each combination, beginning with untransposed pieces, and explore the degree of variation among the signatures and perceived signatures.

C-pieces (Table 6)

The signatures of most untransposed C-final pieces have been rendered accurately in Buxheim as C: –,–,– or C: ♭,♭,–. Two of the latter have no perceived signatures in Buxheim, and one of the former has acquired plenty of B♭s, though not enough

Piece	Bux No.	Model FSC	Bux Final	Tenor B/E	Contra B/E	Superius B/E	Bux "Sig."	Yes/No	Notes
146	146	E: –,–,–	A	0.5/0	0/0.22	0/0	♭,–,–	close	transposed, tenor ♭ weak
23	23	F: –,–,–	F	1/0	0.5/0.4	0.1/0	♭,♭,–	close	1 tenor B
37	37	F: –,–,–	F	0.55/0	0.83/0.27	0.03/0.04	♭,♭,–	less	
	51		F	0.82/0	1/0.18	0/0	♭,♭,–	less	
	52		C	0/0	0/0	0/0	–,–,–	yes	transposed
	89		F	0.83/0	1/0.33	0.06/0	♭,♭,–	less	
	90		F	0.62/0	0.86/0.23	0.09/0	♭,♭,–	less	
	91		F	0.76/0	1/0.17	0.01/0	♭,♭,–	less	
	92		F	0.79/0	1/0	0.01/0	♭,♭,–	less	
	93		F	0.8/0	0.6/0.21	0.11/0	♭,♭,–	less	
	217		C	0/0	0/0	0/0	–,–,–	yes	transposed
230	230	F: –,–,–	C	0.13/0	0.2/0	0/0	–,–,–	yes	transposed
38	38	F: ♭,♭,–	F	0.7/0	0.75/0.27	0.06/0	♭,♭,–	yes	
	137		F	0.62/0	0.83/0.31	0.01/0	♭,♭,–	yes	
	138		F	0.79/0	0.58/0.18	0.02/0	♭,♭,–	yes	
	139		F	0.56/0	0/0	0.02/0	♭,–,–	less	2 contra B♮s, at a DLT
59	59	F: ♭,♭,–	F	0.5/0	0.38/0.13	0/0	♭,♭,–	yes	weak
	60		F	0.73/0	0.56/0.07	0.08/0	♭,♭,–	yes	contra weak
63	63	F: ♭,♭,–	F	0.5/0	1/0	0/0	♭,♭,–	yes	tenor weak
124	124	F: ♭,♭,–	F	0.38/0	1/0	0/0	♭,♭,–	yes	tenor weak
125	125	F: ♭,♭,–	F	0.86/0	0/0	0.06/0	♭,–,–	less	
159	159	F: ♭,♭,–	C	0.68/0	0.38/0.33	0.09/0	♭,–,–	close	transposed, tenor has flat
	160		F	0.28/0	N/A	0.41/0	–,N/A,–	less	
	238a		C	0.42/0	0/0.57	0.13/0	–,–,–	yes	transposed, contra has E♭s
	258		F	0.68/0	0.5/0.21	0.13/0	♭,♭,–	yes	
161	161	F: ♭,♭,–	F	1/0	0.71/0	0/0	♭,♭,–	yes	
250	250	F: ♭,♭,–	F	0.67/0	N/A	0.05/0	♭,N/A,–	yes	
	256		C	0/0	0.17/0	0/0	–,–,–	yes	transposed

Table 8. Signature of model as reflected in Buxheim, E- and F-pieces

to justify assigning a signature.

Seven of eight C-final pieces have been transposed to G (the low-pitched No. 75 up a fifth, the rest down a fourth). Most of them have been rendered as G: –,–,–, but with almost no F♯s to compensate for the transposed B♮s. Two pieces

Piece	Bux No.	Model FSC	Bux Final	Tenor B/E/(A)	Contra B/E/(A)	Superius B/E/(A)	Bux "Sig."	Yes/No	Notes
12	12	G: –,–,–	F	1/1/1	1/0.88/0.67	0.24/0.17/0.41	♭♭♭,♭♭♭,–	no	transposed, *F-dorian*
103	103	G: –,–,–	G	0.5/0	0.67/0	0/0	♭,♭,–	no	G-dorian, tenor weak
106	106	G: –,–,–	C	0.78/0.93	N/A	0.16/0.17	♭♭,N/A,–	*no*	C-dorian, transposed, see also C-pieces
225	225	G: –,–,–	G	0.5/0	0.67/0	0.1/0	♭,♭,–	no	G-dorian, weak
229	229	G: –,–,–	G	0.63/0	0/0	0/0	♭,–,–	no	G-dorian, 2 B's in contra
	243		G	1/0	1/0.17	0.67/0	♭,♭,♭	no	G-dorian
246	246	G: –,–,–	G	0.14/0.17	0.76/0	0/0	–,♭,–	no	G-dorian in contra only
249	249	G: –,–,–	G	0.33/0	0/0	0/0	–,–,–	yes	

Table 9. Signature of model as reflected in Buxheim, G-mixolydian pieces

are exceptional: Nos. 75 (*A discort*) and 127 (*Mille bonjours*) appear to have become G-*dorian*. This latter confirms our tentative reassignment of No. 127 to C-dorian, made in Table 5 due to large amounts of internal E♭s. The exception to the G-transposition rule is the C-dorian No. 117 (*A son plaisir*), which has become D-dorian.

Why are no C-pieces transposed to F rather than G? Avoiding extremes of range appears to have played no role, since transposition to F, in these cases, would not have caused stepping below the lowest note appearing in Buxheim, G. Conceptually, F and G are equally closely related to C: transposition to either involves one interval change in the octave species. A possible explanation is that the intabulator preferred to transpose to the pitch level requiring the smallest number of additional accidentals. We will return to this question after all the other finals have been examined.

There are five intabulations of the four C-dorian models (Nos. 11, 106, 117,

Piece	Bux No.	Model FSC	Bux Final	Tenor B/E	Contra B/E	Superius B/E	Bux "Sig."	Yes/No	Notes
3	3	G: ♭,♭,–	D	0/0	0.14/0	0/0	–,–,–	yes	transposed
19	19	G: ♭,♭,–	D	0/0	0/0	0/0	–,–,–	yes	transposed
	20		D	0/0	0/0	0/0	–,–,–	yes	transposed
	203		D	0/0	0/0	0/0	–,–,–	yes	transposed
30	30	G: ♭,♭,–	G	0.71/0	0.2/0	0.13/0	♭,–,–	close	contra has some ♭s
	31		G	0.86/0	0.2/0	0.06/0	♭,–,–	close	contra has some ♭s
39	39	G: ♭,♭,–	G	0.88/0	0.77/0	0.14/0	♭,♭,–	yes	
	104		G	0.59/0	0.38/0	0.19/0	♭,♭,–	yes	contra very weak
43	43	G: ♭,♭,–	G	1/0.56	1/0.4	0.14/0	♭♭,♭,–	close	
61	61	G: ♭,♭,–	G	0.38/0	0.25/0.5	0/0	♭,♭♭,–	less	very weak
62	62	G: ♭,♭,–	C	0.38/0	0.5/0	0/0	♭,♭,–	yes	very weak
122	122	G: ♭,♭,–	D	0.08/0	0/0	0/0	–,–,–	yes	transposed
128	128	G: ♭,♭,–	G	1/0.25	0.4/0.33	0.22/0	♭,♭,–	yes	contra weak
143	143	G: ♭,♭,–	G	1/0	1/0.07	0.02/0	♭,♭,–	yes	
	144		G	1/0	0.75/0.33	0.07/0	♭,♭,–	yes	
	196		D	0/0	0/0	0/0	–,–,–	yes	transposed
252	252	G: ♭,♭,–	G	1/0.18	1/0.83	0.19/0	♭,♭♭,–	close	
257	257	G: ♭,♭,–	G	0.83/0	1/0.17	0.06/0	♭,♭,–	yes	
237	237	A: –,–,–	A	0/0	1/0	0/0	–,♭,–	close	deceptive (see below)

Table 10. Signature of model as reflected in Buxheim, G-dorian and A-pieces

and 127, Table 6). Both intabulations of No. 11 (*Le serviteur*) are untransposed. Although the second intabulation (No. 226) reflects the C-dorian signature, the first does not have nearly enough flats, especially in the contratenor. No. 106 (*Entrepris*) reflects the signature very well. The other two pieces have been transposed; No. 117 (*A son plaisir*) to D-dorian, and No. 127 (*Mille bonjours*) to G-dorian, as mentioned above. The superius of No. 117, which had one flat in the model, has *not* received any F♯s to correspond to the untransposed E♮s of the model's superius.

D-pieces (Table 7)

Untransposed D-pieces are all reflected consistently as D: –,–,–. Three D-pieces

have, however, been transposed to C-dorian (No. 10 and No. 74) or G-dorian (No. 102 *Esclave puist yl devenir*), accumulating the expected flats in the lower voices, with greater accuracy in the tenor than in the contratenor. Since there are only three transposed D-pieces, it need not be significant that none of them are transposed to the fifth above the final, which after all would not need any signature flats. Nevertheless, I am surprised that the intabulators appear to prefer transposition to C-dorian over A-dorian. Perhaps the major sixth above the final, which would require a signature F♯ above an A-final to be consistently rendered, was really important to them—and such signature sharps were assiduously avoided.[19]

We can test this hypothesis by asking how common B♭s are in D-final pieces, both in Buxheim and in the models, and how common E♭s and A♭s are in G-dorian and C-dorian pieces, respectively.

Among 17 concordances of D-final pieces (including both models and concordant intabulations), most of them in German/Eastern European manuscripts, only two (both in Loch) had any B♭s at all.[20] Altogether, 38 of 420 (9%) sixth degrees are flattened in all non-Buxheim concordances of D-dorian pieces. Outside of No. 39 (*O rosa bella*), only 21/8998 (0.2%) sixth degrees are flattened in all transposed dorian pieces.[21]

Only two of 31 Buxheim pieces categorised as dorian (on any final) have a greater concentration of flattened sixth degrees than 0.15%, and most have less

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[19] Berger offers several possible reasons for avoiding signature sharps; among them, that "a signature accidental transposed a mode only because it affects the hexachordal system", and F♯ (by virtue of being generally reserved for leading-tones and not thought of as a mi-step in this context) does not cause such a hexachordal shift [Berger, 1987, p. 61].

[20] One of these concordances (No. 214 *Mit ganczem willen*) had three flats among 29 B's, and the other (No. 41, a setting of *Allmaechtig Got*) had 35 flats among 87 B's.

[21] Among 14 G- or C-dorian pieces with 88 concordances (in all types of sources), none shows a greater concentration of flattened sixth degrees than 0.01%, with the exception of No. 39 (*O Rosa bella* [Dunstaple]), which has 52 of 2472 (2.1%) B's flattened in 13 concordances.

than 0.05 flattened sixth degrees. The exceptions are No. 252 (*Le souvenir*) with a concentration of 0.26%, and No. 128 (*Qui veut mesdire*).

The single piece which might possibly be classified as A-dorian (No. 237 (*Wuenschlichen schoen*) shows no artificially raised sixth degrees (F♯s) outside Buxheim, and only one inside Buxheim. I will discuss this exceptional piece below, under the heading of A-pieces.

To sum up: in general, Buxheim and its concordances do not tend to mark flattened sixth degrees in dorian pieces (in the signature or internally), with a few notable exceptions such as No. 39 (*O rosa bella*). This could mean that a natural sixth degree was preferred in the dorian modes. In Chapter 6, we will examine the behaviour of the sixth degree, when it occurs as a "peak note" in dorian pieces.

F-pieces (Table 8)

All 20 untransposed F-pieces, whether F: –,–,– or F: ♭,♭,– in the model, are reflected as F: ♭,♭,– in Buxheim. This raises the question of whether F: –,–,– pieces among the models habitually receive large numbers of internally-signed B♭s. There are only four non-Buxheim concordances of two titles, and three of the four are concordant intabulations.[22] There are simply too few concordances of untransposed F-pieces to answer this question.[23] To the Buxheim intabulator, at least, the sound of "true" F-lydian with its tritone appears to have been unacceptable.

There are transposed F-pieces of both types, all of which have been transposed to C. Regardless of the signature of the original, the default signature is C: –,–,–. B♮s in the F: –,–,– models are occasionally, but not consistently reflected by F♯s in the transposition. These F♯s can be explained as propinquity accidentals such

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[22] A *concordant intabulation* is a non-Buxheim intabulation of a model, as opposed to a vocal-notation concordance.

[23] No. 37 (*Une foys avant que morir*) has only one internal flat in all three of its sources (Loch, LoTit, and D-Mbs clm 29775/6), but No. 110 (*Boumgartner*), a concordant intabulation (thus automatically lacking a signature) has very many internal flats, especially in the tenor and superius.

as cadential sharps, rather than as the result of conscientious transposition, and they *never* cause tritone problems. This supports the previous statement that the lydian mode always has a flattened fourth degree: the intabulator has transposed some F-pieces to a level where B♮ needs no correction (in a C-piece, it would become F, not F♯, and in a G-piece, C, not C♯), and does not reflect those B♮s by adding sharps—he clearly believed that the tritones possibly caused in lydian pieces needed correcting as a matter of course.

The implications of C as the chosen transposition level for F-pieces will be discussed below.

G-pieces (Table 9 and Table 10)

G-final pieces show the greatest variation in the accuracy of reflection of signature flats. *Only one* G: –,–,– piece (No. 249, *Seit ich dich hercz lib*) remains mixolydian. All the other untransposed pieces have become G-dorian.

Only two pieces have been transposed, both also becoming dorian. No. 12 (*Moecht ich din wegern*) is transposed to *F-dorian*(!). No. 106 (*Entrepris*) had appeared in two categories in Table 5: G-mixolydian (in Schedel and Strahov) and C-dorian. In Buxheim, it is C-dorian.

G-mixolydian was apparently an unpopular mode for the Buxheim intabulators, and we must question the validity of the final/signature combination assignment of the models. If we look at the manuscripts in question (those with G-mixolydian pieces that appear dorian in Buxheim), we discover that most of them fall into the German/Eastern European group (Loch, Glog, Schedel, Strahov, Tr90, and D-Sl HB VIII 9, the exception being Parma), and that most of these manuscripts transmit few if any signatures (the only one that transmits any signatures for a Buxheim concordance is Tr90). While it is impossible to know for sure if there was a dual-mode transmission tradition for these pieces, I suggest that, given the unreliability of these manuscripts in transmitting signatures, these pieces should be

reclassified as dorian.

G-dorian pieces, on the other hand, remain dorian, occasionally acquiring extra E♭s (in Nos. 43, 61, 144, 252, and 257), with the exception of Nos. 30 and 31 (*Par le regard*), which do not have enough contratenor B♭s to merit a signature in that voice. When G-dorian pieces are transposed, is is uniformly to D.

A-pieces (Table 10)

Both A-final pieces in Buxheim appear to have enough flats that at least one of the lower voices receives a perceived phrygian signature. No. 146 (*Des klaffers neyden*) is especially interesting, because its model appears both as an E: –,–,– and as an A: –,–,– concordant intabulation, in the same manuscript (Loch).[24] The dual transmission of the same piece in Loch in (apparently) A-dorian and E-phrygian, combined with the intabulation of the same piece in Buxheim in A-sort-of-phrygian (only one voice has a perceived signature flat), makes one wonder if the Loch A-intabulation ought in fact to have a perceived signature of ♭,♭,–. A quick look at the internal accidentals in the Loch A-version reveals that *every* tenor B and most superius B's receive internally-signed flats (there are no contratenor B's), supporting this hypothesis.

The second A-piece, No. 237 (*Wuenschlichen schoen*), is transmitted in Strahov and Schedel, both of which have very few accidentals in any piece, and none in this piece. The single B♭ in the contratenor of the corresponding Buxheim intabulation can be explained as a peak-note-function flat.[25] There are three cadences to A in this piece, all of which have a dorian ($\hat{5}$–$\hat{1}$) structure.[26] This piece should continue to be categorised as A-dorian, confirming the lack of signatures found in Schedel

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[24] Only one Loch piece ever has a signature flat (No. 19).

[25] Since there is only the one B, this causes the contratenor to have a perceived signature flat (1/1=1). Obviously, this is somewhat deceptive.

[26] On different types of cadential structure in A-pieces, see Chapter 5.

and Strahov.

No. 237 is one example of the possibilities of using the perceived final/signature combinations in Buxheim to confirm those of pieces found only in manuscripts which cannot be seen as reliable in the transmission of signatures. Unfortunately, we have too few A- and E-pieces among Buxheim and its co-ordinates to answer fully the question of whether A-phrygian pieces are more common than A-dorian pieces; yet we see that both types do exist.

3.2.1. Intabulations in Other Manuscripts

There are a few pieces that have concordances in other tablatures, which of course also do not have signatures. These pieces are listed in Table 11. In this section, I calculate their perceived signatures. How well do they agree with Buxheim's? Do they reflect the standard final/signature combinations (FSC) of their models in the same way as Buxheim?

Final	Piece	Concordance	Standard FSC
C	37	D-Mbs clm 29775/6	F: –,–,–
		Loch	
D	32	PL-WRu I-F-687	D: –,–,–
	41	Loch	
	214	Loch	
		PL-WRu I-F-687	
F	23	Loch	F: –,–,–
	38	Loch	F: ♭,♭,–
	110	Loch	
	250	Spinacino II	F: ♭,♭,–
G	48	Loch	
	100	Loch	
	113	Loch	
	140	D-Mbs clm 29775/4	
A	146	Loch	E: –,–,–
Total	15		

Table 11. Concordances in other tablatures

Table 12 shows perceived signatures for these intabulations. For the six titles which have concordances in vocal notation, only the standard final/signature combination and the Buxheim perceived signature are reproduced here. For the other seven titles, perceived signatures are calculated for both the concordance and Buxheim.

Piece	Bux No.	Model FSC	Conc. Tenor B/E	Contra B/E	Sup. B/E	Conc. "Sig."	Bux. Tenor B/E	Contra B/E	Sup. B/E	Bux "Sig."
37	37	F: –,–,–	0/0	0/0	0/0	C: –,–,–				F: ♭,♭–
			0/0	0/0	0/0	C: –,–,–				C: –,–,–
32	32		0/0	N/A	0/0	D: –,N/A,–	0/0	0.14/0	0/0	D: –,–,–
	33						0/0	0/0	0/0	D: –,–,–
	34						0/0	0/0	0/0	D: –,–,–
41	41		0.89/0	0/0	0.34/0	D: ♭,–,–	0.79/0	0.67/0.07	0.05/0	D: ♭,♭,–
214	214		0.67/0	0/0	0.07/0	D: ♭,–,–	1/0	0.33/0	0.04/0	D: ♭,–,–
			0/0	N/A	0/0	D: –,–,–				
23	23	F: –,–,–	0.5/0	N/A	0.17/0	F: ♭,N/A,–				F: ♭,♭,–
38	38	F: ♭,♭,–	0.11/0	N/A	0.13/0	F: –,N/A,–				F: ♭,♭,♭
110	110	F: –,–,–	0.8/0	0.5/0.23	0.2/0	F: ♭,♭,–	0.7/0	0.5/0.2	0.14/0	F: ♭,♭,–
250	250	F: ♭,♭,–	0/0	0/0	0.2/0	F: –,–,–				F: ♭,N/A,–
	256									C: –,–,–
48	48		1/0	N/A	0.73/0	G: ♭,N/A,♭	1/0	1/0.6	0.11/0	G: ♭,♭♭,–
	49						1/0	0.33/0.67	0.24/0	G: ♭,♭♭,–
	50						1/0	0/0.5	0.05/0	G: ♭,–,–
	94						1/0	0.3/0.44	0.17/0	G: ♭,–,–
	95						1/0	0.22/0.17	0.10/0	G: ♭,–,–
	96						1/0	0.5/0.67	0.22/0	G: ♭,♭♭,–
100	100		1/0	N/A	0.64/0	G: ♭,N/A,♭	0.82/0	N/A	0.09/0	G: ♭,N/A,–
113	113		1/0.25	1/0.25	0.39/0	G: ♭,♭,–	1/0.25	1/0.5	0.15/0	G: ♭,♭♭
140	140		1/0	N/A	0.56/0	G: ♭,N/A,♭	1/0	0.57/0	0.18/0	G: ♭,♭,–
146	146	E: –,–,–	1/0	N/A	0.29/0	A: ♭,N/A,–				A: ♭,–,–

Table 12. Perceived signature of concordant intabulations as reflected in Buxheim

The perceived signatures of these concordances tend to match those found in Buxheim quite closely, and to behave in the same way relative to the models: F-pieces tend to acquire B♭, and are transposed to C-lydian (not mixolydian), and the two D-pieces that show $\hat{6}$, also do so in two out of three concordances. Most of these concordant intabulations are in Loch, which in general appears to have

more flats in the superius than Buxheim.[27] In particular, the high number of B♭s in the superius of G-dorian pieces in Loch suggests that the "missing" superius B♭s in G-dorian pieces in other manuscripts (such as Buxheim) really ought to be inserted.

3.2.2. Transposition Levels for Lydian and Mixolydian Pieces

As mentioned in the discussion of each final above, major-mode C-pieces are commonly transposed to G, and F-pieces are commonly transposed to C. Since only one G-mixolydian piece (No. 249, *Seit ich dich hercz lib*) remains untransposed, we cannot tell from these data what would happen to G-pieces if they were transposed.

The transposed C-pieces were all mixolydian (assigned to C: ♭, ♭,–), and were transposed to the mixolydian G-mode. On the other hand, all transposed F-pieces ended up as C-lydian (C: –,–,–).

Conceptually, at least, there *is* a difference between the lydian and mixolydian modes, and this difference is the low seventh degree of the mixolydian mode. F-pieces are lydian, with an automatically-added B♭, and G-pieces are mixolydian. C-pieces in Buxheim are either lydian (when transposed from F), or mixolydian (when transposed from G). No. 83 (*Se la face ay pale*) in Tr89, with its G final and signature F♯s in three of four voices, must be seen as the exception that proves the rule: it is the only instance of a piece transmitted predominantly as lydian appearing also on G, and perhaps the scribe felt the need to add this peculiar signature accidental, to underline the unusual nature of this transposition.

Out of this conceptual separation of lydian and mixolydian arises a practical concern: if the deciding point is the status of the seventh degree, and we habitually raise the seventh degree at cadences to the final, does the distinction not become

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[27] A study of perceived signatures in *all* of Loch using the same method will have to wait until a later study; however, Table 12 suggests that Loch may well turn out to have even better rates of signing than Buxheim in its intabulations, although its vocal-notation pieces have no signatures.

moot? This question will be addressed further in Chapter 5, during an examination of favoured cadence degrees and leading tones.

Preliminary Conclusions

From these data, we may make some generalisations about the behaviour of signature accidentals in Buxheim intabulations:

1. The superius rarely reflects signature flats, and does not usually reflect transposed B♮s as F♯s.
2. The contratenor reflects flat signatures less consistently than the tenor.
3. F: –,–,– is unacceptable to the Buxheim intabulator, and is always rendered as F: ♭,♭,–.
4. Transposition is usually to the fifth above (fourth below), rather than the fourth above, for the following modes: C-mixolydian to G; F-lydian to C; G-dorian to D. (G-mixolydian is not transposed in Buxheim.) On the other hand, D-dorian may go to C-dorian or G-dorian.[28]
5. A is an uncommon transposition of D-pieces, perhaps because the sixth degree would have to be raised by F♯s if the dorian mode were placed on A, and the fifth degree E would receive phrygian cadences instead of dorian (we will return to this point in Section 6).
6. There appear to be two groups of dorian pieces: those with few flattened sixth degrees, and those with more flattened sixth degrees. Both types occur in G- and D-pieces (there are not enough C-pieces to tell).
7. Perceived signatures in Buxheim can be used to predict the signatures of models with a reasonable expectation of accuracy.

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[28] By contrast, Leo Treitler sees No. 116 (*Franc cuer gentil*) as an F-piece (in Buxheim, it is G-mixolydian), and No. 127 (*Mille bonjours*) as a C-piece (G-dorian in Buxheim). He cites No. 11 (*Le Serviteur*) as an exception [Treitler, 1965, pp. 155, 159, and 163]. However, in Buxheim, C-dorian, while uncommon, does occur as a target for transposition from D (Nos. 10 and 74) and G (No. 62). I mentioned earlier that Boone sees G: ♭,♭,– more as a coloration of G: –,–,–, rather than as a transposition of D-dorian [Boone, 1997, p. 84]. As we have seen, there are both transpositions from D to G and from G to D in Buxheim.

3.3. Intabulations Without Known Models

In Table 13, Table 14, and Table 15, each Buxheim piece that is apparently an intabulation, but lacks a concordant model, is assigned to one of the standardised final/signature combinations.[29] To what extent do these pieces fit into the categories suggested by the intabulations that have models?

Among the lydian and mixolydian modes (37 pieces), F is the most common (18 pieces), followed by C-lydian (10), G (7), and C-mixolydian (3) (the order of preference and the ratios are very similar to those of the pieces with models). Among the dorian modes (34 pieces), D (18) and G (12) are again the most common, with only two A- and one C-piece (among the pieces with models, G-dorian was somwhat more common than D-dorian, C was quite rare [6 pieces] and A occured only once). The phrygian modes are represented by a single piece.

As before, C-pieces tend to be lydian: mixolydian pieces are quite rare, even on G. One of the pieces currently classified as G-mixolydian (No. 171, *Se belle*) shows a slight tendency towards the dorian. Despite its tenor E♭, No. 123 (*Quatons*) is categorised as C-mixolydian: the E♭ occurs at a phrygian cadence to D.[30]

Seven of seventeen D-pieces have at least one perceived signature flat, further supporting the existence of two distinct groups of D-dorian pieces.

Among eighteen F-pieces, eleven do not have sufficient B-flats to allow a categorisation as F: ♭,♭,–. Except in the cases of Nos. 1, 2, and 183, the lack is in the contratenor. To explain the lack of flats, we will need to look at the B's in these pieces individually. Potentially, many of these B's could be double-leading-tones at cadences to F. In Chapter 5, we will investigate this possibility.

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[29] These are pieces that have no identified *cantus firmus*, and are distinct from free keyboard works such as *præambula*, stylistically resembling pieces with known models.

[30] Phrygian cadences and the scale degrees on which they tend to occur are dicussed in Chapter 5.

	Piece	Bux No.	Tenor B/E	Contra B/E	Superius B/E	Final	"Sig."	Notes
C-lydian	22	22	0/0	0/0	0/0	C:	–,–,–	
	25	25	0/0	0/0	0/0	C:	–,–,–	
	26	26	0/0	0/0	0/0	C:	–,–,–	
	162	162	0/0	0.25/0	0/0	C:	–,–,–	
	175	175	0/0	N/A	0/0	C:	–,N/A,–	
	184	184	0/0	0/0	0/0	C:	–,–,–	
	188	188	0/0	0/0	0/0	C:	–,–,–	
	204	204	0/0	0/0	0/0	C:	–,–,–	
	228	228	0/0	0/0	0/0	C:	–,–,–	
	238	238	0/0	0.75/0	0/0	C:	–,♭,–	situation unclear
C-mixolydian	9	9	0.6/0.25	1/0.13	0.11/0.08	C:	♭,♭,–	
	123	123	0.82/1	0.88/0	0/0	C:	♭♭,♭,–	1 E in tenor
	177	177	0.75/0	0/0	0/0	C:	♭,–,–	1 B in contra
C-dorian	199	199	0.8/0.86	N/A	0.14/0.26	C:	♭♭,N/A,–	
D-dorian	45	45	1/0	N/A	0.19/0	D:	♭,N/A,–	
	46	46	1/0	1/0	0.2/0	D:	♭,♭,–	
	67	67	0.88/0	0.33/1	0.12/0	D:	♭,–,–	contra E-flats correct vertical tritones
		181	0/0	N/A	0.02/0	D:	–,N/A,–	
	87	87	0.67/0	0/0	0/0	D:	♭,N/A,–	
	120	120	0/0	0/0	0/0	D:	–,–,–	
	133	133	0.4/0	0/0.03	0/0	D:	–,–,–	
		134	0.17/0	1/0.09	0/0	D:	–,♭,–	1 contra B, which fixes a tritone leap.
	147	147	0.83/0	0/0	0.03/0	D:	♭,–,–	
	164	164	0/0	0/0	0/0	D:	–,–,–	
	165	165	1/0	N/A	0/0	D:	♭,N/A,–	
	166	166	0/0	0/0	0/0	D:	–,–,–	
	179	179	0/0	0/0	0/0	D:	–,–,–	
	180	180	0/0	0/0	0/0	D:	–,–,–	
	220	220	0/0	0/0	0/0	D:	–,–,–	
	223	223	0/0	0/0	0/0	D:	–,–,–	
	253	253	0/0	0.25/0	0/0	D:	–,–,–	
E-phrygian	163	163	0/0	0/0	0/0	E:	–,–,–	

Table 13. Intabulations without models: C-, D- and E-pieces

	Piece	Bux No.	Tenor B/E	Contra B/E	Superius B/E	Final	"Sig."	Notes
F-lydian	1	1	0/0	0/0	0/0	0/0	F:	–,–,–,–
	2	2	0.4/0	0/0	0/0	F:	–,–,–	2 contra B's, both DLTs
	4	4	1/0	0.88/0	0.11/0	F:	♭,♭,–	
	14	14	0.75/0	0.86/0.33	0.07/0	F:	♭,♭,–	
		15	0/0	0/0	0/0	C:	–,–,–	
		219	0/0	0/0	0/0	C:	–,–,–	
	42	42	0.57/0	0/0.75	0.17/0	F:	♭,♭,–	only one B in contra, right before a DLT to D
	76	76	0.57/0	0.2/0.11	0/0	F:	♭,–,–	explicable
	99	99	0.67/0	0/0	0/0	F:	♭,–,–	explicable
	107	107	0.8/0	0.29/0.29	0/0	F:	♭,♭,–	contra weak
	114	114	0.56/0	0/0.14	0.08/0.06	F:	♭,–,–	explicable
	129	129	0.5/0	0.33/0.33	0/0	F:	♭,–,–	weak, explicable
	182	182	1/0	N/A	0/0	F:	♭,N/A,–	
	183	183	0/0	N/A	0/0	F:	–,N/A,–	
	185	185	0.5/0	0.18/0	0.14/0	F:	♭,–,–	weak
	192	192	0.71/0.25	1/0.5	0/0.23	F:	♭,♭,–	
	211	211	1/0.6	N/A	0.56/0.15	F:	♭♭,N/A,♭	mixolydian?
	247	247	0.33/0	N/A	0/0	F:	♭,N/A,–	tenor weak

Table 14. Intabulations without models: F-pieces

The single most interesting intabulation without model is No. 27 (Table 15, "Multi-final", referring to this piece's transmission on several different finals within Buxheim), with three intabulations in Buxheim, each of which is on a different one of the three favoured dorian finals (C, D, G). The perceived signatures of the intabulations confirm these transpositions of the dorian mode beautifully.

Another title with two finals is No. 14/No. 15/No. 219, which occurs as F: ♭,♭, – and C: –,–,–. If the patterns observed in pieces *with* models hold true, we would expect the (non-extant) model for this intabulation to be an F-piece (see Table 14).

	Piece	Bux No.	Tenor B/E	Contra B/E	Superius B/E	Final	"Sig."	Notes
G-mixolydian	108	108	0/0	0/0	0/0	G:	–,–,–	
	115	115	0/0	0/0	0.06/0	G:	–,–,–	
	171	171	0.29/0	0.4/0	0/0	G:	–,–,–	
	173	173	0/0	0/0	0/0	G:	–,–,–	
	174	174	0/0	0/0	0/0	G:	–,–,–	
	176	176	0/0	0/0	0/0	G:	–,–,–	
	178	178	0/0	N/A	0/0	G:	–,N/A,–	
	246	246	0.14/0.17	0.75/0	0/0	G:	–,♭,–	
G-dorian	13	13	1/0	0.8/0.4	0.35/0	G:	♭,♭,–	
	65	65	0.5/0	0.83/0	0.08/0	G:	♭,♭,–	
	101	101	1/0.22	0.63/0	0.5/0	G:	♭,♭,–	
	126	126	0.8/0	0.33/0	0.15/0	G:	♭,♭,–	contra weak
	145	145	1/0	0.5/0	0.2/0	G:	♭,♭,–	
	148	148	1/0	1/0	0/0	G:	♭,♭,–	
	187	187	0.54/0	0.4/0.11	0.13/0	G:	♭,♭,–	contra weak
	197	197	1/0	N/A	0.26/0	G:	♭,N/A,–	
	198	198	0.91/0	0/0	0.43/0	G:	♭,–,–	
	221	221	1/0	N/A	0.5/0	G:	♭,N/A,♭	
	239	239	1/0.67	1/0.83	0.78/0.14	G:	♭♭,♭♭,♭	
A-dorian	105	105	0/0	0/0	0/0	A:	–,–,–	
	245	245	0.2/0	1/0.5	0.11/0	A:	–,♭,–	
Multi-final	27	27	1/0	0.78/0	0/0.08	G:	♭,♭,–	
		28	0.43/0.75	0.75/0.5	0.1/0.2	C:	♭♭,♭♭,–	tenor weak
		29	0/0	0/0	0/0	D:	–,–,–	

Table 15. Intabulations without models: G-, A- and Multi-final-pieces

The perceived signatures of the intabulations without models thus largely confirm the conclusions suggested at the end of Section 3.2.

3.4. Free Keyboard Works and *Cantus-Firmus* Settings

To what extent do the standard final/signature combinations favoured in Buxheim intabulations also prevail in Buxheim keyboard-specific works? Table 16, Table 17, Table 18, and Table 19 show the perceived final/signature combinations for these pieces, not including the *fundamenta* (which have multiple finals).[31]

	Piece	Bux No.	Tenor B/E	Contra B/E	Superius B/E	Final	"Sig."	Notes
C-lydian	206	206	0/0	0/0	0/0	C:	–,–,–	*"C vel G"*
	37	217	0/0	0/0	0/0	C:	–,–,–	
		52	0/0	0/0	0/0	C:	–,–,–	
	78	78	0.4/0	0/0.67	0.01/0	C:	–,–,–	
	81	81	0.41/0	0/0	0.02/0	C:	–,–,–	
	97	97	0.04/0	0/0	0/0	C:	–,–,–	
		205	0/0	0/0	0/0	C:	–,–,–	
		207	0/0	0/0	0/0	C:	–,–,–	
		208	0/0	0/0	0/0	C:	–,–,–	
		209	0/0	0/0	0/0	C:	–,–,–	
	118	118	0/0	0/0	0/0	C:	–,–,–	
	119	119	0/0	0/0	0/0	C:	–,–,–	
	216	216	0/0	0/0	0/0	C:	–,–,–	
	232	232	0/0	1/0	0/0	C:	–,♭,–	one contra B
C-mixolydian	77	77	1/0.14	0.61/0.67	0/0	C:	♭,♭,–	E♭s at x4
	194	194	0.5/1	0.75/0.33	0.4/0	C:	♭♭,♭,–	

Table 16. Other pieces: C-pieces

C-pieces (Table 16)

One of the C-pieces requires closer examination to determine in which category it belongs. No. 77 is a magnificat setting, supposedly in the eighth tone, so we would not expect it to have so many E♭s in the contratenor (on the surface suggesting

[31] Nos. 153 and 157 have been eliminated from these pieces, because they are tripartite Kyrie settings, with different sections having different finals.

	Piece	Bux No.	Tenor B/E	Contra B/E	Superius B/E	Final	"Sig."	Notes
D-dorian	35	35	0.61/0	0/0.05	0.07/0	D:	♭,–,–	
	36	36	0.07/0	0/0	0/0	D:	–,–,–	
	54	56	1/0	0.2/0.25	0.02/0	D:	♭,–,–	
		57	0.76/0	0.67/0.29	0.01/0	D:	♭,♭,–	
	64	64	1/0	0/0.67	0.05/0	D:	♭,–,–	
	68	68	0.95/0	0.17/0	0.13/0	D:	♭,–,–	
		69	0.81/0	0.38/0.04	0.07/0	D:	♭,–,–	
		70	0.82/0	1/0.21	0.05/0	D:	♭,♭,–	
	72	72	0.81/0	0.17/0	0.09/0	D:	♭,–,–	
		73	0.65/0	0.42/0.13	0.02/0	D:	♭,–,–	
	79	79	0.76/0	0/0.04	0.01/0	D:	♭,–,–	
	84	84	1/0	0/0	0/0	D:	♭,–,–	
		213	1/0	0/0	0/0	D:	♭,–,–	
	86	86	0.89/0	0/0.5	0.08/0	D:	♭,–,–	
	96a	96a	0/0	0/0	0/0	D:	–,–,–	
	112	112	0/0.33	0.2/0	0/0	D:	–,–,–	
	149	149	1/0	0.08/0	0/0	D:	♭,–,–	
	150	150	1/0	0/0	0.16/0	D:	♭,–,–	
	215	215	0/0	0/0	0/0	D:	–,–,–	
	222	222	0/0	0/0	0/0	D:	–,–,–	
	232b	232b	0.6/0	1/0.33	0/0	D:	♭,♭,–	
	224	224	0.88/0	0/0	0.07/0	D:	♭,–,–	
	241	241	0/0	1/0	0/0	D:	–,–,–	
	251	251	0/0	1/0	0/0	D:	–,–,–	

Table 17. Other pieces: D-pieces

C-dorian). Nevertheless, they can be explained: a modally-correct transposition of the eighth tone to C requires B♭, and since this is a tenor *cantus firmus* setting, we should not be surprised to find that all the tenor B's have been flattened, further underlining the intabulator's concern with modal distinctions among C-pieces. All the contratenor E♭s function as vertical tritone-repair against B♭; none occurs against a C (a combination which might suggest C-dorian). The hierarchy of concerns operating in this piece is thus: first, the tenor must be an exactly correct transposition

	Piece	Bux No.	Tenor B/E	Contra B/E	Superius B/E	Final	"Sig."	Notes
E-phrygian	131	131	0/0	0/0	0/0	E:	–,–,–	
	132	132	0/0	0/0	0/0	E:	–,–,–	
	156	156	0/0	0.46/0	0/0	E:	–,–,–	
	233	233	0/0	0.46/0	0/0	E:	–,–,–	
F-lydian	54	54	0.89/0	1/0.36	0.10/0	F:	♭,♭,–	
		55	0.88/0	0.91/0.05	0.06/0	F:	♭,♭,–	
	58	58	1/0	1/1	0.25/0	F:	♭,♭♭,–	1 contra E♭ repairs tritone
	85	85	0.79/0	0.33/0.25	0.01/0	F:	♭,–,–	only 3 contra B's
	88	88	0.75/0.3	0.22/0.33	0.04/0	F:	♭,–,–	most contra B♮s can be explained
	97	98	0.79/0	0.78/0.12	0.07/0	F:	♭,♭,–	
	135	135	0.8/0	0.86/0	0.02/0	F:	♭,♭,–	
	136	136	0.87/0	0.8/0.56	0.01/0	F:	♭,♭♭,–	
	172	172	0.6/0.55	N/A	0.06/0	F:	♭♭,N/A,–	
	186	186	0.67/0	1/0.25	0.13/0	F:	♭,♭,–	
	195	195	1/0	1/1	0.09/0	F:	♭,♭♭,–	1 contra E
	200	200	0.86/0.2	N/A	0.17/0.05	F:	♭,N/A,–	
	201	201	0.8/0.25	N/A	0.08/0	F:	♭,N/A,–	
	210	210	1/0	N/A	0/0	F:	♭,N/A,–	
	212	212	1/0	N/A	0.04/0	F:	♭,N/A,–	
	225a	225a	0/0	1/0	0/0	F:	–,♭,–	1 tenor B, between 2 C's
	234	234	1/0.4	1/1	0/0	F:	♭,♭♭,–	
	235	235	0.5/0	1/0.5	0/0	F:	♭,♭♭,–	
	244	244	0.75/0	1/0.5	1/0	F:	♭,♭,♭	2 contra E's

Table 18. Other pieces: E- and F-pieces

of the eighth tone. Second, the added material must form good counterpoint, with illegal tritones being repaired by added E♭s. There is no apparent concern with expressing eighth-tone characteristics in the added voices; apparently, it is enough that the tenor is clearly in the correct tone.

	Piece	Bux No.	Tenor B/E	Contra B/E	Superius B/E	Final	"Sig."	Notes
G-mixo/lydian	191	191	0/0	0.67/0	0.5/0.29	G:	–,♭,♭	labelled *G vel C*
	151	151	0/0	0.25/0	0/0	G:	–,–,–	
	167	167	0.09/0	0/0	0/0	G:	–,–,–	
	189c	189c	0/0	0/0	0/0	G:	–,–,–	
	248	248	0/0	0/0	0/0	G:	–,–,–	
G-dorian	53	53	1/0	1/0	0/0	G:	♭,♭,–	
	71	71	1/0.5	1/0	0.38/0	G:	♭♭,♭,	
	100	100	0.82/0	N/A	0.09/0	G:	♭,N/A,–	
	140	140	1/0	0.57/0.2	0.18/0	G:	♭,♭,–	
	141	141	1/0	0.8/0.25	0.09/0	G:	♭,♭,–	
	142	142	0.89/0	0.54/0	0.12/0	G:	♭,♭,–	
	191	191	N/A	0.67/0	0.5/0.29	G:	N/A,♭,♭	labelled *G vel C*
	218	218	1/0	0/0	0.82/0	G:	♭,–,♭	only one contra B, which could be tritone repair
	240	240	0.75/0	N/A	0.36/0	G:	♭,N/A,–	

Table 19. Other pieces: G-pieces

D-, F- and G-pieces (Table 17, Table 18, and Table 19)

As in the intabulations without models, most of the D-pieces have many B♭s in the tenor, again suggesting a disctinct "D-dorian-with-♭$\hat{6}$" group. As promised earlier, the exact relationship between these pieces and a tendency to flatten the peaks of melodic lines will be investigated in Chapter 6.

The F-pieces are just as consistent as the intabulations in having B♭s in the lower voices, and the G-pieces break down into their two categories (G-mixolydian and G-dorian) quite cleanly.

"Multi-Final" Tenor settings

There are multiple settings of some of the tenors. The shared transposition levels are

C and F. As in the intabulations with models, the F-final versions have consistent ♭, ♭, — signatures. The exception is the *basse danse Collinetto*, which is represented by two F-final lydian settings, and two D-final dorian settings. The presence of both of these in the same manuscript, a manuscript as scrupulously-notated as Buxheim in terms of transmitted signatures, suggests that this tenor really does exist in two distinct modes. In Cornazano, Collinetto is a D-final tenor ([Crane, 1968, pp. 64 and 104] and [Cornazano, 1981, p. 52]).

Altogether, the *cantus firmus* settings and free keyboard works support the hypotheses suggested in the investigation of the intabulations with models.

3.5. Conclusions and Implications

1. The study of the models suggests a classification into four distinct modes in several transpositions, in keeping with the eight-mode system. This is confirmed by the behaviour of the Buxheim intabulations of these pieces, especially by the consistency with which pieces are transposed to other finals of the same mode. In essence, we have confirmation from this repertoire of Berger's findings from theoretical sources. Other Buxheim pieces also fit well into this classification, including several pieces transmitted within Buxheim at multiple transposition levels of the same mode. The modal classifications in operation are as follows:
    - Dorian, on C (♭♭), G (♭), D, and (rarely) A
    - Phrygian (rare), on A (♭) and E
    - Lydian, on F and C, with automatically-lowered ♭$\hat{4}$
    - Mixolydian, on C (♭) and G
2. The tenor signature is the most consistently transmitted, in Buxheim as well as in the concordances, suggesting that the tenor signature is indeed "firmer" and more mode-determining.
3. The greater inconsistency of transmission for superius and contratenor signatures may well be related to the application of accidentals (cancellation of signature flats), especially in cadential progressions.
    - Variations among perceived contratenor signatures in Buxheim can often be explained by double-leading-tones or by vertical tritone (or diminished fifth) corrections. This suggests that both harmonic corrections and conveniently raised leading tones influence the use of partial signatures, and that signatures need not be taken as completely prescriptive.

- The frequent absence of signature flats in the superius of the models carries as a consequence that the leading-tones of C-cadences (and F-cadences) are raised as a matter of course. Are these leading-tones also raised (by cancellation of a signature flat) when they occur in the tenor and contratenor (see Section 5.1)?

Chapter 4

Internal Accidentals: Problems and Analysis

The central issue for this dissertation is the comparison of Buxheim with its concordances for different types of accidentals. The principal source of inspiration for the methodology was a quantitative analysis of accidentals in Binchois's chansons as transmitted in their various sources, by Thomas Brothers [Brothers, 2000]. In his article, Brothers demonstrates that quantitative analysis can yield valuable insights to the questions of *musica ficta*, and breaks new ground in developing a method for such analysis.

Brothers discusses several problems inherent in such an analysis. Some of these problems can be solved in a larger-scale study such as this one, but some, at best, can be solved only imperfectly. In this section, I will summarise Brothers's method, address these problems, describing my solution for each, and explain my analytical method.

Brothers counts all places where an internal (i.e. not signature) accidental appears in any source. Each accidental is then assigned to one or more groups, based on his analysis of its function. Since an accidental can have more than one function, it can belong to more than one group. This increases the total number of accidentals, since some accidentals are counted more than once. His function groups are as follows:

1. Propinquity: accidentals added to perfect a progression of vertical intervals, as described in discant treatises.
    1.1. 6–8 progressions
    1.2. 3–5 progressions
    1.3. 3–1 progressions
    1.4. 3–8 progressions

1.5. raised thirds: often found at the goal sonority of mid-point cadences, these are considered propinquity inflections because their voice-leading appears to resolve in the next phrase. [32]

1.6. early anticipation (a sharp appears a while before the actual cadential progression)

1.7. evaded cadence (one structural voice does not resolve as expected)

2. Peak notes:[33] flats added to round off the top note of a melodic line; often correcting illegal horizontal intervals.
   - Peak note approached by step.
   - Peak note approached by leap.
3. Pre-cadential lowered thirds: a coloristic device, not mentioned in the treatises (subcategory of peak note).
4. Miscellaneous: not belonging into any other category; some possibly erroneous.
5. Necessity: vertical corrections of illegal intervals.
6. Causing augmented or diminished intervals: vertical. Accidentals which seem to be added with the intention of causing a dissonance deliberately.
7. f"-fa: a flat added to f" because of its position above the regular gamut.

The number of accidentals in each function group is represented as a percentage of the total number of accidentals. For each function, Brothers also determines a rate of signing (RoS).

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[32] Brothers argues that these serve to propel forward, containing tension, and that they are in this way different from later Renaissance raised thirds as found in final cadences [Brothers, 2000, pp. 258–259]. In this, he agrees with Margaret Bent's interpretation [Judd, 1998, p. 47]. In this study, I will look at raised thirds in final cadences only. Karol Berger [Berger, 1987, pp. 138–139] states that thirds do not commonly appear in final cadences much before the early-16th-century theorists' advice to raise these thirds. However, there are several pieces in Buxheim where these occur. These will be discussed in greater detail later (Section 5.6).

[33] Brothers uses the term "top tone".

For example, when an accidental is present in a specific place in one MS, in what percent of concordances of that place is the same accidental present? This percentage would be the RoS for that individual accidental. To get the RoS for a function, he adds together the RoS's of all accidentals found that fall under that function category.

Brothers excludes all pieces that are transmitted only in one source from this calculation, arguing that for the accidental-places in these pieces, the RoS is automatically 100% [Brothers, 2000, p. 286]. In other words, he is bothered by the possibility that an accidental-place for which there is only one concordance might receive the same weight as accidental-places for which there are eight or ten concordances. He realises that an accidental-place for which we have many sources to compare can tell us more about transmission practices than an accidental-place for which we have only one source. Undoubtedly, he is right. However, in the end, he makes no difference beween places for which there are two concordances, and places for which there are eight concordances (for example). He only excludes places for which there is only one concordance. The problem is that he is combining a "vertical" calculation (in what percentage of manuscripts is this specific accidental transmitted?) with a "horizontal" calculation (on average, in what percentage of manuscripts are all accidentals of this type transmitted?) without accounting for the distortion caused by the possible answers to the vertical calculation.

Brothers also examines the RoS (for all functions together) within individual sources. He finds that those sources which are generally considered the best for Binchois's songs have a higher RoS, leading him to associate a high RoS with manuscript authority. Later manuscripts tend to have a lower RoS; that is, accidentals tend to disappear over time. If notation of accidentals depended on performance conventions, one would expect a piece to accumulate more accidentals over time (to clarify matters for the performers), not to lose them. He does not compare the RoS for

specific functions within most of the individual manuscripts, since he feels the data pool is too small [Brothers, 2000, pp. 273–274]. Since this study focusses on a large manuscript rather than on a single composer, we can make this latter comparison for Buxheim. In the next section, the adaptation of this method to Buxheim is described.

4.1. Application of Function Categories in this Study

I am avoiding any *a priori* decisions about an accidental's function or its duration. Rather than looking at an accidental and deciding what its function is (which bears a danger of circularity), I try to define an accidental-function precisely, and then identify all situations, whether they actually carry accidentals or not, that answer to the function (for example, I identify all 6–8 progressions, whether or not there is a sharp nearby). Then, I look at each of the function-situations I have found, and find accidentals that have been added at this situation. This brings with it several consequences:

1. Multiple-function accidentals will show up in each function category to which they apply. Accidentals answering to a certain function do not receive attached function labels; they are found and counted anew for each separate function. Thus, I cannot know which accidentals are multiple-function, and therefore, I cannot look at multiple-function accidentals as a separate category.
2. The function categories are of necessity precisely defined. This means that some of the odder arrangements of notes are ignored, and only accidentals answering to one of these defined functions are collected. Thus, there is currently no way to collect "miscellaneous" accidentals, i.e. accidentals which answer to no other function. Brothers's propinquity categories "3–8", mid-point "raised third" and "evaded cadence" are not included.
3. The RoS problem, in which some accidentals receive far more weight than others because of distortion, disappears, since pieces transmitted in two sources are no longer given the same weight as pieces transmitted in eight sources. Instead, I count each concordance of any given model as though it were a

separate piece.

Brothers counts only internally-signed accidentals; thus, he ignores any possible interaction between signature and internal signs. I will consider each function category in light of Final/Signature Combinations: does the presence of the signature help avoid having to add internal accidentals, or is it solely about transposition of the gamut or of the mode? This will allow me to make a better guess at the purpose of signatures/partial signatures.

Brothers points out that the whole system of function categories does not allow easily for more complicated situations—placing an accidental in a category sometimes involves judgments as to its duration.[34] One way to approach this problem is to count accidentals first only if they occur *at* the actual situation, and then to increase the window in which an accidental is admitted to apply to the situation.

Finally, Brothers suggests a task for the future: carrying out analyses on larger sample groups, using a similar method. He would like this to be carried out with, ideally, "an awareness of stylistic tendencies associated with individual composers, on the one hand, and with a refined sense of how each source has been put together, on the other [Brothers, 2000, p. 275]."

I will apply such a method (counting accidentals based on function categories), but I will not be examining individual composers, because only Binchois, Du Fay, and Paumann are demonstrably represented by five or more pieces in my data set. The path of transmission of an accidental between sources—was it added or omitted because of a musical reason or because of a circumstance of the copying process?—is unclear to us. We know of direct relationships between a few manuscripts, but for

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[34] For instance, see his example of a sharp put in the propinquity category because he judges that it anticipates/would last until the leading-note immediately before the cadential resolution—this note does not actually have a sharp, but he treats the earlier note *as though* the later note had a sharp [Brothers, 2000, pp. 259–260].

most, we can propose only an approximate origin in terms of time and location. In addition, some manuscripts are obviously more reliable than others in terms of scribal competence—for example, the scribe of Schedel seems to have been only imperfectly aware of the proper use of clefs and mensuration signs, not to mention signatures, and it is a happy coincidence if all voices manage to get to the end of the piece within a semibreve of each other. His (often substitute) contratenors generally sound somewhat—martian.

Instead of examining composers, I will compare the accidental-signing-styles of the Buxheim intabulators to the general picture given by concordances of the same pieces in other manuscripts: among sloppy and precise, "authoritative" and never-meant-to-be-sung-from, what can Buxheim tell us about the range of practices in the use of accidentals and the priorities of its scribes?

4.2. Categories and Conventions

The following is an overview of the topics that will be examined in the next chapters. Each of the function categories listed below will be described in more detail with musical examples.

Cadences and Finals:

1. Which cadential notes are most common in relation to which finals?
2. Which types of cadential voice-leading are preferred?

Categories of Internal Accidentals:

1. leading tones at cadential progressions (6–8, 3–1) (propinquity)
    1.1. is there a relationship to final/signature combination?
    1.2. do certain combinations of "cadential strength" markers (derived from PHRASEFIND) receive more accidentals?
2. double leading tones at cadential progressions
3. phrygian cadences
4. raised thirds in final chords
5. peak-note accidentals
    5.1. on what pitches do peak-note flats occur in relation to final/signature combination?
    5.2. are peak-note flats more commonly added to steps than to skips?
    5.3. special subcategory: the pre-cadential lowered third (as defined by Brothers)
6. melodic corrections of augmented fourths and diminished fifths
    6.1. skips
    6.2. steps
7. harmonic corrections of augmented fourths and diminished fifths

8. rare accidentals: G♯, D♯, A♭: in what situations do these occur?

A few terms need to be clarified before proceeding. In the following chapters, "rate of signing" will be used to mean how many times a given function is signed out of all occurrences of this function (signed and unsigned). This is a broader use of the term than Brothers's, who calculates the RoS for specific places in a piece.

In tables, the letters "S" and "I" will be used as explained in Section 2.3, to mean signature and internal accidentals, respectively. Thus, "SI" is a redundantly-signed accidental (e.g. an internally-signed B♭ in a voice with a signature B♭ already in effect).

Chapter 5
Accidentals in Cadential Progressions

The output of CADFIND gives us labels at progressions that might be considered cadential (6–8, 3–1). By adding an extra requirement, that the sixth (or third) be major (or minor), we can count all those cadential progressions that are directly provided with a propinquity accidental (for the cadential notes G, A, and D) and those which appear to have been deliberately given a minor sixth (for the cadential notes E [F♯], F [E♭], and C [B♭]). To take into consideration accidentals which are marked earlier, but might be intended to apply at the cadential progression, we have to allow a longer window of opportunity: we remember each internal accidental as it occurs, and check if there is a cadential progression to the appropriate pitch within a certain period of time. I have chosen to reset this window of opportunity for internal accidentals every time a new cadential progression occurs, thus allowing an internal sharp or flat potentially to be in effect for a whole phrase.

5.1. Leading Tones

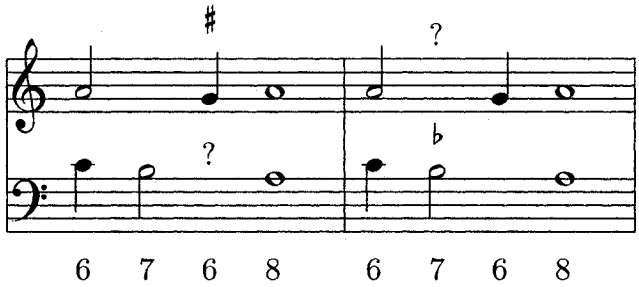


Figure 26. Leading-tone accidentals

First, I will examine leading tones at cadential progressions.[35] The following questions will be answered in this section:

1. Which degrees receive the most cadences for each final?
2. Do favoured cadential degrees receive more raised leading tones?
3. Should raised leading tones be investigated as a potential indicator of cadential strength?
4. Are signature flats regularly cancelled to provide raised leading tones?
5. Is a whole phrase generally too large a window of opportunity for leading-tone-affecting accidentals?

Table 20, Table 21, and Table 22 (at the end of Section 5.1) show numbers of cadential progressions, raised leading tones, and flattened leading tones, divided by the finals of the pieces. In each table, the columns refer to finals, divided into the concordances and the Buxheim pieces. The rows refer to the pitch which is the goal of the cadential progression. Each of these is subdivided into the state of the leading tone. For example, C-progressions are divided into three rows: 1. the

[35] Leading tone is used here to identify the pitch below the cadential note, whether or not it is raised.

leading tone is B♭ (caused by signature [S]/caused by internal accidental [I]), 2. the leading tone has an internally-signed natural (cancellation of signature), and 3. all progressions going to C, regardless of ♭/♮. (A similar system will be followed for subsequent tables.)

Table 20 shows those progressions where the leading tone appears in the superius, Table 21, the tenor, and Table 22, the contratenor. The following discussion will refer to these tables. For ease of reference, graphic representations of most of the information from these tables can be found in Bar Graphs 20a–22a (progressions to E and B have been omitted from the bar graphs). Bar Graph 22.5 summarises the data for leading tones across all voices.

In the bar graphs, each bar represents 100% of each of the available leading tones. Each bar is subdivided into differently-shaded sections for the accidentals applying to this leading tone, with the lowest pitch of the leading tone at the bottom of the bar. For example, in the C-progressions graph of Bar Graph 20a, under progressions in C-final concordances (the first bar), the medium-gray section represents (signature) B♭s, the thin white section represents internally-signed B♮s, and the light-gray section on top represents (unsigned) B♮s.

Leading tone in the superius

Approximately 90% of cadential progressions with the leading tone in the superius are tenor-superius progressions, with contratenor-superius progressions a distant second.

C, D, F, and G-final pieces all strongly favour progressions to the final and the fifth above (see Table 20 and Table 23). G-pieces seem to be the most final-affirming, cadences to G outnumbering those to D by almost 2:1. There are few E- and A-pieces, but the data available suggest favouring of the final for each, with second place going to G (for E-pieces) and E (for A-pieces)(see Table 20).

The other cadential-progression pitches are placed in order of descending fre-

quency in Table 23, amalgamating Buxheim and the concordances (A and E are omitted due to insufficient data):

Final						
C:	$\hat{1}$	$\hat{5}$	$\hat{2}$	$\hat{4}$	$\hat{6}$	$\hat{3}$
	C	G	D	F	E	A
	39%	29%	12%	8%	6%	5%
D:	$\hat{1}$	$\hat{5}$	$\hat{3}$	$\hat{4}$	$\hat{7}$	$\hat{2}$
	D	A	F	G	C	E
	35%	25%	16%	13%	6%	5%
F:	$\hat{1}$	$\hat{5}$	$\hat{2}$	$\hat{3}$	$\hat{6}$	$\hat{7}$
	F	C	G	A	D	E
	38%	30%	15%	10%	4%	1%
G:	$\hat{1}$	$\hat{5}$	$\hat{4}$	$\hat{2}$	$\hat{7}$	$\hat{6}$
	G	D	C	A	F	E
	44%	24%	13%	13%	4%	2%

Table 23. Favoured cadential-progression degrees for the superius

From this ordering, we can suggest a list of priorities when choosing cadential notes:

1. Favour the final and the fifth.
2. Favour C, F, G, and D as cadential pitches.
3. Avoid E.
4. Avoid the seventh degree (could this imply an awareness of the seventh degree as unstable, because frequently raised?).
5. There is no consistent favouring of the fourth degree or the sixth degree.

Next, we compare the favoured cadential degrees to the proportion of leading tones receiving sharps. While there are few accidentals in the Buxheim superius, there are still more than in the concordances (among the concordances, 69/1141 or 6% of total G-, D-, and A-progressions receive sharps, and among Buxheim, 214/1530, or 14%). We will worry about flats (in the context of F- and C-cadential progressions) later.

For the following discussion, refer to Table 20 and Bar Graph 20a.

In C-final pieces, G has proportionately more F♯s (26.7%) than D has C♯s (2.6%) or A, G♯s (4%) in Buxheim. It is difficult to tell with the concordances, because there are so few leading-tone sharps. In D-final pieces, D (13.9%), A (10.6%), and G (19.5%) all have 10% or more sharps. In the models, D has by far the highest concentration (nearly 30%). In F-final pieces, G has significantly more sharps than A or D in Buxheim and Concordances, and in G-final pieces, G has over 20% sharps in Buxheim. D has ca. 10% sharps, and A, none. In the concordances, G also has proportionately almost twice as many sharps as D (7.3%:4.3%), while A has none. One cannot tell conclusively if the prevalence of F♯ is due mainly to a preference for its position as the first sharp, or due to G being favoured as a cadential pitch before D and A in all finals except D. The fact that D does have nearly as many sharps in D-pieces as G, might indicate a slight tendency to give a signed raised leading tone at cadential progressions to the final.

We can test this proposal by examining C- and F-final cadences, which naturally have a raised leading tone, but may well have this leading tone lowered by signed (or internal) flats.

Let us begin with the concordances. Upon closer investigation, the few internally-signed flats in phrases preceding F- or C-cadential progressions prove to be well before the progression: there are almost no E♭s in F-cadential progressions. The bulk of the lowered leading tones is due to signature accidentals, which are cancelled by internally-signed B♮s in a very few cases. Since these leading tones never seem to be lowered on purpose (through redundant internal signing of a signature flat or application of an internal flat *immediately* before a cadential progression), I suggest that the internal flats in question are *not* meant to apply to the whole phrase.

To support this statement, we will turn to the Buxheim pieces. When discussing final/signature combinations, I stated that in Section 3 concentrations of reflected

signature flats of less than 100% might be explained by "cancelled-out" signature flats to allow for raised leading-tones. On the surface, this seems to have happened: for example, only five of the signature-B♭s in C-final pieces remain flat in Buxheim. However, I also pointed out that the Buxheim superius tends not to reflect the model's signature at all. Given this fact, our *few* Buxheim lowered leading tones suddenly seem rather *too many*—perhaps they were put there on purpose? When we look at the individual offenders in an attempt at saving our theory, we discover that most of these flats actually occur three or more semibreves before the cadential progression, and the leading tone immediately before the progression is, in fact, B♮!

When we compare the degree of implied-signature-flat-cancellation in Buxheim to the favoured cadential degrees mentioned above, we discover that in fact the few remaining B♭s at C-cadences occur in F- and G-pieces. As in the case of leading-tone sharps, this suggests that it was more important for the intabulator to raise leading tones in cadences to the final than in cadences to other degrees.

Examining the superius, then, gives us a list of favoured cadential degrees, which seem to have a slight relationship to the raising of leading tones. Altogether, the preference in the superius is to raise leading tones for finals, and to raise F to F♯. If cadential progressions to the final are in general found to be stronger (according to the measures of PHRASEFIND) than others, we might consider adding raised leading tones as a very minor indicator of cadential strength, and favour the final by adding raised leading tones.

Leading tone in the tenor

How do cadential progressions with the leading tone in the tenor fit with these conclusions?

There are far fewer cadential progressions with the leading tone in the tenor. Most of these progressions are tenor-superius 3–1 progressions, with a few contra-tenor-tenor 6–8 progressions.

Table 24 gives the order of preference for tenor-leading-tone cadential progression degrees.

Final						
C:	$\hat{1}$	$\hat{5}$	$\hat{2}$	$\hat{4}$	$\hat{6}$	$\hat{3}$
	C	G	D	F	A	E
	36%	32%	10%	7%	5%	4%
D:	$\hat{1}$	$\hat{5}$	$\hat{4}$	$\hat{7}$	$\hat{3}$	$\hat{2}$
	D	A	G	C	E	F
	44%	21%	15%	8%	6%	4%
F:	$\hat{5}$	$\hat{1}$	$\hat{2}$	$\hat{3}$	$\hat{6}$	$\hat{7}$
	C	F	G	A	D	E
	50%	17%	11%	10%	7%	3%
G:	$\hat{5}$	$\hat{1}$	$\hat{4}$	$\hat{2}$	$\hat{7}$	$\hat{6}$
	D	G	C	A	F	E
	39%	26%	12%	9%	6%	5%

Table 24. Favoured cadential-progression degrees for the tenor

The degrees past second place have suffered a little rearrangement; however, the primary difference is that the balance among them is far closer to equal in the tenor than in the superius (for example, among F-final pieces, the difference between the third- and sixth-place cadence degrees is 14% for the superius, but only 8% for the tenor). This might suggest that there is less of a hierarchy at play among these less-frequent cadential notes. This is supported by the switch in position of degrees $\hat{1}$ and $\hat{5}$ for F- and G-pieces. The 3–1 cadential construction, by its lesser consistency in terms of preferred cadential degrees, can be considered somewhat weaker than the 6–8 construction, and this will be added to the indicators of cadential strength.

The concordances provide very few raised leading tones: of 472 opportunities for sharps, only six progressions receive them (1%), and all of them are F♯s. How about Buxheim? 144/426, or 33.8%, of total G-, D-, and A- progressions receive sharps. (The superius, by comparison, had 69/1141 or 6% signed in the concordances, and 214/1530 or 14% signed in Buxheim). That is a terrifically high rate of signing.

Do these sharps bear any relationship to preferred cadential notes? In C-pieces, most of the sharps are, as before, at G-progressions. In G-pieces, nearly half of G-progressions have F♯s, and a satisfying 31.3% of D-cadences have C♯s. In F-pieces, there are very few sharps, all at G-progressions. *However*, D-pieces show most of their sharps at D-progressions (61.4% have C♯s) and at A-progressions (48.1%), with G-progressions lagging behind (22.2%). The leading tone sharps of the tenor in fact suggest quite strongly that cadential-degree-preference and raised leading tones are interrelated.

There are a total of six leading tones explicitly lowered through internally-signed flats in the concordances. All of them occur at C-progressions. Two (in F-pieces) occur long before the relevant progression, and may very well not apply. The two in a G-piece (in a concordant intabulation of No. 48 in Loch) occur in tablature, where the implied tenor signature (using the method established earlier for Buxheim) would be B♭. These, then, fall into our category of "non-cancelled signature flats"; asking why they are not cancelled, we can note that they both occur at places that would be considered very weak by PHRASEFIND standards—something to remember later. The last two occur in Nos. 11 and 117, two C-dorian pieces, immediately before the C-progressions in question. Neither (according to PHRASEFIND) is a particularly strong cadence; we will therefore earmark them also for later consideration.

The Buxheim tenors show an even more uncomfortably high concentration of flattened leading tones than the superius (38/191, or 19.9%). This is to be expected, given the much better reflection of signature accidentals in the tenor. Earlier, we saw that incomplete reflection, instead of suggesting randomness on the part of the intabulators, could partially be explained through raised leading tones. Although there are not enough pre-F-progression E♭s to come to any conclusions, the fairly small number of B♭s in C-pieces (as compared to F-pieces) lends more support to the idea that favoured cadential degree matters at least a little. Again, we must

compare these notated flats with other indicators for phrase strength (Section 5.2), to see if these flats support the idea that an important cadential progression is more likely to receive a raised leading tone. On the surface, it appears that not raising the leading tone at unimportant cadential progressions is an option espoused by the Buxheim intabulators.

The tenor's leading tone behaviour having supported the hypotheses proposed in the investigation of the superius, we will now turn to the contratenor.

Leading tone in the contratenor

The contratenor, to no-one's surprise, takes the leading tone rôle in cadential progressions even less frequently than the tenor. Almost all of these are contratenor-superius 3–1 progressions.

First, the preferred cadential-progression degrees:

Final						
C:	$\hat{2}$	$\hat{1}$	$\hat{5}$	$\hat{6}$	$\hat{4}$	$\hat{3}$
	D	C	G	A	F	E
	28%	23%	21%	14%	9%	2%
D:	$\hat{1}$	$\hat{5}$	$\hat{4}$	$\hat{7}$	$\hat{3}$	$\hat{2}$
	A	D	G	C	F	E
	23%	22%	18%	15%	10%	8%
F:	$\hat{1}$	$\hat{5}$	$\hat{2}$	$\hat{6}$	$\hat{3}$	$\hat{7}$
	F	C	G	D	A	E
	29%	20%	13%	13%	10%	10%
G:	$\hat{1}$	$\hat{5}$	$\hat{2}$	$\hat{7}$	$\hat{4}$	$\hat{6}$
	G	D	A	F	C	E
	46%	22%	10%	9%	8%	5%

Table 25. Favoured cadential-progression degrees for the contratenor

The surface chaos of Table 25, as taken from the prevalence of D-progressions in C-final pieces and the seemingly random re-shuffling of secondary degrees, becomes even more apparent when one compares this list to the complete Table 22, and realises that Buxheim and the concordances are in a far greater degree of disagree-

ment over the order of preference than was the case for superius and tenor. This can be explained by the prevalence of re-written contratenors in Buxheim. On the whole, $\hat{1}$ and $\hat{5}$ are still preferred. Most striking is, again, the difference between Buxheim and the concordances in respect to E-progressions in G-pieces. The Buxheim intabulators seem to have rooted them out ruthlessly. The one thing perfectly consistent in the analogous lists for all three voices is the avoidance of cadences to E.

Next, we consider raised leading tones. The models have *none*. Buxheim has quite few: the numbers average at 6% (27/446), similar to the superius of the concordances. The numbers are so low that comparisons among finals make little sense, except to say that the only G♯s of A-progressions occur in D-final pieces. Once again, F♯ is most common.

Very few flats at C- and F-progressions among the concordances are internally-signed. The two E♭s are in the same parallel Loch intabulation of No. 110, and occur in apparently weak places. Two of the three B♭s are from Schedel: has this scribe, normally so reluctant to provide any accidentals at all, perversely decided to give us flattened leading tones at these cadences? Again, a comparison with the results of PHRASEFIND is needed to sort out these details.

There are even more lowered leading tones at F- and C-progressions in the Buxheim contratenors. The number actually approaches and even exceeds 50% in three instances: F-cadences in C-pieces (50%), F-cadences in F-pieces (47.8%), and C-cadences in F-pieces (57.1%). Again, there seems a slight tendency to "cancel" signature flats at progressions to the final more than those to other degrees.

Conclusions

Having examined leading tones in cadential progressions in all three voices, we can come to some preliminary conclusions for the questions posed at the beginning of this section:

1. The strong preference for cadences to the final and fifth in C- G- F- and D-pieces in the superius is less marked, but still discernible, in the tenor and contratenor. E is generally avoided as a cadence degree, especially in Buxheim, giving near-equal-or-greater preference to G- and D-progressions even in E-final pieces. The seventh degree is also generally avoided, possibly due to perceived instability as a possible sharp/natural-carrier.
2. Favoured cadential degrees receive slightly more sharps at leading tones than others, especially the final, and especially in the tenor.
3. Whereas few signature flats are "cancelled" at F- and C-progressions in the concordances, perceived signature flats are often "cancelled" in Buxheim, although not as often as we might expect. There appears to be a correlation with favoured cadential degree and possibly strength of cadence according to other measurements.
4. Based on the answers to questions 2 and 3, we should further investigate the relationship between cadential strength and raised leading-tones.
5. The between-cadential-progressions phrase as a window of opportunity for cadential accidentals is very good, although a few flats were discarded for occurring very early in the phrase. Sharps occurring at the beginning of a cadential ornament (and clearly intended to apply for the whole ornament) were caught using this window, but very few sharps occurring earlier (than just before the progression) were encountered.

Cad	Final LT	C Con	C Bux	D Con	D Bux	E Con	E Bux	F Con	F Bux	G Con	G Bux	A Con	A Bux	*fund.* Bux	Total Con	Total Bux
C	B♭S/I	80/1	5	0	2	0	0	11/5	6	12/6	7	0	0	4	115	24
	B♮I	4	0	0	0	0	0	0	0	0	0	0	0	0	4	0
	all	221	176	5	37	3	5	155	145	105	62	2	2	168	491	595
D	C♯I	4	1	13	29	0	1	1	4	8	10	0	0	21	26	66
	all	86	39	45	210	2	6	9	33	185	112	6	4	150	333	554
E	D♯I	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
	all	19	46	8	27	2	15	3	4	9	15	1	2	116	42	225
F	E♭S/I	0/1	1	0	0	0	0	0	5	0	0	0	0	0	1	6
	all	44	38	11	100	1	0	186	193	15	32	3	6	105	260	474
G	F♯I	6	35	2	15	0	3	8	12	23	49	2	0	14	41	128
	all	164	131	19	77	3	11	99	58	314	234	2	3	112	601	626
A	G♯I	1	1	1	15	0	0	0	0	0	0	1	0	5	2	20
	all	26	25	27	142	0	1	57	42	90	47	7	9	85	207	351
B	all	1	3	1	5	0	2	9	3	1	5	0	1	15	12	34

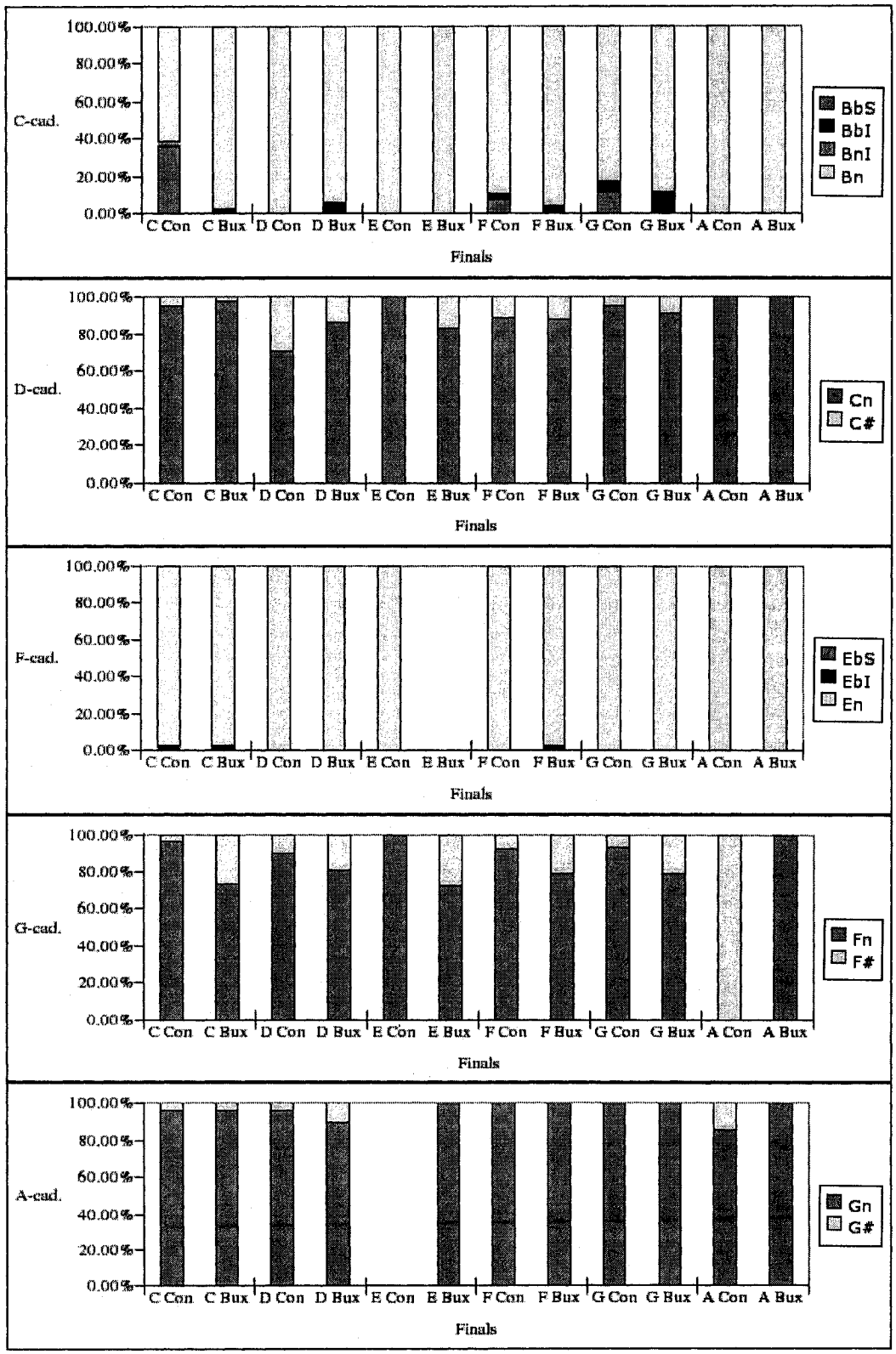
Table 20. Cadential progressions with leading tone in superius

Cad	Final LT	C Con	C Bux	D Con	D Bux	E Con	E Bux	F Con	F Bux	G Con	G Bux	A Con	A Bux	*fund.* Bux	Total Con	Total Bux
C	B♭S/I	47/2	2	0	5	0	0	90/2	8	8/2	12	0	0	5	151	32
	B♮I	0	0	0	0	0	0	2	0	1	0	0	0	0	3	0
	all	112	28	1	12	0	0	153	50	33	30	1	1	12	300	133
D	C♯I	0	2	0	35	0	0	0	0	0	26	0	0	5	0	68
	all	26	13	7	57	0	1	9	20	125	83	1	2	21	168	197
E	all	11	7	0	9	0	0	4	7	23	2	0	4	27	38	56
F	E♭S/I	2/0	1	0	1	0	0	0	2	0	0	0	0	2	2	6
	all	18	12	0	6	0	0	57	16	18	7	0	0	17	93	58
G	F♯I	2	21	0	4	0	2	0	3	4	18	0	0	9	6	57
	all	87	43	7	18	0	3	27	16	94	40	0	0	26	215	146
A	G♯I	0	0	0	13	0	0	0	0	0	0	0	0	6	0	19
	all	15	7	5	27	2	1	29	13	37	10	1	0	25	89	83
B	all	12	2	0	1	0	0	0	4	5	0	1	0	8	18	15

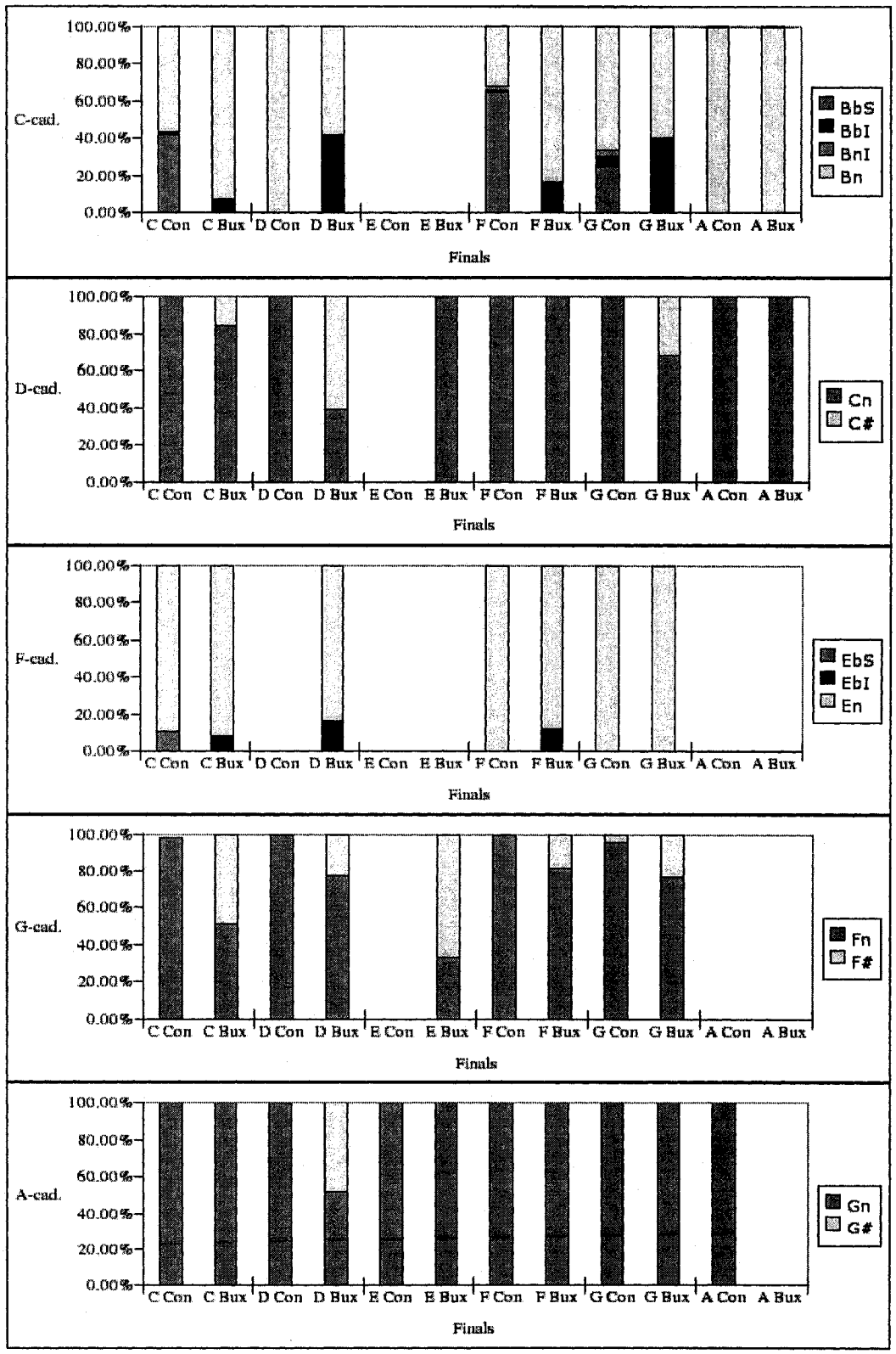
Table 21. Cadential progressions with leading tone in tenor

Cad	Final LT	C Con	C Bux	D Con	D Bux	E Con	E Bux	F Con	F Bux	G Con	G Bux	A Con	A Bux	*fund.* Bux	Total Con	Total Bux
C	B♭S/I	23/3	3	0	4	0	1	13/1	20	5/0	12	0	0	10	45	40
	B♮I	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	all	48	13	7	19	0	1	31	35	24	16	0	1	12	110	97
D	C♯I	0	2	0	3	0	0	0	0	0	4	0	0	0	0	9
	all	53	20	8	34	0	4	28	15	86	30	1	2	38	176	143
E	all	1	4	6	8	0	1	28	4	24	5	2	3	21	61	46
F	E♭S/I	0	7	0	11	0	0	0/1	22	0/1	5	0	0	18	2	63
	all	11	14	1	17	0	1	52	46	29	15	1	1	23	94	117
G	F♯I	0	2	0	5	0	0	0	0	0	6	0	0	3	0	16
	all	24	27	4	26	1	2	13	29	138	89	0	3	41	180	217
A	G♯I	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
	all	29	8	12	26	0	1	19	15	37	12	1	2	22	98	86
B	all	3	2	0	3	0	0	16	3	0	1	0	1	2	19	12

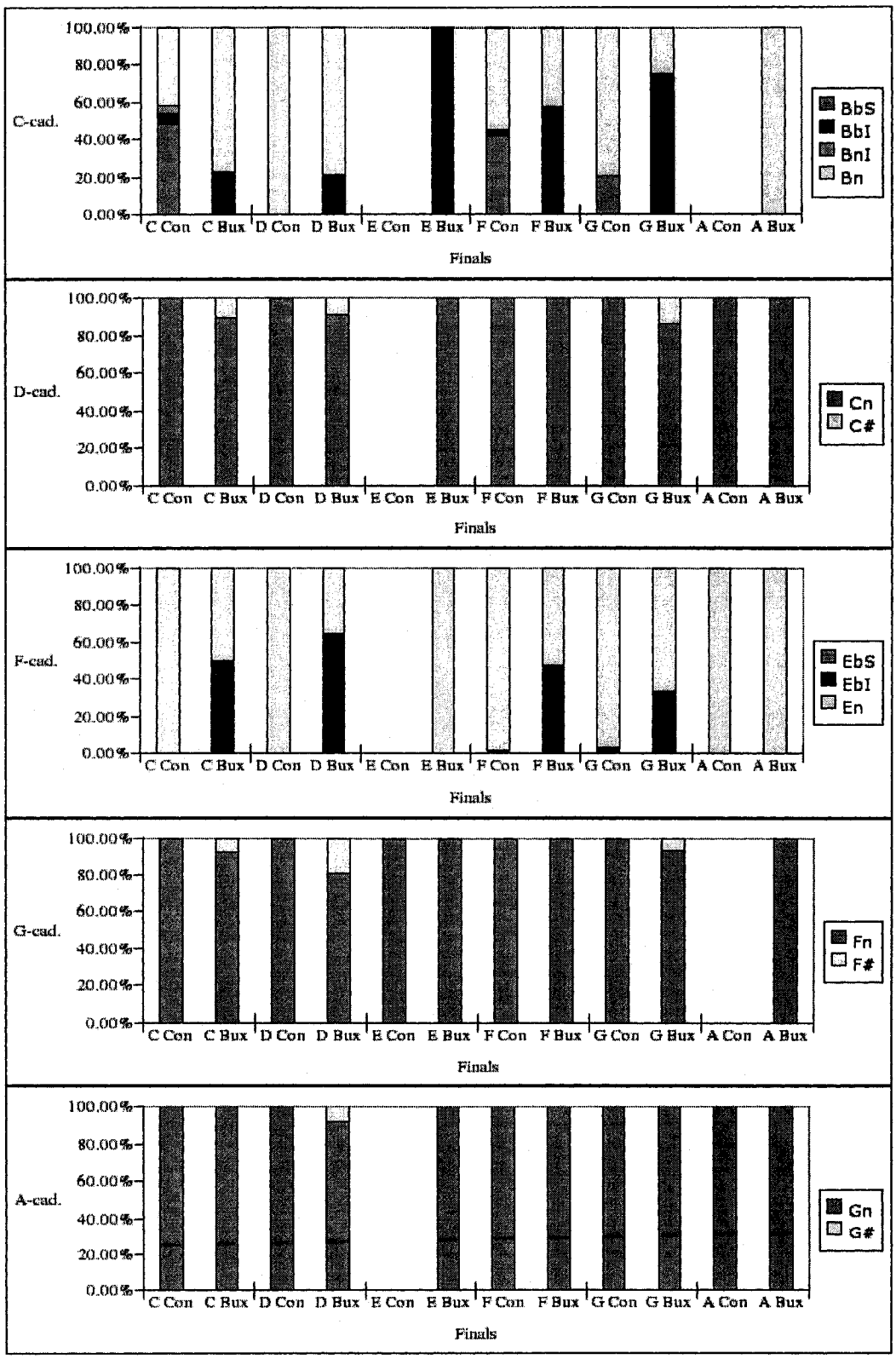
Table 22. Cadential progressions with leading tone in contratenor



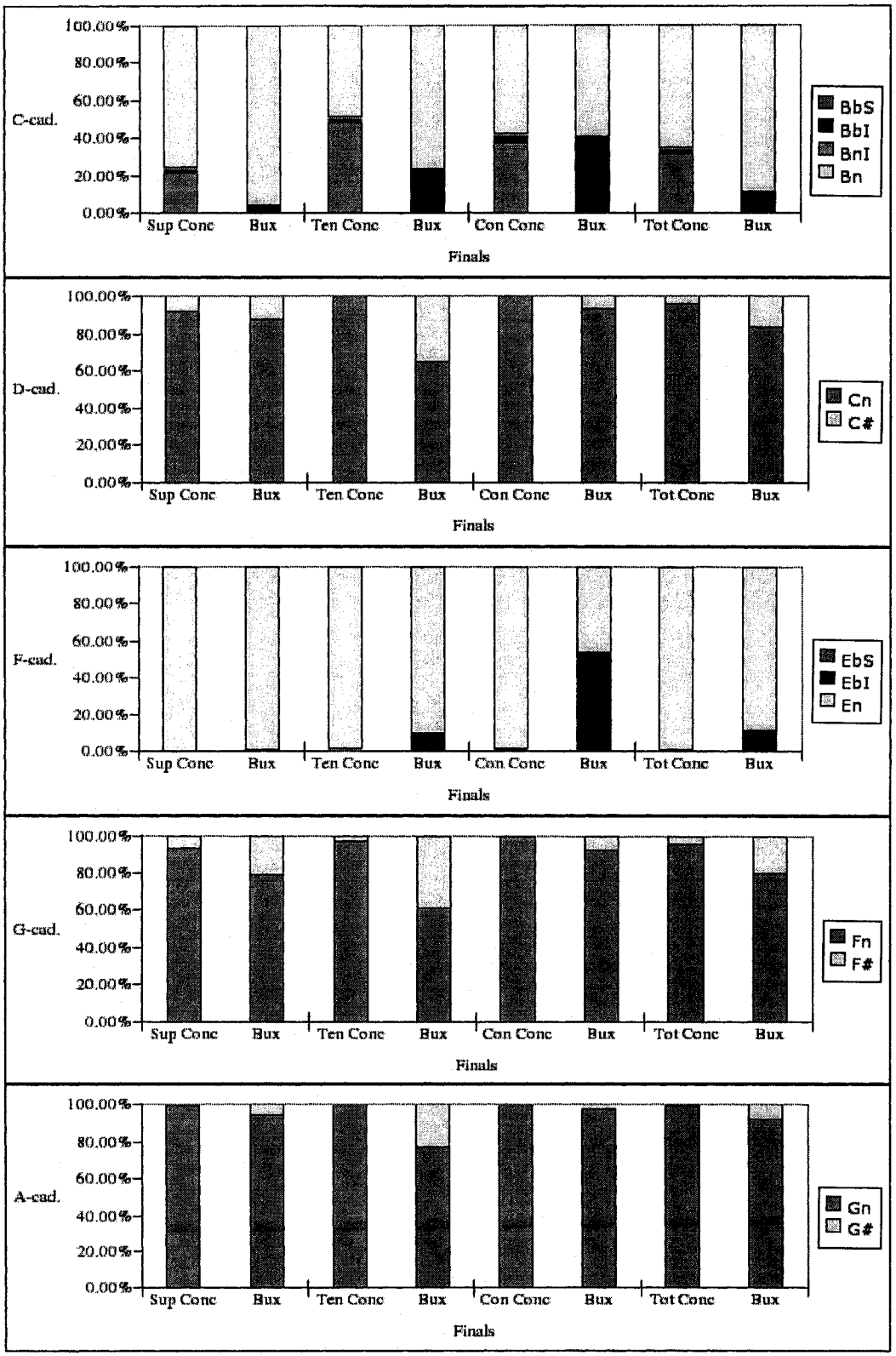
Bar Graph 20a. Cadential progressions with leading tone in superius



Bar Graph 21a. Cadential progressions with leading tone in tenor



Bar Graph 22a. Cadential progressions with leading tone in contratenor



Bar Graph 22.5 Cadential progressions with leading tone in all voices

5.2. Cadential Accidentals and Cadential Strength

In the previous section, we saw an apparent relationship between incidence of raised leading-tones and the cadential-strength markers applied by PHRASEFIND. In this section, we will investigate this relationship in a little more detail.

Table 26 shows the percentage of progressions in Buxheim and the concordances that received each of four cadential strength indicators as marked by PHRASEFIND. Two figures are given: the percentage of progressions with cadential sharps that receive each cadential strength label, and the percentage of total progressions (including sharps and phrygian progressions) that receive each cadential strength label. Progressions with leading-tones in any voice are included. (For example, in Buxheim, 73.8% of progressions with sharps occurred at the beginning of a breve, and only 65.6% of total progressions occurred at the beginning of a breve.) Especially interesting notes are printed in boldface.

	PHRASEFIND	label⇒	Beginning of breve	Rests 1 v.	2 vv.	Long Notes	Final Cad.
Bux	545	with ♯	**73.8%**	16.7%	2.4%	61.1%	3.8%
Bux	4471	all	65.6%	16.7%	4.2%	55.0%	6.3%
Conc.	95	with ♯	**89.5%**	14.7%	0%	**63.2%**	**18.9%**
Conc.	3811	all	59.1%	25.2%	5.5%	33.5%	4.0%

Table 26. Cadences with sharps vs. PHRASEFIND indicators

The percentages for sharps in the concordances need to be taken with a grain of salt: there are only 95 progressions with sharps, as opposed to nearly 4000 total progressions. That said, some of the cadential strength indicators from PHRASEFIND do appear to be related to the adding of sharps to the leading-tone. In both Buxheim and the concordances, a significantly greater percentage of progressions with sharps occurs on downbeats than cadential progressions in general. The presence or absence

of rests after the cadential arrival seems to be less important: it has no effect in Buxheim, and in the concordances, it actually seems to be a negative indicator.

In Buxheim, progressions with sharps tend not to be final cadences, which is not surprising, since we saw that the tenor is the voice with the greatest proportion of raised leading-tones, and final cadences usually have the leading-tone in the mostly-unsigned superius. In the concordances, on the other hand, there appears to be a clear correlation between final cadences and sharps.

Similarly, in the concordances, progressions with sharps have long arrival notes almost twice as often as progressions in general. This is not the case in Buxheim: again, the reason is clear, since the ornamented style of many of the intabulations results in the glossing-over of cadences with streams of short notes. Nevertheless, cadences *with* sharps do have long notes slightly more frequently than cadences without sharps.

In Section 5.1, when investigating leading-tones in the tenor, we asked if there is a correlation between B♮ in C-progressions and *Phrasefind* labels. In particular, we would like to know if such a correlation exists in F- and C-pieces, where C is a favoured cadential degree.

Table 27 shows the percentage of C-progressions in F- and C-pieces that received each of three cadential strength indicators. Only progressions with the leading tone in the tenor were included.

	strength	label⇒	Beginning of breve	Rests	Long Notes
Bux	58	with ♮	53.4%	**32.8%**	39.7%
Bux	15	with ♭	53.3%	20.0%	40.0%
Conc.	124	with ♮	56.5%	38.7%	28.2%
Conc.	141	with ♭	58.9%	48.4%	23.4%

Table 27. C-cadences in C- and F-pieces with B♮ in the tenor vs. PHRASEFIND indicators

In the concordances, we do not expect to find any correlation among these three

factors with B♮s, since we saw earlier that tenor signature flats are not cancelled with a signed B♮. What is somewhat more surprising is that in Buxheim, where cancellations of perceived signature flats are more common, only one factor (the presence of rests after the cadential arrival) appears to be related to the raising of the leading tone. While this finding does suggest that the relationship between cadential strength factors and cancellation of signature flats in the tenor may be worth investigating further, the situation is not nearly as suggestive as that observed for cadential sharps.

Conclusions

The proportion of notated leading-tone sharps is thus related to the perceived strength of a cadential progression as defined by arrival on a downbeat, arrival on a long note in one or more structural voices, and position as the final cadence in a piece. Margaret Bent suggests that incomplete or delayed resolutions of cadential progressions ought to be signalled by not raising the leading tone, whereas the default for completed 6–8 cadences ought to be making the sixth major, with careful consideration given when one decides *not* to do so [Judd, 1998, pp. 43–44]. The data of Buxheim suggest that factors contributing to the perceived strength of a cadence could indeed be a guide in such "careful consideration", with cadences at the ends of phrases (tending to arrive on long notes, and often followed by rests in the superius) regularly receiving sharps, and 6–8 progressions in the middle of phrases left unaltered.

5.3. Double Leading Tones

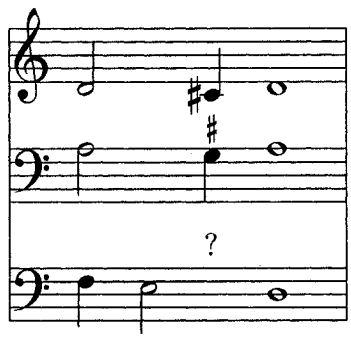


Figure 27. Parallel-contratenor progression and double-leading-tone accidental

Two questions will be investigated in this section:

1. Is there any discernible pattern (re. cadence-note preference or cadential strength) to the notation of double leading tones?
2. How frequently is the fourth degree of a parallel-contratenor progression raised when the leading tone itself is not raised, and should we raise the leading tone in those cases?

A♯ and E♯ never occur in all these pieces, and the single D♯ will be discussed later; therefore, there are never any double leading tones at E-, B- and A-progressions of the parallel-contratenor type, and these are left out of the tables below.

I will confine my discussion to the contratenor, since there are very few parallel-contratenor voice-leading situations in the superius or the tenor. In Table 28, only those cadential progressions identified by PHRASEFIND as parallel-contratenor progressions are included in the totals. Table 28 may be found at the end of this section. It has a similar structure to the leading-tone tables above.

Even a cursory glance at the rightmost column of Table 28 shows us that there are almost no raised fourth degrees in parallel-contratenor progressions in the concordances, but many in Buxheim. On Bar Graph 28a (following Table 28), the visual effect is particularly striking: the C-progressions, for example, show columns of alternating colours. Those for the concordances are gray, indicating F♮s, and those for Buxheim are nearly completely white, indicating F♯s at parallel-contratenor progressions.

In the concordances, there are very few notated sharps for fourth degrees, even in the contratenor. Moving down the cadential pitches in Table 28, we see that no C-progressions receive an F♯, only one D-progression receives a G♯, and two G-progressions receive a C♯. On the other hand, there are never any deliberately-lowered (through internal naturals or flats) fourth degrees in parallel contratenors, and four signature B♭s are deliberately cancelled in F-progressions (all in C-final pieces). Altogether, that gives a rate of signing for double leading tones across the concordances of 7/406, or slightly less than 2%.[36] Once we include B♮s in F-progressions in pieces with no signature flat in the contratenor, we arrive at 26/406, or 6% of parallel-contratenors with high double leading tones.

Buxheim is quite another story. 225/268, or 84%, of parallel-contratenor progressions have raised fourth degrees. There can be little doubt that the intabulator saw this alteration as being a matter of course. Counting only those progressions that require a sharp (C, D, and G), we arrive at 202/241, or (again) 84%, showing that the intabulators were just as willing to venture outside the Guidonian Hand to provide double leading tones.

15 of the 23 B♮s in F-progressions occur in pieces that *would* have acquired perceived signature flats in tenor and contratenor—if it were not for these double

[36] Interestingly, three of these seven occur in Ox, and two pieces—Nos. 83 (*Se la face ay pale*) and 117 (*A son plaisir*) are represented twice.

leading tones, as already mentioned in Section 3. Such B♮s effectively function as cancelled signature flats.

Usually, we do not have enough internal accidentals to detect a pattern for signing. Here we have the opposite problem: there are so few places where there is *not* a raised fourth degree, that it is difficult to see a pattern for *not* signing double leading tones. For example, three of four B♭s in F progressions occur at fairly strong cadential positions. Two are in pieces with perceived signature flats (F: ♭,♭,—). The third B♭ is in a D-piece with many B♭s—enough to give a perceived signature flat in the tenor—and many parallel-contratenor progressions. The fourth B♭ (in No. 74) occurs at a progression that seems quite strong, but follows immediately after an even stronger progression. It is also followed by a rest in the same voice, before proceeding to C, which could be considered to undermine the strength of the voice-leading pattern.[37]

From the many signed double leading tones, and the difficulty in finding a pattern among the unsigned double leading tones, it appears that the Buxheim intabulators thought that double leading tones were more-or-less mandatory.

It is difficult to discern a relationship between preferred cadential-progression degrees and double leading tones: often, there are not enough progressions to make statistically-valid comparisons. However, for every final, C-progressions receive the most sharps (i.e. F♯, among progressions with more than five occurrences).

How often do raised fourth degrees in parallel-contratenor progressions occur without the leading tone also being raised? In F- and C-progressions, the leading tone is never lowered, that is, it is always E♮ or B♮. Only 7/88 (8%) of D-progressions with a sharp fourth degree have the leading tone raised as well, and only 2/17 (12%)

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[37] Of these 268 parallel-contratenor progressions, only ten have an ornament in the contratenor obscuring the $\hat{4}$–$\hat{5}$ motion. This ornament is either an interposed short rest, or a Landini-cadence-like figure.

G-progressions have a raised leading tone. Thus, if a sharp would be required to make the leading tone high, it is not usually provided. Since so many parallel contratenors receive sharps, why not notate sharps for the leading tones as well? Are double leading tones somehow less obvious than leading tones, thus requiring more notification for the performer? This is not likely: the leading tones are simply not raised in Buxheim, because they mostly occur in the rarely-signed upper voice. If the top voice were also in letter notation (as in later organ tablature), we might expect the leading tones to be raised as well.

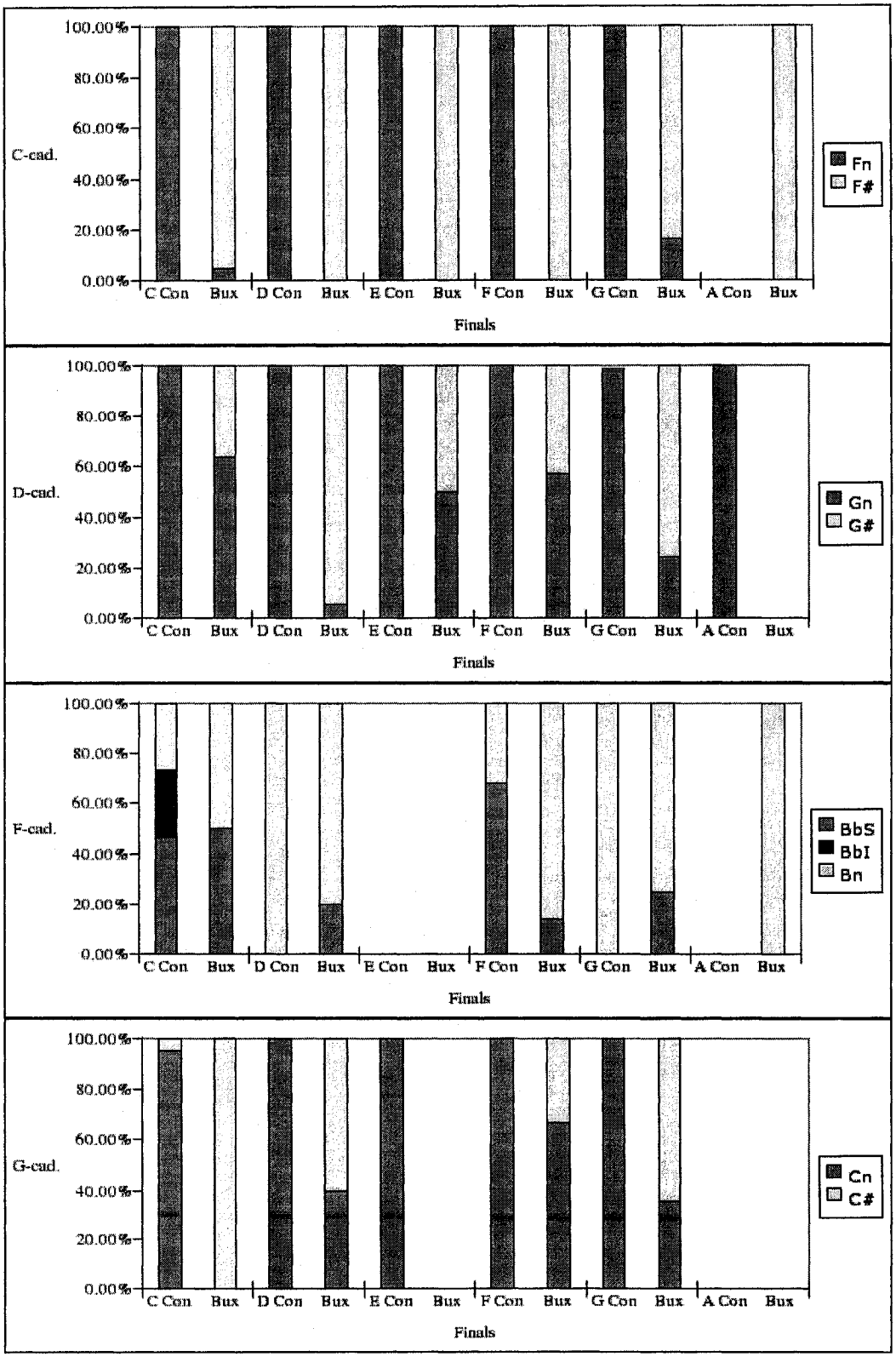
Conclusions

Our questions from the beginning of this section can be answered as follows:

1. In Buxheim, the rate of double leading tone signing for parallel-contratenor progressions in general is extremely high (84%). It is not possible to discern a relationship between rate of signing for any pitch and final/signature combination, but F♯ is signed slightly more frequently than G♯ or C♯.
2. Signed double leading tone progressions in Buxheim only rarely have the leading tone signed as well, which is not surprising, given that the leading tones are in the rarely-signed superius. Given that ♭$\hat{7}$ combined with ♯$\hat{4}$ would be very strange indeed, we ought to raise the leading tones at these progressions as well.

Cad	Final DLT	C Con	C Bux	D Con	D Bux	E Con	E Bux	F Con	F Bux	G Con	G Bux	A Con	A Bux	Total Con	Total Bux
C	F♯I	0	58	0	6	0	1	0	12	0	10	0	1	0	88
	F♮I	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	all	72	61	1	6	1	1	7	12	18	12	0	1	99	93
D	G♯I	0	4	0	67	0	1	0	3	1	22	0	0	1	97
	all	41	11	26	71	1	2	3	7	61	29	2	0	134	120
F	B♭S/I	7/0	1	0	1	0	0	28/0	2	0	1	0	0	35	4
	B♮I	4	0	0	0	0	0	0	0	0	0	0	0	4	(23)
	all	15	2	1	5	0	0	41	14	1	4	0	2	58	27
G	C♯I	2	3	0	3	0	0	0	2	0	9	0	0	2	17
	all	39	3	11	5	2	0	35	6	28	14	0	0	115	28

Table 28. Parallel-contratenor cadential progressions



Bar Graph 28a. Cadential progressions with parallel-contratenor voice-leading

5.4. Cadential Structure Types

Some other questions arise out of Table 28 which are perhaps more easily answered. Why do there appear to be fewer parallel-contratenor progressions in Buxheim in general? Does this mean that the breakdown into types of cadences in Buxheim is different from the concordances?

Table 29 shows the three main types of cadential structure used in dorian, lydian, and mixolydian progressions (leaping-contratenor, bassizans, and parallel-contratenor), as well as the falling-fourth structure, which is an alternative to the parallel-contratenor in phrygian progressions (for examples of each type, see Section 2.10). Each number is expressed as a percentage of the total progressions of these four types to that pitch. Progressions to B are excluded, because none fall into these four types.

In the concordances, the most common of the three main types is the parallel-contratenor, followed by the leaping-contratenor and the bassizans, at a (very rough) ratio of 4:2:1. In C-, D-, and A-progressions, the preference for the parallel-contratenor is clear, whereas in F- and G-progressions, the margin between parallel-contratenor and leaping-contratenor is much smaller (both are ca. 40–50%).

The Buxheim intabulators, on the other hand, had a clear preference for the leaping-contratenor structure, followed by the parallel-contratenor and the bassizans. The ratio is roughly 6:4:1. Again, C-, D-, and A-pieces have more parallel-contratenor progressions than leaping contratenors, but the ratio is much smaller. In F- and G-pieces the difference, slightly in favour of parallel contratenors in the concordances, has moved decisively in favour of leaping contratenors. This preference is frequently expressed in the recomposition of the contratenor, to change parallel contratenors into leaping contratenors. This is so marked that even a phrygian

Cadential Pitch		Lp-Ct	Bassizans	‖-Contra	↓-4th	Total No.
Buxheim	C	23.5%	24.6%	52.0%	0%	179
Concord.	C	21.6%	21.0%	56.8%	0.6%	176
Buxheim	D	24.9%	10.2%	63.8%	1.1%	177
Concord.	D	4.9%	5.6%	87.7%	1.9%	162
Buxheim	E	0%	0%	88.9%	11.1%	36
Concord.	E	0%	0%	88.2%	11.8%	17
Buxheim	F	84.6%	4.7%	10.3%	0.4%	234
Concord.	F	39.0%	17.7%	43.3%	0%	141
Buxheim	G	81.3%	5.8%	10.8%	2.1%	240
Concord.	G	42.4%	7.1%	49.2%	1.3%	238
Buxheim	A	26.0%	1.5%	58.8%	13.7%	131
Concord.	A	0%	4.4%	30.8%	64.8%	91
Buxheim	Total	51.5%	8.9%	36.6%	3.0%	997
					Total Cadences	4471
Concord.	Total	24.5%	11.2%	56.1%	8.2%	825
					Total Cadences	3811

Table 29. Percentages of four contratenor progression types

A-cadence has suffered this change, albeit in a warped way: the contratenor leaps by ninth from d to e' in emulation of a proper leaping contratenor (see Figure 28).

As mentioned in Section 2.8, Slavin finds a similar preference for leaping-contratenor cadences (at final cadences and cadences to the same pitch as the final) in early songs of Binchois [Slavin, 1992, pp. 350 and 353]. In Buxheim, leaping-contratenor progressions are always very strong (in terms of PHRASEFIND measures), although they are not limited to cadences on the final. It appears that to the Buxheim

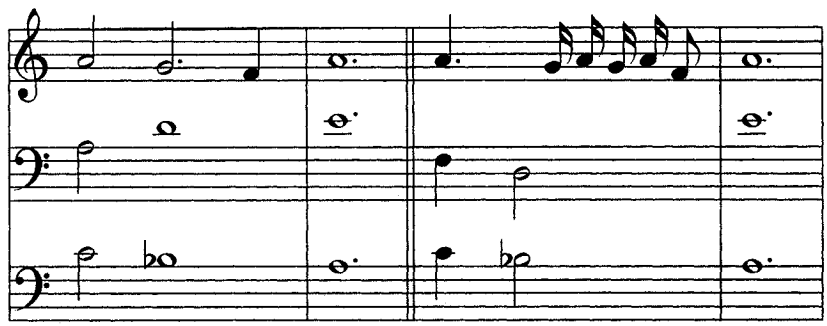


Figure 28. Mock leaping-contratenor cadence on A: No. 17 mm. 58–9

intabulators, contratenor voice-leading and cadential hierarchy are linked.

5.4.1. Conflict of Interest in Falling-Fourth Progressions

Also rather odd are the ten falling-fourth progressions to C, G and F. Since the falling-fourth is from the second below the cadential pitch to the fifth below, one is faced either with a falling tritone, or with not having a high leading tone: this progression would seem to be exclusively phrygian, or else involve a *minor* 6–8 (Figure 29).

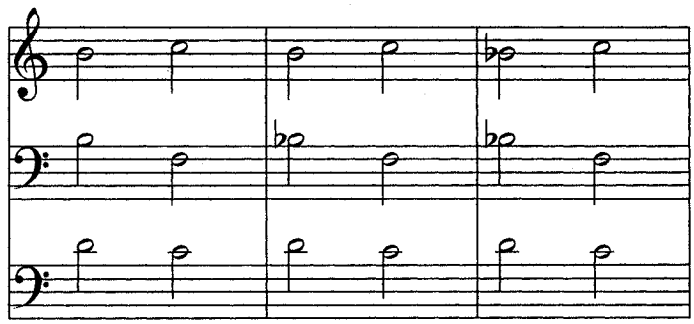


Figure 29. Consequences of falling-fourth progressions on C, G, and F

I investigated each of these ten problematic progressions individually. 6 of 8 G-progressions (five in Buxheim) have no signed F♯s, and of these, five occur at

weak metric positions with very short arrivals. The sixth also does not seem very strong. From these G-progressions, it would appear that in this circumstance, a minor-6–8 progression is acceptable in a weak position, and preferable to a vertical augmented octave.

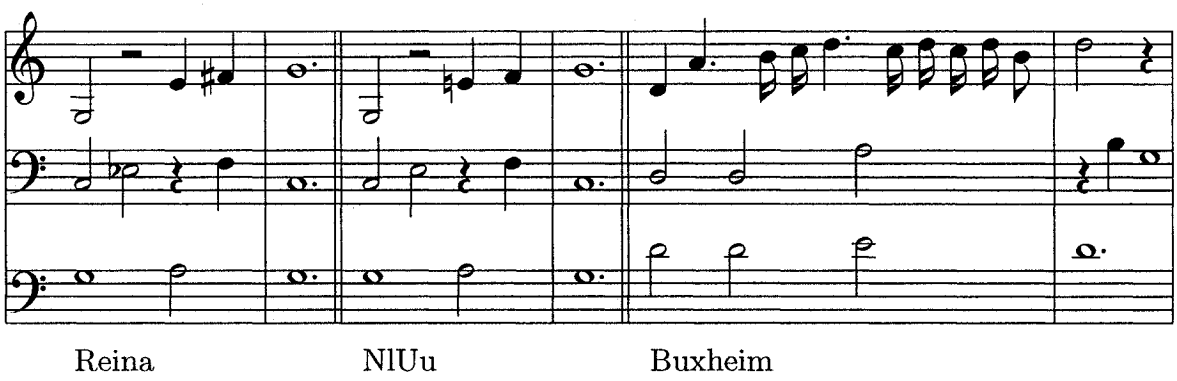


Figure 30. Strange G-progression in concordances of *A discort*

The last two G-progressions are the most interesting: they occur at the same place, in two concordances of No. 75 (*A discort*), one of the earliest pieces in Buxheim. This is a strong progression, both from the metric position and the length of the arrival. Both versions are shown in Figure 30. Buxheim avoids this problem by replacing the contratenor with a deceptive progression. Perhaps the augmented octave in the very early Reina Codex had become unacceptable by the middle of the century. [38]

[38] The one F-progression (in Buxheim No. 38) replaces the falling tritone with a rising diminished fifth E–B♭, against an E♮ in the superius, and is in a weak position. The last problem case, a C-progression (*Fortune* in Spec, which contains very few accidentals) again occurs in a weak position, and has a falling tritone (B–F) against B in the superius.

5.5. Phrygian Cadences

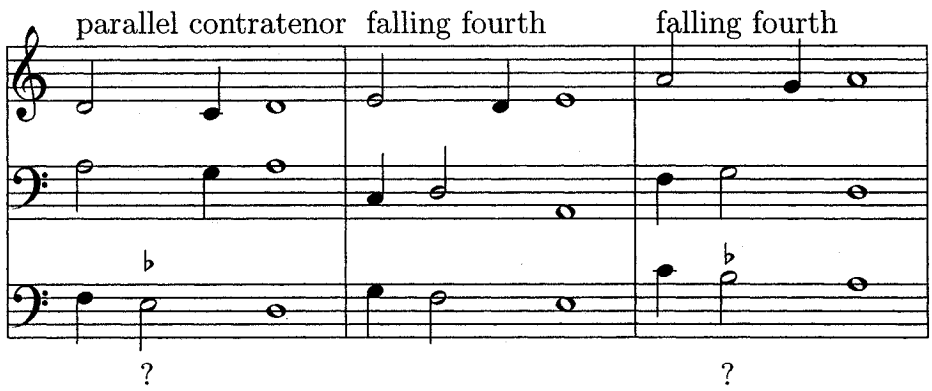


Figure 31. Phrygian progressions

Examining phrygian cadences is a little more complicated than just looking for lowered descending seconds. When investigating raised leading tones, I did not take into special consideration the potential for A- and D-progressions to be phrygian. This was possible because these progressions are not terribly common, and including them in a search for leading tones would lower the number of potential raised leading-tones, rather than raise them.

However, when we look for phrygian progressions specifically, we have the opposite problem: we cannot distinguish between dorian and phrygian A- and D-progressions on the basis of a flattened second degree, since even dorian progressions, if they occur in pieces with signature flats, will have a descending minor second that would need to be raised with a natural to make a dorian progression. In Section 5.1, we saw that signature flats were rarely cancelled to give raised leading-tones in the concordances; from this, we can expect that they will similarly not be cancelled to give major descending seconds. Thus, looking for descending minor seconds is not by itself sufficient to identify potentially phrygian cadential progressions to A and D.

Instead, we will once again use the cadential-structure-type tags provided by PHRASEFIND, since there are several cadence types which are exclusively dorian (no matter on which pitch they occur), which we can discard (leaping-contratenor and bassizans). Parallel-contratenor progressions could be either dorian or phrygian. We will focus here on the parallel-contratenor and falling-fourth types, since they are the two most normal contratenor patterns that can be phrygian.

In this section, the following questions will be addressed:

1. Do dorian progressions ever occur on E or B, with a raised descending second (F♯ or C♯)? Is there a special context for these?
2. Do explicitly dorian and phrygian cadential progressions ever occur on the same pitch in the same piece?
3. Is there a clearly-discernible preference for phrygian or dorian progressions to A (or D) in pieces of certain finals?

There are very few progressions of any of these types with the descending step in the contratenor or the superius; therefore, I will concentrate on the tenor. Double-leading-tone and falling-fourth progressions (with the tenor descending) do not occur to B. Counting the accidentals for all these progressions to the remaining notes will allow us to answer these questions. For the following observations, refer to Table 30, which may be found at the end of this section, and Bar Graph 30a, which may be found after Table 30.

Signature flats are never internally cancelled in order to raise the second degree at a cadential progression. E-progressions are never given an F♯ to turn them into dorian progressions.

The leading-tone tables earlier showed us that only one E-cadence (in a *fundamentum*) ever receives a raised leading-tone, making it explicitly dorian. Looking at that cadence directly, we discover that it is in a *clausula* over the tenor "mi h h mi" (e b b e)—there really is no choice with this tenor; the cadence must be

dorian. However, the composer leaves out the *tenorizans* voice entirely, perhaps uncomfortable with suggesting a dorian cadence to E. Why have such a problematic tenor for a *clausula* at all? The composer was following a pattern of intervals (based on ever-increasing interval size between successive tenor notes), to be provided for every possible final. Apparently, he wanted to be completely systematic about including every possibility, including this rather awkward one. This cadence must be considered as an exception.

A second exceptional E-cadence occurs in the G-final No. 202 (*Je loe amours*, seventh concordance inside Buxheim) at m. 17: an F♯ (but no D♯) has been added, making a minor-6–8 progression. All the other Buxheim concordances of this cadence have a normal E-phrygian progression (in G-final concordances) or a signed A-phrygian progression (in C-final concordances). The other concordances (NYB, Ox, and Pz) all have an A-progression with a signature B♭. Thus, the peculiar F♯ in No. 202 must be seen as an aberration.

Having established that E-progressions are always phrygian, let us now examine A- and D-progressions.

There are only two places where an A-progression receives both B♭ and G♯ in the same piece. I am inclined to view these as anomalous.[39] Likewise, D-progressions never receive both E♭ and C♯.

In the concordances, B♭s and E♭s, when they occur at potentially-phrygian progressions, are almost always caused by a signature. Half the D-progressions appear to be phrygian (24/48), and all of these occur in C pieces, specifically in the various concordances of the C-dorian No. 11 (*Le serviteur*). Somewhat more than half of the A-progressions (41/78) have B♭s: 13/28 parallel-contratenor and 28/49 falling-

[39] One of these situations is in a parallel intabulation of No. 146 in Loch: this G♯ is not very clear, and could be interpreted as a mordent, or possibly an attempt to remove a mordent. The other is in Buxheim No. 84, a D-final piece with a few tenor B♭s.

fourth progressions. Are we expected to cancel some of these flats to provide more dorian progressions, or should we add more flats (in pieces without signature flats) to gain more phrygian progressions?

In Buxheim, D-progressions hardly ever receive an E♭ (and only one is a falling-fourth progression). The highest rate of signing is 8/12, or 66.7% of E♭s, in C-pieces, where C-dorian pieces (Nos. 10, 11, 74, and the modally-ambiguous 123) always have phrygian progressions, and other C-pieces do not.[40]

A-progressions of these two types (parallel contratenor and falling fourth), on the other hand, almost always appear to be phrygian: 90/95, or 94.7%, have B♭ signed. When we compare the number of signed ($\flat\hat{2}$), phrygian parallel-contratenor or falling-fourth progressions (90) to unsigned ($\natural\hat{2}$) parallel-contratenor, bassizans or leaping-contratenor progressions (41), we find a distinct preference in Buxheim for phrygian progressions to A (see Bar Graph 30a). [41]

Are all those parallel-contratenor A-progressions in the concordances, then, also meant to be phrygian? Let us compare Buxheim and the concordances in terms of the behaviour of progression types.

The Buxheim intabulators appear to have used progression type to distinguish between phrygian and dorian progressions: only Buxheim has leaping-contratenor A-progressions, and almost all parallel-contratenor A-progressions in Buxheim are phrygian.[42]

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[40] The other five phrygian D-progressions occur in two G-dorian pieces (No. 128 and No, 43) and one F-lydian piece (No. 88). These five progressions are the only D-progressions in these three pieces.

[41] For weaker progression types on A, the rates of signing for $\flat\hat{2}$ in Buxheim are 70% (no third voice), 75% (arrival on third), 14.8% (deceptive), and 62.9% (other/rest arrival). In the concordances, the corresponding rates of signing are 33.3% (no third voice), 60.87% (arrival on third), 29.3% (deceptive), and 61.8% (other/rest arrival).

[42] Only four of the Buxheim pieces with leaping-contratenor A-cadences have concordances: Nos. 19 (20), 32 (33, 34), 66, and 122. Of these, only Nos. 32 and 66 are not transposed in the concordances.

Do these different progression types (specifically implying dorian or phrygian progressions) ever occur in the same piece? In Buxheim, the answer is yes: in four pieces, leaping-contratenor A-progressions (never with B♭) occur together with clearly-signed phrygian double leading tone A-progressions (Nos. 147, 35, 73, and 79), and in one piece (No. 73), a falling-fourth A-progression appears as well. None of these pieces, comprising two intabulations and three tenor settings, has any concordances. Thus, in Buxheim, when dorian and phrygian cadences occur on the same pitch in the same piece, a disctinction is made between them by using the leaping-contratenor structure for those progressions intended to be dorian.

When we look at A-progressions in all the concordances, on the other hand, we find that none of the types of A-progressions are ever mixed in the same piece: either all A-progressions are bassizans, or they are parallel-contratenor, or they are falling-fourth.[43] Since parallel-contratenor progressions and falling-fourth progressions are given B♭s with a similar degree of (in)consistency (each is internally-signed only once), and since none of the parallel-contratenor A-progressions receives a raised leading-tone, it is difficult to decide if progression-type has any special significance. If the observations made for Buxheim hold true, then consistency in cadential structure type in the concordances might mean consistency in choosing *either* dorian *or* phrygian accidentals—but not both.

Conclusions about Phrygian Cadences

1. Dorian and phrygian cadential progressions to the same degree rarely co-exist in an intabulation.

Comparing the corresponding A-progressions, we find that one is a deceptive progression (No. 66 in Schedel) and one is a parallel-contratenor progression (No. 32 in Loch). Perhaps the clearly-dorian nature of the progression in No. 32 in Buxheim suggests that the same progression in Loch should also be dorian, even though it is preceded by a falling-fourth progression to A (in Loch), which cannot be dorian. See also the next footnote.

[43] A single exception to this is No. 32 in Loch, which has a very weak, unsigned falling-fourth progression as well as a much stronger unsigned parallel-contratenor progression.

2. Progressions to E are always phrygian.

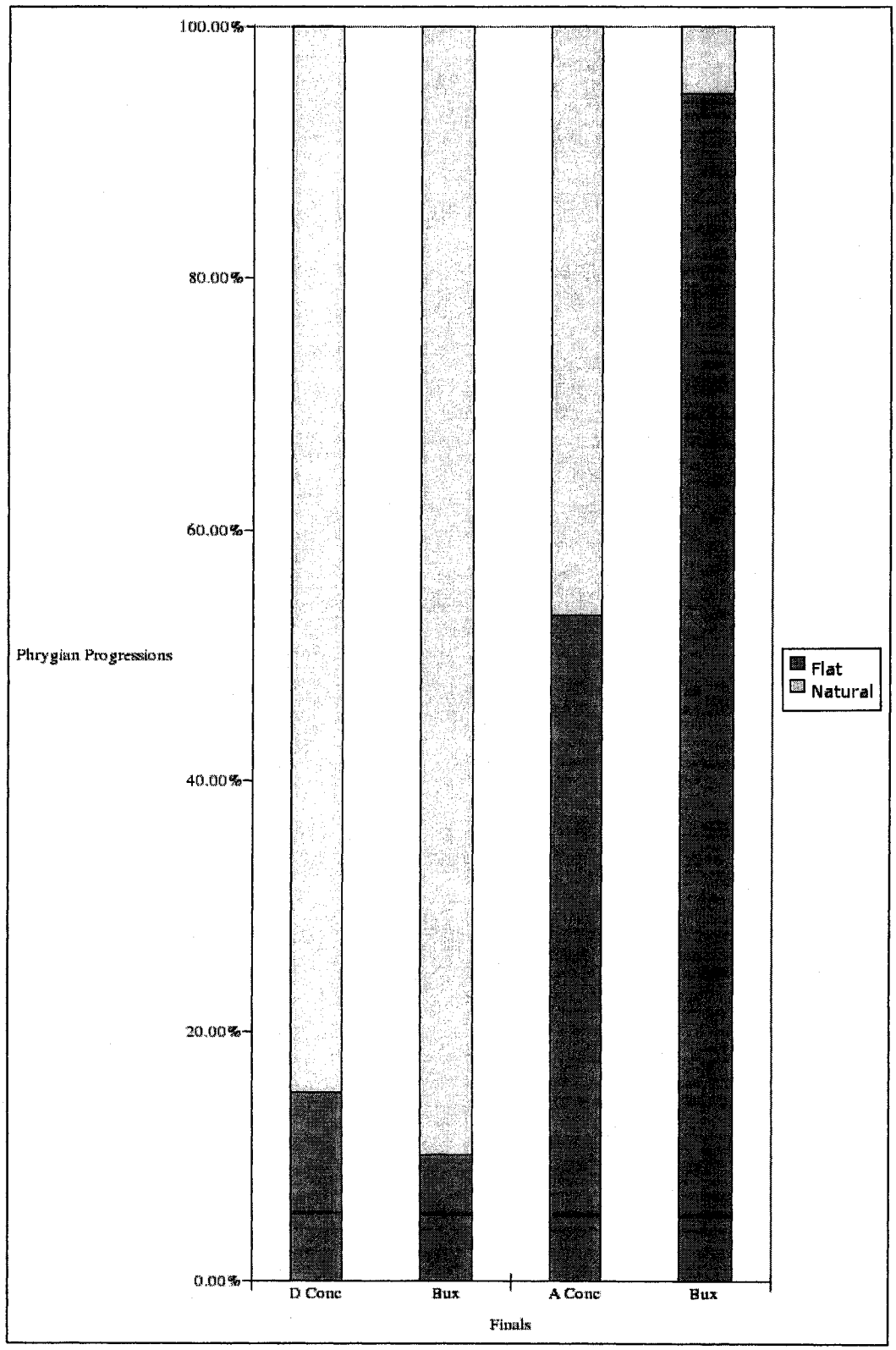
3a. In Buxheim, strong parallel-contratenor A-progressions are always phrygian. Leaping-contratenor or bassizans structures are, of course, A-dorian. This appears unrelated to the final.

3b. Parallel-contratenor and falling-fourth D-progressions in C-dorian pieces are always phrygian. In pieces of other finals, phrygian D-progressions appear to be much more rare.

3c. Both phrygian and dorian progressions occur to the fifth degree in dorian modes (see also Tables 20, 21, and 22 for comparison of raised leading-tones). Thus, the fact that the fifth degree of A (E) requires a phrygian cadence cannot be the reason for the rarity of A as a transposition level for the dorian mode.

Cad	Final DLT	C Con	C Bux	D Con	D Bux	E Con	E Bux	F Con	F Bux	G Con	G Bux	A Con	A Bux	Total Con	Total Bux
D	E♭S/I	17/7	8	0	0	0	0	0	2	0	3	0	0	24	13
	all	48	12	30	66	1	2	3	6	71	31	2	0	155	117
E	all	10	8	6	11	1	10	0	0	0	5	0	2	17	36
A	B♭S/I	7/2	11	0	45	0	0	8/0	23	24/0	11	0	0	41	90
	all	10	12	11	46	0	0	15	24	41	12	0	1	77	95

Table 30. Parallel-contratenor and falling-fourth cadential progressions with descending second in tenor



Bar Graph 30a. Parallel-contratenor and falling-fourth progressions, tenor

5.6. Raised Thirds at Final Cadences

There are twelve circumstances in Buxheim (not including *fundamenta* and incomplete pieces, which cannot really be said to have a final cadence) where the final cadence includes a third: 5 C-pieces, 3 F-pieces, one G-piece, one E-piece (G♮), one D-piece (F♯), and one A-piece (C♯). Among the models, six concordances include thirds at the final cadence, all of them in an added fourth voice, a second contratenor. All but one of these six (a signature B♭ in a concordance of No. 39 [*O rosa bella*] in Trent 89) are major thirds. Thus, it appears when such a new and unusual third is added to the final cadence of a piece, it must be major.

Chapter 6
Other Accidentals

6.1. Peak-Note Accidentals

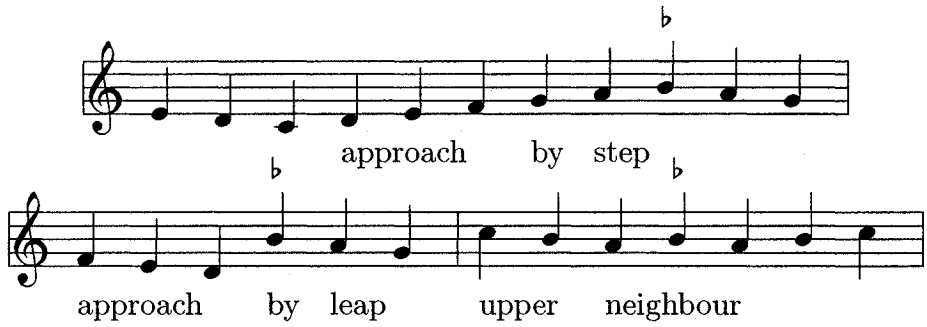


Figure 32. Examples of peak notes

A peak-note accidental is a flat added to the top note of a given melodic contour (a contour is bounded by changes in direction; see Figure 32). To describe this, the saying "*Una nota super la semper est canendum fa*" is frequently invoked in modern commentary, although this saying appears to be of later origin than the repertoire of Buxheim[44]. In our search for peak-note flats, we shall ask the following questions:

1. What is the relationship between final/signature combination and peak-note flats? If signatures imply transposition of the entire hexachordal system, then a signature B♭ would imply a B♭ hexachord (containing an added E♭) as the new "soft" hexachord. If this is the case, and hexachords outside the

[44] It is unclear when this phrase originated. Berger lists several early-sixteenth-century sources of the rule, though not of the jingle. Some of these advocate the use of *fa super la* in any peak-note situation (Cochlaeus [1511], Vanneo [1533]), and others who restrict it to situations where some sort of tritone correction seems likely (Rhau [1517] *et al.*)[Berger, 1987, pp. 77–78]. Some references in treatises are actually in the form of a negation, for example in Aaron's *Lucidario in Musica* (1545): "molti [...] danno per ferma regula, che quella nota, ouero sillaba, che sarà sopra la nota chiamata la, sempre sara pronontiata fa, per la qual uana oppenione indocono il nuouo discepulo a una falsa intelligenza [...] [Oppenione 8, fol. 102']", and in Aiguino's *Il Tesoro Illuminato* (1581): "Che di sopra di A la mi re, una nota non sempre si debbe dire fa [Title of Chapter 42]". My thanks to Peter Schubert for pointing out this reference.

Guidonian Hand are conceptually common, we might expect to find more distant *fa-super-las*, such as A♭ (over a B♭-hexachord) or D♭ (over an E♭-hexachord). Are there many A♭s and D♭s?

2. Is there a relationship between peak-note flats and final or signature?
3. Are peak-note flats more common when approached by step, so that both the *la* and the *fa* immediately above it are sounded?

A special subcategory of peak note, the "pre-cadential lowered third" as defined by Brothers, will be examined in a later section.

Before we look at the implications of flats in particular, we need to make some observations about the behaviour of peak notes in general, against which to compare the behaviour of flats. I will address two questions:

1. Which pitches are preferred as peak notes over which finals?
2. Which type of approach is most common: leap-wise, step-wise, or a simple upper-neighbour tone (a one-note melodic arch)?

6.1.1. Preferred Peak Notes vs. Finals

If peak notes are closely related to hexachords, we would expect that certain pitches (those functioning as *la-super-fa* over hexachords) would be favoured as peak notes, regardless of the final. On the other hand, if final or mode is more important, we would expect an order of preference independent of *la-super-fa* considerations.

To assemble Table 31, all peak notes were counted in all voices. For each final, the note-names on which peak notes occurred were arranged in descending order of frequency. Note that, for example, "B" includes B♭ *and* B♮.

The percentages-of-all-peaks used to assemble Table 31 were spread quite evenly, from ca. 20–22% for the most preferred peak note in each case, to ca. 7–8% for the least preferred. The concordances consistently showed slightly stronger preferences (greater difference between most and least) than Buxheim, perhaps due to the

Final		Peaks	(%)						Total
C	Conc.	G	C	D	A	F	E	B	
		22.2	19.7	14.7	12.2	12.1	11.3	7.8	4713
	Bux	G	C	A	D	F	E	B	
		20.0	17.6	15.7	15.2	14.5	9.1	7.9	5404
D	Conc.	A	D	G	F	B	C	E	
		21.3	17.6	14.4	14.0	13.7	10.2	8.7	928
	Bux	A	D	G	F	B	C	E	
		19.7	16.2	15.9	14.3	12.3	11.7	9.8	7324
E	Conc.	C	G	A	D	E	F	B	
		21.3	18.8	17.5	15.0	12.5	8.8	6.3	80
	Bux	C	A	G	D	E	F	B	
		19.2	19.0	14.4	14.4	13.5	12.2	7.4	557
F	Conc.	C	F	A	G	B	D	E	
		29.8	19.6	16.7	11.9	9.5	7.3	5.2	4791
	Bux	C	F	A	G	D	B	E	
		20.1	18.0	14.6	14.6	14.2	12.6	5.8	6329
G	Conc.	D	G	A	C	B	F	E	
		23.9	19.3	14.0	13.2	13.0	9.1	7.4	6639
	Bux	D	G	A	C	B	F	E	
		19.2	18.5	16.7	15.3	12.6	9.2	8.5	6089
A	Conc.	D	A	G	B	F	C	E	
		20.9	19.6	19.0	13.1	11.1	9.8	6.5	153
	Bux	A	F	G	B	D	C	E	
		19.1	17.6	16.4	14.1	13.2	10.6	9.1	341

Table 31. Final vs. order of preferred peak notes

noodly ornamental style espoused by the intabulators.[45] On the whole, the level of agreement between Buxheim and the concordances is very high, with the greatest degree of variation in order of preference shown in those finals for which there are very few data.

In general, the fifth and first degrees head the order of preference in peak notes, just as in cadences, although the second-rank contenders are far closer in frequency than was the case for cadential progressions. The exceptions to this rule are E-finals, preferring C and A over the final E and the fifth B, and A-finals, preferring

[45] A distinction among melodic arches of three notes and longer melodic arches will be made below.

seemingly any degree to the fifth E.

What is the order of preference among the "flattable" peak notes (B, E, A, and D)? By "flattable", I mean those peak notes which need a flat in order to become a *fa-super-la* for a hexachord, inside or outside the Hand.

D and A are the most consistently preferred of the "flattable" peak notes. However, D must be stricken from the list, because it *never* actually receives a flat (suggesting that the *ficta* E♭-hexachord, which it would top, is out of the question). A, also very common as a peak note, receives a flat extremely rarely; the circumstances under which it does so are discussed below.

B and E, the prime suspects for peak-note accidentals if the hexachord relationship is most important, are actually quite low in the order of preference. B moves up somewhat in the order of preference for those finals where a signature flat is fairly common (F and G), and for A and D.

6.1.2. Preferred Type of Approach

In all voices, leap-wise approach is most common (55%), followed fairly closely by step-wise approach (36%), and distantly by upper neighbours (9%). This tendency is unrelated to the final/signature combination, and is most consistently observed in the contratenor (which makes sense, since the contratenor is usually the voice that leaps the most). As one might expect from the many running ornaments, Buxheim has a slightly-greater percentage of step-wise approaches and upper neighbours than the concordances (38% vs. 33% and 9% vs. 8%, respectively). In the next section, we will see if these percentages change significantly for the approaches of peak notes which might be *fa-super-la*.

6.1.3. Flats at Preferred Peak Notes

Next, we will look at the peak notes on the remaining three "flattable" pitches, to see how frequently they actually receive flats.

Again, the tables and graphs to which the following discussion refers can be found at the end of this section.

To arrive at Table 32, Table 33, Table 34, and Table 35 (and the corresponding bar graphs), each voice of each piece was extracted, and peak notes of several categories were identified. Since a cursory glance showed that tenor and contratenor behave similarly with respect to peak notes, the results for the two lower voices were combined (the superius will be discussed briefly).

The first category (Table 32) includes all peak notes, including those which are simply upper neighbours. The second category (Table 33) includes only upper neighbours. In the third category (Table 34 and Table 35), peak notes approached by leap are separated from those with stepwise approaches in arches consisting of more than three notes (an upper neighbour). We separate these to see if it is true that a peak note is more likely to receive a flat if the *la* immediately underneath it is sounded first. Each of the tables is divided into three bar graphs. Each bar graph shows peak notes of the indicated pitch (E♭, A♭, or B♭), compared with the final. The bar graphs, as before, are percentage graphs, where the flattened notes are at the bottom of each bar, and the natural notes at the top. Redundantly-signed accidentals (♭SI on the tables) are included among the signature flats on the bar graphs, for visual clarity.

Among the three remaining "flattable" *fa-super-las*, B receives the most flats: often, 50% or more of the peak notes are signed, by signature or internally. E, the most unpopular peak note, receives the second-most flats; however, most of these are signature flats in C-dorian pieces. A♭s, outside of one freakishly-F-dorian piece,

are extremely rare, and occur most frequently (frequent being a relative word here) in C-dorian pieces, the only exception being two A♭s in the G-dorian No. 39 (*O rosa bella*), already noted previously for its unusual fondness for flats.

In the superius, internal rates of signing among the concordances are significantly higher, in particular for B♭s in G- and F-pieces. This can be explained by the frequent absence of a signature in the top voice of the concordances: even counting all the internal flats, the superius falls short of the lower voices in over-all rate-of-signing, but the internal flats seem to compensate mainly for missing signatures.

In the lower voices, the rates of signing for internal E♭s and B♭s (such as in F- and G-pieces, and non-dorian C-pieces) are about the same in Buxheim as in the concordances, drifting roughly between 5% and 15% (the tenor being slightly higher than the contratenor). This suggests that the flattening of a peak (*that is not flattened by the signature or to compensate for a missing signature*) in these voices is quite optional, and we can actually take the notated evidence of the concordances as fairly representative of what was actually sung. The relative degree of consistency of internal rate-of-signing across all finals suggests that flattening of peak notes is not related to final or to mode, beyond the restrictions of the signature.

We asked if signed peak-note flats are actually more common when the peak note is approached by step, so that *la* and peak note *fa* are both sounded. Comparing the bar graphs for the different types of approach (Bar Graphs 32a–35a), it is difficult to discern a pattern (the percentages are quite close), but it appears as though stepwise approaches and upper neighbours receive *slightly* more flats than leap-wise approaches.

If signing of peak notes has anything at all to do with hexachord theory, it suggests a great reluctance to think outside the regular gamut, at least when writing the piece down. If a piece is transposed, it accumulates the accidentals necessary to preserve its mode; more distant ones such as peaks of distant *ficta* hexachords

are discarded (such as A♭ as a peak to a B♭ hexachord). If the implementation of transposed hexachords beyond B♭ were comfortable conceptually, we would expect far more pieces transposed to levels requiring these hexachords.

Redundant signing (♭SI) of E♭ in the concordances is a peculiarity of No. 11 (*Le serviteur*). B♭ is redundantly signed in three pieces with great frequency: *Le serviteur*, No. 250 (*Le souvenir*) and No. 39 (*O rosa bella*), all previously noted for their unusually large numbers of flats in general. Two other pieces also exhibit redundant B♭s: No. 30 (*Par le regard*), and No. 3 (*De madame*). The redundant B♭s appear only in the superius. All of these pieces have at least one other concordance where the superius does not have a signature flat: it appears that the scribe is simply making doubly sure that we remember to sing the flat from the signature.

Conclusions:

Let us return to the questions posed at the beginning of this subchapter.

1. There are no D♭s at peak notes at all, and very few A♭s, which are generally confined to distant transpositions of the dorian mode (to C or F, an exception being the G-dorian No. 39 *O rosa bella*).[46] B♭ and E♭ are very common. Hexachordal transposition (giving a B♭ hexachord) appears to be rarely implemented, even in transposed pieces.
2. Most flattened peak notes receive their flats from the signature. The addition of non-signature, internal flats to peak notes is consistently low across all finals, and appears optional.
3. Peak notes are actually slightly more common approached by leap than by step, however, stepwise approaches receive slightly more flats.

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[46] This is in consonance with Berger, who finds that many theorists point out the dorian modes in particular when discussing the *fa-super-la*-issue [Berger, 1987, p. 78].

Peak	Final Acc	C Con	C Bux	D Con	D Bux	E Con	E Bux	F Con	F Bux	G Con	G Bux	A Con	A Bux	Total Con	Total Bux
E	all ♭	128	20	0	2	0	0	3	15	20	23	0	0	151	60
	♭S	78	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	78	N/A
	♭SI	18	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	18	N/A
	♭I	50	20	0	2	0	0	3	15	20	23	0	0	73	60
	all ♮	179	137	48	306	5	25	119	130	303	190	6	24	660	812
	total	307	157	48	308	5	25	122	145	323	213	6	24	811	872
A	♭I	7	3	0	0	0	0	0	5	2	0	0	0	9	8
	♮	348	371	121	640	12	51	165	305	583	410	18	23	1247	1800
	total	355	374	121	640	12	51	165	310	585	410	18	23	1256	1808
B	all ♭	108	86	9	114	0	4	147	184	170	184	0	2	434	574
	♭S	97	N/A	0	N/A	0	N/A	139	N/A	154	N/A	0	N/A	390	N/A
	♭SI	0	N/A	0	N/A	0	N/A	0	N/A	4	N/A	0	N/A	4	N/A
	♭I	11	86	9	114	0	4	8	184	16	184	0	2	44	574
	all ♮	74	74	42	86	3	14	106	19	208	62	7	14	440	269
	total	182	160	51	200	3	18	253	203	378	246	7	16	874	843

Table 32. Peak-note flats in tenor and contratenor

Peak	Final Acc	C Con	C Bux	D Con	D Bux	E Con	E Bux	F Con	F Bux	G Con	G Bux	A Con	A Bux	Total Con	Total Bux
E	all ♭	10	4	0	0	0	0	0	2	0	7	0	0	10	13
	♭S	9	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	9	N/A
	♭SI	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
	♭I	1	4	0	0	0	0	0	2	0	7	0	0	1	13
	all ♮	10	10	11	50	2	2	1	5	67	56	0	1	91	124
	total	20	14	11	50	2	2	1	7	67	63	0	1	101	137
A	♭I	1	0	0	0	0	0	0	1	0	0	0	0	1	1
	♮	38	39	6	17	1	1	56	13	105	48	1	1	207	119
	total	39	39	6	17	1	1	56	14	105	48	1	1	208	120
B	all ♭	5	3	2	14	0	0	0	12	18	9	0	0	25	38
	♭S	3	N/A	0	N/A	0	N/A	0	N/A	18	N/A	0	N/A	21	N/A
	♭SI	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
	♭I	2?	3	2	14	0	0	0	12	0	9	0	0	4	38
	all ♮	6	2	4	7	0	0	1	0	13	3	2	2	26	14
	total	11	5	6	21	0	0	1	12	31	12	2	2	51	52

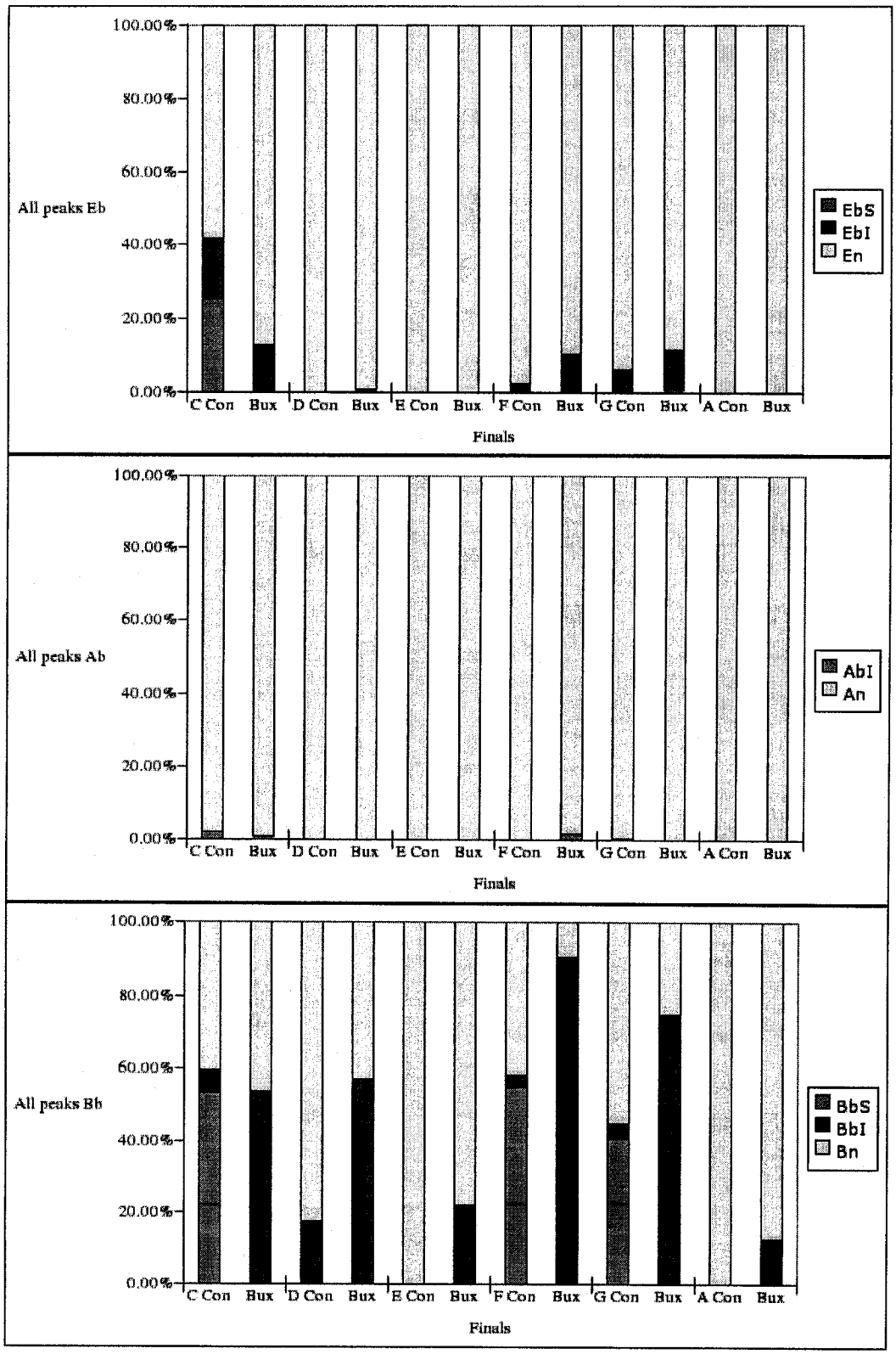
Table 33. Peak-note flats on upper neighbours (tenor and contratenor)

Peak	Final Acc	C Con	C Bux	D Con	D Bux	E Con	E Bux	F Con	F Bux	G Con	G Bux	A Con	A Bux	Total Con	Total Bux
E	all ♭	16	3	0	0	0	0	3	4	18	10	0	0	37	17
	♭S	11	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	11	N/A
	♭SI	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
	♭I	5	3		0	0	0	3	4	18	10	0	0	26	17
	all ♮	45	30	16	91	1	13	87	57	140	55	3	6	292	252
	total	61	33	16	91	1	13	90	61	158	65	3	6	329	269
A	♭I	5	2	0	0	0	0	0	3	2	0	0	0	7	5
	♮	154	115	20	203	2	16	63	76	136	125	4	6	379	541
	total	159	117	20	203	2	16	63	79	138	125	4	6	386	546
B	all ♭	26	28	2	28	0	0	24	37	72	44	0	1	124	138
	♭S	23	N/A	0	N/A	0	N/A	23	N/A	68	N/A	0	N/A	114	N/A
	♭SI	0	N/A	0	N/A	0	N/A	0	N/A	1	N/A	0	N/A	1	N/A
	♭I	3	28	2	28	0	0	15	37	4	44	0	1	10	138
	all ♮	19	24	20	20	2	3	15	5	60	13	3	2	119	67
	total	45	52	22	48	2	3	39	42	132	57	3	3	243	205

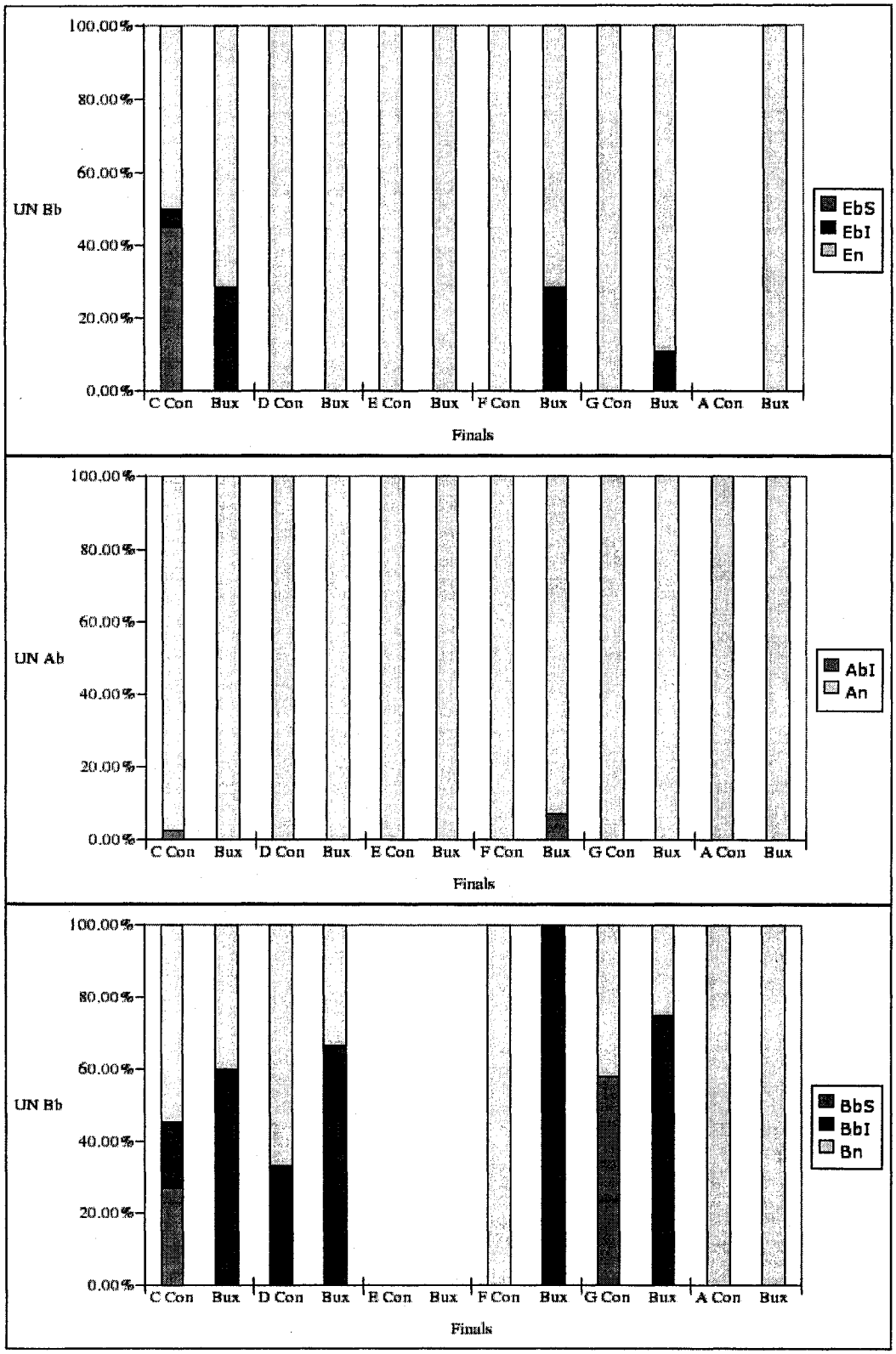
Table 34. Peak-note flats approached by step (tenor and contratenor)

Peak	Final Acc	C Con	C Bux	D Con	D Bux	E Con	E Bux	F Con	F Bux	G Con	G Bux	A Con	A Bux	Total Con	Total Bux
E	all ♭	102	13	0	2	0	0	0	9	2	6	0	0	104	30
	♭S	58	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	58	N/A
	♭SI	18	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	18	N/A
	♭I	44	13	0	2	0	0	0	9	2	6	0	0	46	30
	all ♮	124	97	21	165	2	10	31	68	96	79	3	17	277	436
	total	226	110	21	167	2	10	31	177	98	85	3	17	381	466
A	♭I	1	1	0	0	0	0	0	1	0	0	0	0	1	2
	♮	156	217	95	420	9	34	46	216	342	237	13	16	661	1140
	total	157	218	95	420	9	34	46	217	342	237	13	16	662	1142
B	all ♭	77	55	5	72	0	4	123	135	80	131	0	1	285	398
	♭S	71	N/A	0	N/A	0	N/A	116	N/A	68	N/A	0	N/A	255	N/A
	♭SI	0	N/A	0	N/A	0	N/A	0	N/A	3	N/A	0	N/A	3	N/A
	♭I	6	55	5	72	0	4	7	135	12	131	0	1	30	398
	all ♮	49	48	18	59	1	11	90	14	135	46	2	10	295	188
	total	126	103	23	131	1	15	213	149	215	177	2	11	580	586

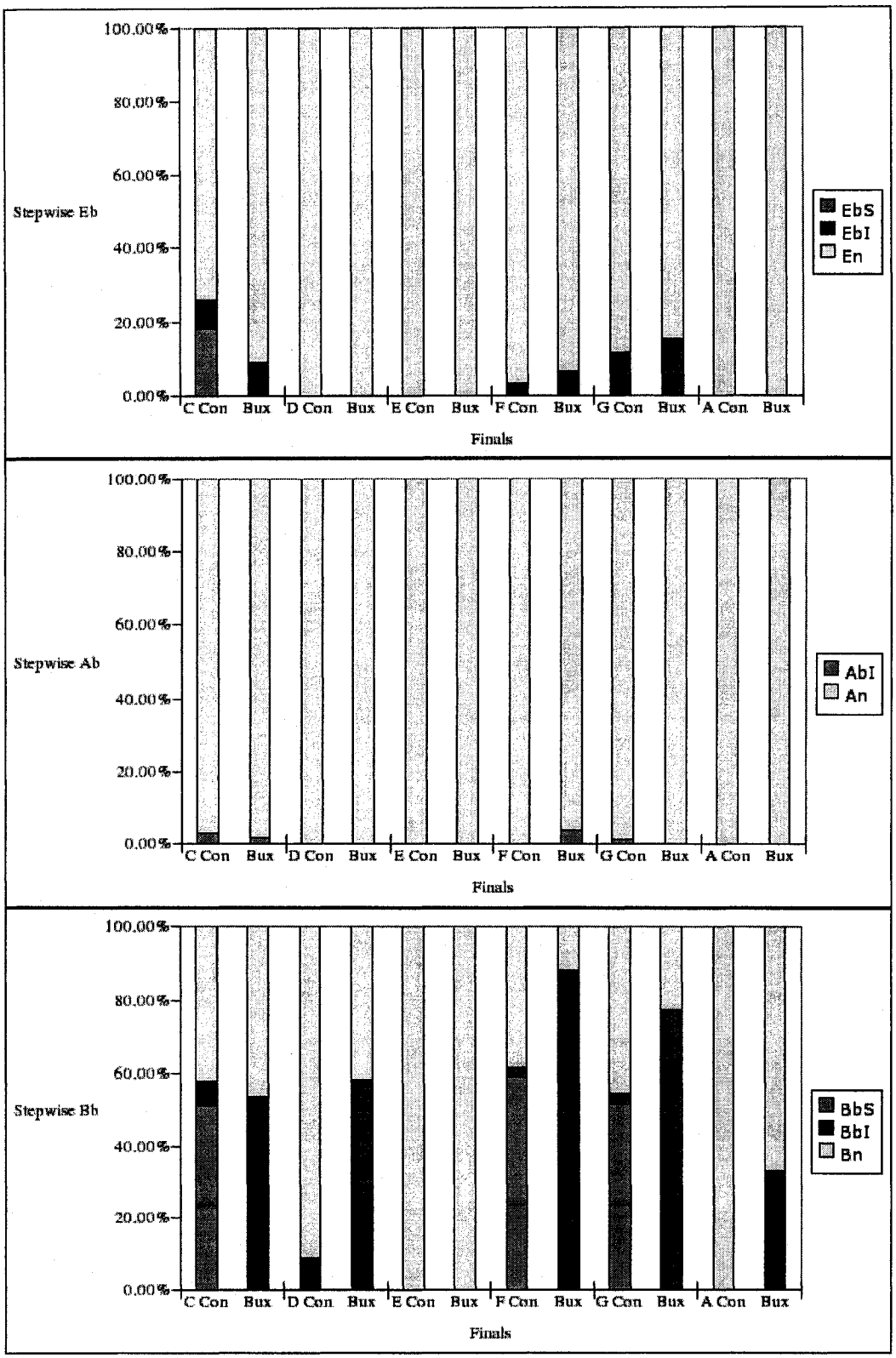
Table 35. Peak-note flats approached by leap (tenor and contratenor)



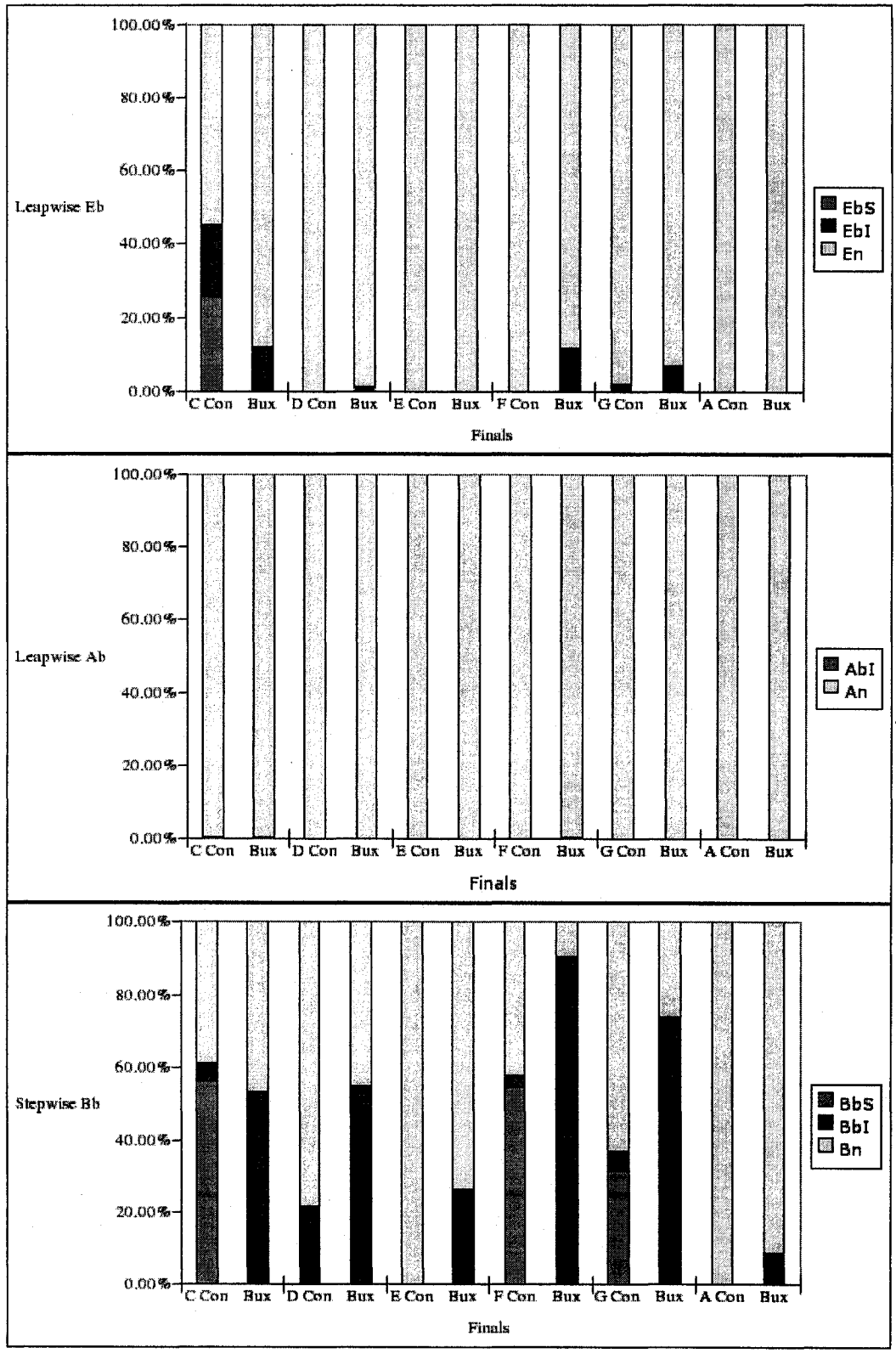
Bar Graph 32a. Peak-note flats in tenor and contratenor



Bar Graph 33a. Peak-note flats on upper neighbours (tenor and contratenor)



Bar Graph 34a. Peak-note flats approached by step (tenor and contratenor)



Bar Graph 35a. Peak-note flats approached by leap (tenor and contratenor)

6.2. Pre-Cadential Lowered Thirds

Brothers finds that during the period ca. 1400–1440, a particular subcategory of peak-note flat was quite common. The peak note in question occurs shortly before a cadence, and is a third above the cadential pitch [Brothers, 2000, p. 262]. Accordingly, he names them "pre-cadential lowered thirds".

I will examine pre-cadential lowered thirds in the superius and the tenor, since these are the voices most frequently arriving on the cadential pitch.

In Table 36 and Table 37, only those progressions are shown for which a pre-cadential third would need to be signed to be minor (e.g. D-progressions, which never need signed lowering of the F, are not shown). Only those finals are shown, for which at least one progression has a signed pre-cadential lowered third. As before, rows are given for internally-signed (I), signature (S), and redundantly-signed (SI). The "Total" rows refer to the total number of eligible progressions.

Superius

Prog.	Final⇒ Third	C Conc.	C Bux	D Conc.	D Bux	F Conc.	F Bux	G Conc.	G Bux
C	E♭I	6	4	0	0	0	0	1	0
	E♭S	16	N/A	0	N/A	0	N/A	0	N/A
	Total	90	62	0	0	20	64	35	28
F	A♭I	0	0	0	0	0	1	0	0
	Total	9	22	0	0	70	118	0	0
G	B♭I	0	4	0	2	6	4	29	30
	B♭SI	0	N/A	0	N/A	2	N/A	16	N/A
	B♭S	33	N/A	0	N/A	1	N/A	26	N/A
	Total	46	48	5	37	18	37	152	137

Table 36. Pre-cadential lowered thirds in the superius

On the surface, it appears as though rates of signing for pre-cadential lowered thirds are much higher in the concordances than in Buxheim (e.g.[6+16=] 22/90 or 24.4%

of total eligible C-progressions in C-pieces, as opposed to only 4/62, or 6.5%, in Buxheim). However, this impression is deceptive: among the concordances, we find a small number of pieces with potential pre-cadential lowered-third situations, which receive these flats consistently across multiple concordances (for example, all 16 signature E♭s preceding C-progressions in C-final pieces are in concordances of No. 11 *Le serviteur*), whereas in Buxheim, we find a larger number of pieces with potential situations, allowing for more variation.

Nevertheless, a few observations can be made. Signed pre-cadential lowered thirds occur only at C-progressions (E♭) and G-progressions (B♭) (the single exception at an F-progression is discussed below)—that is, in transposed dorian pieces. Most pre-cadential lowered thirds in the concordances are due to signature flats. This is corroborated by the Buxheim pieces, since all of the pieces with such flattened thirds have perceived signature flats in the lower voices (G- and C-dorian, F-mixolydian, and D-dorian-with-flat). However, there are a few pieces among the concordances with internally-signed flats foreign to the mode, and three with redundantly-signed flats (No. 3 *De madame*, No. 39 *O rosa bella*, and No. 250 *Le souvenir*).

Among the concordances, most pieces that have internal or signature pre-cadential lowered thirds are dorian—and the flats concerned are part of the mode. A few are F-pieces, in which the signed accidental is B♭ before a G-cadence—also modally-dictated. Two C-mixolydian concordances in which a mode-foreign pre-cadential flattened third occurs—an E♭ over a C—are G-dorian in Buxheim, are concordances of the previously-mentioned problematic No. 75 (*A discort*). Other precadential E♭s occur in No. 127 (*Mille bonjours*), which on account of the large numbers of internally-signed E♭s in all three of its concordances we reassigned to C-dorian in Section 3. The greatest number of internally-signed pre-cadential flattened thirds can thus be said to be due to the superius signature insufficiently expressing

the minor third degree of the dorian mode, or the flattened fourth degree of the lydian mode.

Why not simply put this flat in the signature? Why redundantly-sign a third which is already flat according to the signature? There are several possible answers to these questions, with no way to tell which are correct.

Earlier, I mentioned the theory that the lesser signatures of the superius might be due to more naturals being needed on these pitches in the superius, usually for cadential purposes. In modes with a minor third above the final, this would presuppose either a lot of cadences to the fourth degree (requiring a raised third degree) or a lot of cadences to the fifth degree (where the third degree is raised in the approach to the raised fourth degree, or as part of a Landini-ornament). In modes with a major third above the final, the "cancelled-by-being-left-out-of-the-signature" flat would be the leading-tone of the fifth degree. Although the fourth degree is not especially highly favoured as a cadence degree (see Table 23), the fifth degree is, making this argument plausible.

Perhaps the superius-singer is taking his cue from the more-rigorously signed tenor (using his ears over his eyes),[47] and a flat is marked only where a dorian sound is absolutely essential: in the modally-stabilising approach to a cadence on the final. By this reasoning, redundantly-signed pre-cadential flattened thirds could be explained as well: the notational convention is to give the singer a clue now and again as to what mode he is in, at the approach to a cadential progression, since this is where a phrase is coming to a close. Even a scribe who is more consistent in providing signatures for the superius might subscribe to this convention, in the manner of a modern typesetter providing unnecessary cautionary accidentals.

From the concordances, then, we learn that pre-cadential lowered thirds in the

[47] This could also be applied to a keyboard player, if he is using his eyes to process the lower voices, and his ears to let him adjust the superius accordingly.

superius are limited to those contained within the mode.

There are 17 pieces in Buxheim which contain signed pre-cadential lowered thirds not signed in the concordances. All of these are categorised as dorian. Again, these flats occur only where the mode would require it. The only exceptions are two D-pieces, in which the two B♭s represent thirds over the fourth degree of the mode—analogous to the single flattened E♭-third in a G-dorian model.[48]

Tenor

Prog.	Final Third	C Conc.	C Bux	D Conc.	D Bux	F Conc.	F Bux	G Conc.	G Bux
C	E♭I	9	3	0	0	0	0	3	0
	E♭SI	2	N/A	0	N/A	0	N/A	0	N/A
	E♭S	9	N/A	0	N/A	0	N/A	0	N/A
	Total	50	18	0	0	8	20	11	9
F	A♭I	0	0	0	0	0	1	0	0
	Total	5	10	0	0	78	33	0	0
G	B♭I	2	8	0	3	0	10	3	34
	B♭SI	0	N/A	0	N/A	0	N/A	0	N/A
	B♭S	19	N/A	0	N/A	21	N/A	38	N/A
	Total	33	18	0	5	40	11	63	41

Table 37. Pre-cadential lowered thirds in the tenor

There are far fewer potential situations for pre-cadential lowered thirds in the tenor. As in the superius, among the concordances, the rates of signing are fairly high (e.g. 41/63 or 65.1% of potential B♭s signed in G-pieces). Again, we discover that these are concentrated in a fairly small group of pieces, which are consistently signed

[48] Six of these Buxheim pieces actually do have concordances: in four cases, the absence of the concordances from the count of pre-cadential flattened thirds is explained by the fact that the model is at a modal transposition level that does not require signed flats for these thirds (D-dorian instead of G-dorian, or C-lydian instead of F-lydian). A fifth (No. 225) may be discarded, because the cadential progression is extremely weak and actually not present in two of the three models. The sixth, No. 12, is an oddity: actually F-dorian in Buxheim (!), it is G-mixolydian in its only concordance, Loch.

across multiple sources. These flats tend to be caused by the signature; internally-signed flats tend to occur when other concordances have a signature flat for that pitch. Foreign-to-the-mode internal flats are very rare: a single B♭ occurs in a C-lydian piece (No. 111, *Creature la plus belle*), and two E♭s in No. 106 (*Entrepris*, G-mixolydian in Schedel and Strahov, but C-dorian elsewhere).

In Buxheim, the rates of signing for B♭ in F- and G-final pieces, in particular, are much higher than in the superius (10/11 or 90.9%, and 34/41 or 82.9%). This is to be expected: these flats correspond to the perceived flat signatures of F-lydian and G-dorian pieces. As before, E♭s are signed only in C-dorian pieces and very rarely in G-dorian pieces. In some cases, the Buxheim pieces with signed flats are transpositions of models that required no flats for lowering of pre-cadential thirds (such as No. 10 [C-dorian] and No. 102 [G-dorian], both transposed from D-dorian).

Thus, in both superius and tenor, in Buxheim as well as in the concordances, pre-cadential thirds are low if the mode requires it, and are only very rarely lowered otherwise. A comparison to PHRASEFIND data in both tenor and superius showed no apparent relationship between cadential-structure type and pre-cadential lowered thirds.

Conclusions:

1. Pre-cadential lowered thirds are usually due to the signature, or to internal signing (in the superius) of flats which are signature flats in the lower voices. That is, pre-cadential lowered thirds are a part of the mode.
2. Signed lowered thirds occur mostly at cadences on the final in transposed dorian modes, and at cadences on the second degree in transposed lydian modes.
3. Very occasionally, the sixth degree in dorian pieces (being third above the fourth degree) is flattened. This is indicated only in D- and G-dorian pieces, where the required accidental is "normal" (B♭ or E♭), but not in C-dorian

pieces.

4. Pre-cadential thirds are not artificially *raised* in dorian pieces.

6.3. Correction of Melodic and Harmonic Intervals

6.3.1. Melodic Correction of Illegal Outlines

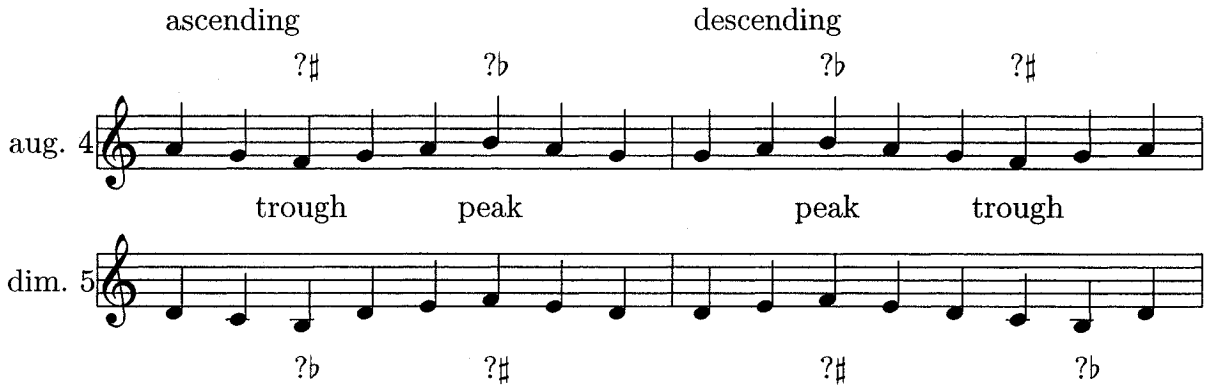


Figure 33. Illegal melodic outlines

A melodic outline is that segment of a melody which is bounded by two changes in direction. The change in direction from ascending to descending (at the top) is referred to as the peak (as in peak notes), and the change in direction from descending to ascending is referred to as the trough. A melodic outline may be of any length. It may contain skips, but it may not contain any further changes of direction between its boundaries. In an *ascending* outline, the trough comes before the peak, and in a *descending* outline, the peak comes before the trough.

Although the usual method of correction for illegal outlines (augmented fourths and diminished fifths) is the addition of a peak-note flat, a conceptual difference makes me discuss these corrections here, rather than as a subcategory of peak-note flats: other peak-note flats are decorative in purpose. From that perspective, then, these corrections fit better with other corrections of illegal intervals. Also, it is technically possible to correct a melodic outline problem with a trough-note sharp

rather than a peak-note flat (in the case of a fourth; for fifths, the reverse applies); the unlikeliness of doing so is one thing I wish to establish here.

In this section, then, the following questions will be addressed:

1. Are melodic outlines of augmented fourths or diminished fifths regularly corrected to perfect fourths or fifths?
2. Are these corrections related to certain final/signature combinations?
3. Are sharps or flats preferred for correcting melodic outlines?

For the purpose of counting these accidentals, each voice was extracted. All melodic outlines of fourths and fifths were counted for all pitches which occur in the data set. These were divided into ascending and descending outlines.

The data for ascending intervals and descending intervals showed distinctly different patterns, and will be discussed seperately.

Descending outlines

There are only about half as many descending fourth- and fifth-outlines as ascending fourth- and fifth-outlines: it has frequently been observed for this repertoire that there is a tendency for melodies to ascend very quickly up to the fifth degree, and then to trickle back down slowly (with many intermediate changes of direction, breaking up the outlines). Most of these descending outlines occur in the contratenor.[49]

[49] This statistic is not really relevant to the topic at hand, but is so peculiar that it merits its own table, in which note-names are used regardless of sharps or flats:

Desc. 5th	Desc. 4th	most common in:
F–C	G–C	contratenor
G–D	A–D	contratenor
A–E	B–E	contratenor
B–F	C–F	contratenor
C–G	D–G	contratenor/tenor
D–A	E–A	all voices
E–B	F–B	all voices (very rare)

In the concordances, outlines of descending fifths were always perfect: none involved any accidentals whatsoever, and F–B never occurred. In Buxheim, there were 14 descending diminished fifths perfected by using B♭ or E♭; all of these occurred in the contratenor, mostly in pieces without models (such as No. 194 [*Præambulum super C*], Nos. 232a and 233b [sections of the *Fundmentum organizandi* No. 231], and Nos. 236 and 236a [more *fundamenta*]). The pieces with models had signature B♭s in at least some concordances. Two groups of diminished fifths remain: three F–B fifths, all in the superius, remain uncorrected. Four diminished fifths caused by sharps at the bottom (G–C♯ or C–F♯) can be discarded: three have rests or section breaks interrupting the melodic arch, and the fourth (a descending C–F♯ fifth in No. 73 *Salve Regina*) occurs against a B♭ in the tenor, and must be questioned as possibly erroneous.

Only one uncorrected descending diminished fifth remains: a B♭–E in the contratenor of No. 4 (*In mentem veniunt cucumeres*). Since the bulk of descending diminished-fifth outlines in the lower voices are in fact corrected with flats, we may conclude that such outlines generally ought to be corrected with flats.

Descending fourths in the concordances are never given internal accidentals: all of them are perfect, except a group of 23 augmented B–F fourths. *All* of these are in pieces that have signature B♭s in other sources, such as the C-dorian Nos. 106 and 117, the G-dorian Nos. 39 and 252, and the F-mixolydian Nos. 124, 161, and 250. Conversely, every single B♭–F was caused by the signature of the piece.

In Buxheim, descending B–F occurs only 14 times (4 times in the superius) in contrast to 70 B♭–F outlines. In the concordances, there are far more uncorrected descending augmented fourths (23 B–F: 33 B♭–F). Of the three descending tritones on other pitches (one each of E–B♭, A–E♭, and F♯–C), the last one appears to be

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Since ascending outlines are somewhat favoured in the superius, perhaps this contrast indicates a tendency for the contratenor to move in contrary motion?

an error (it occurs against an F just before an F cadence).

Altogether, the pattern for descending outlines of fourths and fifths appears to be as follows: the composer avoided writing outlines that would be augmented or diminished given the signature. Thus, when these passages were copied and the signature was left out, the necessary internal accidentals were not added, and the performer should correct these descending diminished fifths and augmented fourths by adding a flat.

Ascending outlines

In general, the situation for ascending outlines of fourths and fifths is far less consistent. Ascending outlines are slightly more common in the superius than in the other voices, but the tendency is not nearly as clear as with descending outlines.

Ascending diminished-fifth outlines other than B-F occur in both Buxheim and the concordances; these include outlines with trough-note sharps, which are far more common in Buxheim than in the concordances. Indeed, most of the trough-note sharps in the concordances are to be found in concordant intabulations; for example, all nine F♯–C outlines are in Loch. Most of them are in the superius, and function as Brothers-style propinquity accidentals.

E–B♭ diminished-fifth outlines appear both in pieces with signature B♭ and in concordances of those same pieces *without* signature flats. This E is never corrected in the concordances. In Buxheim, most E♭–B♭ corrections appear in the *fundamenta.* A–E♭ diminished-fifth outlines are likewise uncorrected.

B–F and B♭–F fifths are rare outlines in the concordances, occurring 50 and 44 times respectively. Again, B♭ is *always* due to the signature, and B♮–F occurs very often in pieces with signature flats in other manuscipts. In Buxheim, there are a phenomenal 297 B–F outlines to only 20 B♭–F outlines. This number becomes somewhat less impressive when we realise that 272 of them (ca. 92%) are in the rarely-signed superius.

In the case of fifths, then, there appears a tendency to avoid writing outlines that would be diminished given the signature. However, such outlines do occur, and occasionally seem to be caused incidentally by the addition of sharps for other purposes.

We might expect a little more rigour in the treatment of ascending tritone outlines, yet the concordances are again quite inconsistent. However, there is a pattern belying this inconsistency:

An E♭–A ascending tritone occurs *only* in No. 11 (*Le serviteur*), where the E♭ comes from the signature, and the A receives an internal flat in some sources.

A B♭–E ascending tritone happens only in pieces with at least one signature flat; some of these (10/22, or 45.5%) have signature or internal E♭s in other sources.

An F–B ascending tritone happens in pieces with a signature B♭ in other sources, and most of these (158/186, or 84.9%) also have internal B♭ in other sources.

The fact that at these illegal ascending augmented fourths are often found to be corrected in other sources of the same piece suggests that this might be one of those "obvious" corrections that many do not feel a need to write down (there is no discernible pattern as to which concordant manuscripts add flats).

We can confirm this idea by checking this pattern against Buxheim:

Buxheim has only *one* E♭–A ascending tritone, vs. 911 E–A and two E♭–A♭ perfect fourths; and it has *five* B♭–E ascending tritones, vs. 400 B–E ascending perfect fourhts (for comparison, the ratio in the concordances was 22:77). Three of these B♭–E are (once again) in the rarely-signed superius.

There are 268 F–B ascending tritones, and only 199 F–B♭ ascending perfect fourths. This seems perfectly awful; however, 248 (ca. 93%) are again in the superius. The ratio of uncorrected (augmented) to corrected (perfect) in the lower voices is 20:144, or 87.8% corrected, which is a lot higher than the comparable 112:198, or 63.9% corrected, in the lower voices of the concordances. Buxheim

appears to support the conclusion that ascending augmented-fourth outlines ought to be corrected with a flat.

Conclusions

1. In the concordances, corrections to outlines of augmented and diminished fourths and fifths are only indicated internally where other concordances of the piece have a signature flat for that pitch.
2. There is no apparent correlation between correction of these outlines and final; however, the circumstance pointed out in 1. suggests that composers avoided writing outlines that would need internal correction given the signature, and that the presence of uncorrected outlines might indicate that a signature is in fact missing. Internal corrections in pieces with signatures in other sources might have accumulated after a piece has been transmitted lacking its signature. (For example of pieces in which this might apply, see, No. 39 [*O rosa bella*], No. 250 [*Le souvenir*], or No. 252 [*Tout a par moy*].) These empirical findings support the Berger's suggestions based on theoretical evidence of the purpose of partial signatures [Berger, 1987, p.69].
3. Sharps are not normally used to correct melodic outlines. The evidence of Buxheim suggests that one should correct such outlines using flats.

6.3.2. Correction of Illegal Melodic Skips

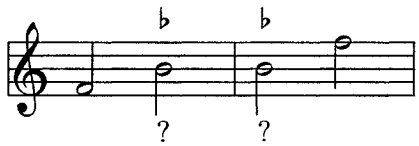


Figure 34. Melodic skips

For melodic skips, we will pursue a strategy similar to that used for melodic outlines: all diminished fifths and augmented fourths are extracted and compared to

the final/signature combinations of the pieces in which they occur. Only those skips that are immediate are counted; that is, skips with intervening rests are ignored.

Table 38 shows ascending and descending skips of augmented fourths and diminished fifths, separated by voice. For each type of skip, the number that are between B–F are also given separately.

	Conc.				Bux.			
Interval	T	C	S	Total	T	C	S	Total
Asc. d5	1	5	1	7	1	6	10	17
B–F	1	5	0	6	0	3	7	10
Desc. d5	0	0	0	0	1	4	5	10
F–B	0	0	0	0	1	2	4	7
Asc. A4	36	38	48	122	9	16	65	90
F–B	31	35	42	108	7	5	63	75
Desc. A4	8	26	0	34	7	25	8	40
B–F	8	26	0	34	4	15	7	26

Table 38. Corrections of melodic skips

In both the concordances and Buxheim, there are very few diminished-fifth skips. In the concordances, they occur only in three pieces: No. 127 (E–B♭), No. 12, and five occurences in concordances of No. 250 (*Le souvenir*). There are more augmented-fourth skips; however, they likewise occur in a fairly small group of pieces, with multiple occurrences per title (e.g. No. 11 [*Le serviteur*], No. 39 [*O rosa bella*], No. 117 [*A son plaisir*], No. 124 [*Fortune*], No. 161 [*Descendi in ortum meum*], and No. 250 [*Le souvenir*].) All these pieces share in common that there are signature flats for the illegal-interval-causing pitch in other concordances. The few pieces to which this rule does not apply tend to have perceived signature flats in Buxheim (e.g No. 23, and No. 103, which is G-dorian rather than mixolydian in Buxheim).

In addition, the illegal skips in the concordances tend not to be in the same places as in Buxheim; that is, Buxheim has perfect intervals in those places.

In Buxheim, the signing patterns in the lower voices are a bit different: only 38/69 (55.1%) of the lower-voice illegal skips are between B and F (as opposed to 106/114, or 93%, among the concordances). Instead, there are some skips involving sharps, and a much greater spread of pieces (many of the examples are in the *fundamenta*). Altogether, there are eleven sharps, eight in the contratenor: several can be explained as botched attempts at double-leading-tone cadences, where the contratenor drops to the final instead of rising to the fifth.

Overall, these patterns suggest similar conclusions to those made earlier regarding outlines: composers simply avoided writing skips that would be illegal given the final/signature combination, and frequent occurrences of these skips can be seen as evidence of missing signature accidentals.

To confirm this pattern, we next look at internally-signed accidentals in the concordances. If our conclusion is correct, we would expect to find internally-signed corrections of augmented fourths/diminished fifths *only* in those pieces that have signature accidentals in other sources. This is, in fact, the case: in the lower voices, internal corrections (B♭s) are found in Nos. 3, 11, 106, and 159, all of which have concordances with signature flats.

There are two exceptions—or are there? One is the unusual No. 127 (*Mille bonjours*), which we reclassified as C-dorian based on its high number of internally-signed E♭s—confirmed by the perceived G-dorian signature in Buxheim. Two of its concordances contain a B♭–E♭ correction. The second is No. 229 (*Sig seld und heil*, in Schedel), which has a G-mixolydian signature, yet an F–B♭ correction. This piece, also, is G-*dorian* in Buxheim. In both of these cases, I suggest that they are not in fact exceptions: it is the signatures in the surviving sources that are insufficient.

Internal corrections in the superius of the concordances (there are 28) occur sometimes in pieces that have superius-signature-♭s in other sources, but *always* in pieces that have the flat in question in the lower voices.

Very very rarely, a melodic skip in Buxheim is perfected by means of a sharp (17 times, as opposed to 348 perfections by means of a flat). In one of these cases (No. 44, *Sur toutes fleurs*), the F♯ could be said to be caused by transposition of the piece from C to G, with B♮ becoming F♯.

Conclusions

1. Correction of augmented fourth and diminished fifth skips should be mandatory.
2. There is a tendency to avoid writing intervals that require correction given the signature of the lower voices.
3. When the superius has fewer signature flats, the fourths and fifths used correspond to those available given the signature of the lower voices. The resulting augmented fourths/diminished fifths may be corrected with internally signed flats.
4. Presence of uncorrected intervals points to a missing signature.

6.3.3. Harmonic Correction

The two harmonic intervals most subject to correction from dissonant to consonant by the addition of an accidental are the tritone and the diminished fifth. Identifying harmonic corrections of tritones and diminished fifths is more complicated than simply counting occurrences of these harmonic intervals, since they can easliy occur in a contrapuntally-legal context (such as an unaccented passing note). Instead, one must search for occurences of specific contrapuntal errors (such as those shown in Figure 35). Initially, all dissonant intervals were counted (not only augmented fourths or diminished fifths), to get a general idea of how seriously infractions of each

rule were taken. For example, since it appears that dissonant upper neighbours are very common in general (occurring in many ornaments such as the Landini cadence [see Figure 15]), we cannot use them as a measure of how often augmented fourths or diminished fifths are corrected in this type of situation. Of the four situations shown in Figure 35, the *dissonant simultaneous arrival* proved to be the most consistently identifiable, and we will concentrate on it in the following discussion.

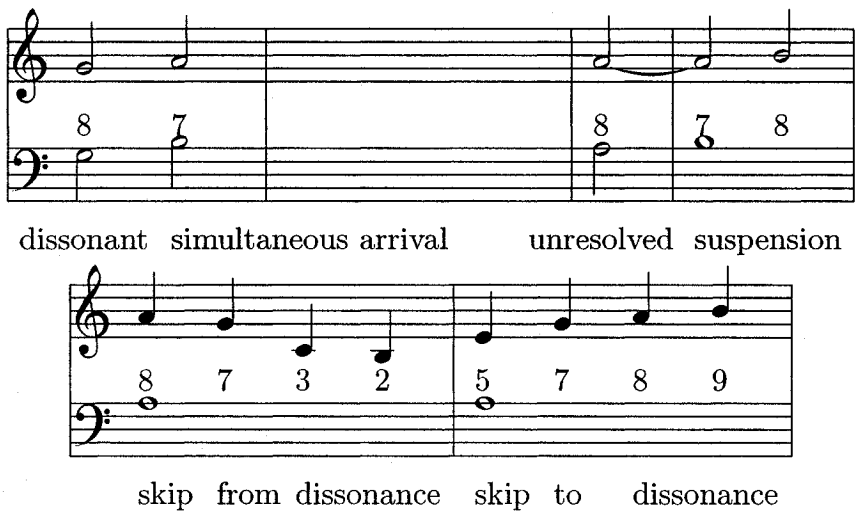


Figure 35. Examples of voice-leading errors potentially subject to correction

6.3.3.1. Dissonant Simultaneous Arrivals

In a *dissonant simultaneous arrival* situation (see Figure 35), both voices move in order to arrive on a dissonance; thus, the dissonance cannot be explained as a passing note, suspension, or neighbour tone.

Table 39 shows which percentage of all simultaneous attacks occurred to each of the listed dissonances (seconds and sevenths are included for comparison only, and will not be discussed here). Table 40 shows only simultaneous attacks at the beginning of semibreve-units. The second column of each refers each of the three voice-pairings (tenor-superius, contratenor-superius, and tenor-contratenor).

		Second	Seventh	Dim. Fifth	Aug. Fourth
Buxheim	TS	0.6%	3.9%	0.4%	0.4%
	CS	0.5%	1.6%	0.5%	1.0%
	TC	0.2%	0.1%	0.1%	0.1%
Conc.	TS	0.3%	1.2%	0.3%	0.2%
	CS	0.5%	1.6%	0.8%	2.4%
	TC	0.9%	0.3%	0.6%	0.2%

Table 39. Simultaneous attacks anywhere in the mensural unit

		Second	Seventh	Dim. Fifth	Aug. Fourth
Buxheim	TS	0.5%	3.6%	0.4%	0.2%
	CS	0.4%	1.3%	0.4%	0.8%
	TC	0.2%	0.1%	0.1%	0.05%
Conc.	TS	0.1%	1.1%	0.2%	0.1%
	CS	0.4%	1.3%	0.5%	1.7%
	TC	0.5%	0.2%	0.3%	0.1%

Table 40. Simultaneous attacks at the beginnings of semibreves

Over all, dissonant simultaneous arrivals are somewhat more common on subdivisions of the semibreve than on the semibreve itself. By far the most common dissonance is the seventh; this is especially marked between tenor and superius. Augmented fourths are found most often between contratenor and superius. This is to be expected, since fourths in general are found most often between these two voices.

In general, Buxheim has fewer dissonant simultaneous arrivals than the concordances, except for sevenths, of which Buxheim has far more. In terms of diminished fifths and augmented fourths, we can see that Buxheim has fewer than the concordances.

Where do these diminished fifths and augmented fourths come from? Or, from the other perspective: how many perfect fourths and fifths are there that would be

diminished or augmented if it were not for internal accidentals? Given the general observations just made, we will continue to separate voice-pairs, but include all simultaneous attacks (not just those at the beginnings of semibreves: the difference was slight). In Table 41 and Table 42, the most common intervals subject to correction are divided according to quality and the type of accidental in effect.

Interval	TS Buxheim	Conc.	CS Buxheim	Conc.	TC Buxheim	Conc.
B♭I–F	124	4	36	4	90	5
B♭S–F	N/A	26	N/A	43	N/A	22
B–F	66	26	30	52	4	34
E♭I–B♭I	0	1	1	1	103	2
E♭I–B♭S	N/A	2	N/A	2	N/A	0
E♭SI–B♭S	N/A	0	N/A	0	N/A	0
E♭S–B♭SI	N/A	0	N/A	1	N/A	0
E♭S–B♭S	N/A	0	N/A	3	N/A	3
E–B♭I	0	0	4	2	5	2
E–B♭SI	N/A	0	N/A	1	N/A	1
E–B♭S	N/A	1	N/A	4	N/A	40
E–B	242	35	84	44	341	102
A–E♭I	0	0	0	2	0	0
A–E♭S	N/A	7	N/A	0	N/A	0
A♭–E♭	0	1	0	0	0	0
A–E	636	116	294	259	390	271

Table 41. Fifths commonly subject to accidentals

Let us look specifically at the data for the B–F fifths, since the trends are most clearly visible here (Table 41).

In the concordances, all three voice pairs show about as many uncorrected B–F fifths as corrected (26:30 for tenor–superius, 52:47 for contratenor–superius, and 34:27 for tenor–contratenor). The corrections are caused, as in the case of melodic corrections, by signature accidentals, or by internal accidentals in concordances of pieces with signature accidentals. The uncorrected diminished fifths are concentrated in pieces which have signature flats in other sources.

Interval	TS Buxheim	Conc.	CS Buxheim	Conc.	TC Buxheim	Conc.
F–B♭I	0	1	9	1	26	0
F–B♭S	N/A	11	N/A	30	N/A	7
F–B	38	9	70	96	11	16
B♭I–E♭I	0	0	2	0	0	0
B♭S–E♭I	N/A	0	N/A	2	N/A	0
B♭S–E♭S	N/A	0	N/A	20	N/A	0
B♭I–E	32	0	16	2	1	0
B♭SI–E	N/A	0	N/A	0	N/A	1
B♭S–E	N/A	15	N/A	75	N/A	8
B–E	46	23	315	133	4	13
E♭I–A	0	1	0	0	0	1
E♭S–A	N/A	0	N/A	4	N/A	3
E–A	50	13	414	95	197	22

Table 42. Fourths commonly subject to accidentals

In Buxheim, the two pairs that include the superius also have a fair number of uncorrected fifths, although there are proportionally more corrected fifths in Buxheim than among the concordances (66 B–F:124 B♭–F for tenor–superius, as compared with 26:30 in the concordances; 30:36 for contratenor–superius, as compared with 52:47 in the concordances). Far more telling, however, is the tenor–contratenor pair: only four fifths are diminished, compared to 90 B♭–F fifths. Among E(♭)–B♭ fifths, a similar trend can be observed: in Buxheim, there are only five diminished fifths and 103 E♭–B♭ perfect fifths, compared to 43:5 in the concordances. These corrections may occur one flat beyond the perceived signature (for example, No. 77, which has corrective E♭s in the contratenor despite its C-mixolydian mode).

Among fourths (Table 42), the picture is similar (although the data pool is substantially smaller, since most legal fourths will occur between contratenor and superius): when the rarely-signed superius is a member of the pair under investigation, the augmented fourth is uncorrected in Buxheim (*never* for tenor–superius,

and only nine times to 70 uncorrected F–B fourths for contratenor–superius). This is again reversed for the tenor–contratenor pair (26 corrected to 11 uncorrected).

Altogether, the observation made for earlier for melodic corrections holds true for harmonic corrections as well: in general, the combination that could cause an illegal interval given the signature is avoided. If the combination does occur, one flat beyond the tenor signature may be applied. Since the search routines merely count situations as they are found and do not label them for future reference (excepting cadences, of course), it is currently impossible to say whether horizontal concerns generally prevail over vertical ones, when there is a conflict of interest in the correction of illegal intervals. However, in the few such situations found when manually checking augmented-fourth skips, the intabulators appeared to favour the vertical correction. Whether this reflects the priorities of a keyboard player playing from tablature rather than those of a singer performing from an individual part remains conjecture.

6.4. Rare Accidentals: D♯, A♭, G♯

Altogether, D♯, A♭, and G♯ are rarely notated. It is worth summarising the conditions under which we have seen these three accidentals.

D♯ occurs only once in Buxheim and all its concordances. This single occurence was in the *fundamentum* No. 236, in a *clausula* on "mi hh mi", where the D♯ provides a dorian leading-tone to E. This circumstance was mentioned earlier as being exceptional, caused by the systematic arrangement of the *fundamentum*.

We encountered **A♭** as a peak note or pre-cadential lowered third in C-dorian pieces, and exceptionally as a peak note in the G-dorian No. 39 (*O rosa bella*). In the single F-dorian piece (No. 12 [*Möcht ich din wegern*]), A♭ appeared as the minor third degree of the mode.

G♯ was the most common of the three. In the models, it was very rare, and occurred as a leading tone at A-progressions and a double leading tone at D-progressions. In Buxheim, it was much more common. Its primary function was as a double leading tone at D-progressions: 97 occurrences in the contratenor alone, compared with 41 occurrences as a leading tone in A-progressions in all three voices.

D♯ and A♭ were about equally rare in both the concordances and Buxheim, suggesting that these two accidentals really were not used very much. On the other hand, the much greater occurrence of G♯ in Buxheim (a list of G♯s in Buxheim takes up about four pages, as opposed to about a quarter of a page for the concordances) suggests that we ought to be adding far more G♯s than are present in the notated record.

Chapter 7
Conclusions

This study's contributions are twofold: on the one hand, a development of computerised methods, and on the other hand, new findings about the use of accidentals in the mid-fifteenth century. These findings themselves suggest further avenues of research, which may be explored using the methods developed. Accordingly, this chapter is tri-partite. In the first part, I discuss the usefulness and efficacy of the chosen type of computer-aided analysis, along with associated problems and suggestions for improvement. In the second part, I summarise my findings on the questions of accidentals and mode, in the form of suggestions offered for musical practice. Appended to this second part are two pieces, a Buxheim concordance and a piece not found in Buxheim, with suggestions for *musica ficta* based on my findings. The third part sets out some projects for the future.

7.1. Computer-aided Analysis of Buxheim

We frequently limit our analytical studies of a given musical repertoire to a fairly small body of pieces that we regard as "worthwhile" or "interesting". Given the comparatively large time investment of analysis, this is understandable. However, this tendency causes problems when we are trying to identify the wonders or peculiarities of a compositional or performance practice style, since we need a general background against which to view the individual piece or group of pieces. For this, we need to analyse the mediocrities of the repertoire as well, and (preferably) in large numbers.

The method used in this study allows us to identify norms, through as precise as possible a description of specific musical situations. Once we have identified these norms, we can look at individual pieces with a better idea of what makes them special.

The greatest advantage of computer-aided analysis is our ability to process large numbers of pieces very quickly. Thus, in this study, a general background of accidental-notation practice was painted using the concordances, against which the peculiarities of Buxheim's practice became readily apparent—and unusual pieces or situations showed up as statistical extremes. For example, the rate of signing for raised double-leading-tones is amazingly high in Buxheim—but no one had ever noticed this before, because the usual *modus operandi* is to examine a few individual pieces, perhaps noticing that a few parallel-contratenor cadences have sharps in Buxheim, *but not counting every single parallel-contratenor cadence in the whole manuscript*. On occasion, we encounter something unexpected in this way; for example, the peculiar tendency for the contratenor to have more descending outlines of fourths and fifths than any other voice (mentioned in Section 6.3.1). This unlooked-

for finding suggests a new line of questioning. When we think of a new question to ask, we can look at *all* examples of a given situation without going through all the scores by hand yet again: we define the situation in terms the computer can understand, and go. Defining the questions for the computer is in itself a useful exercise, since it encourages us to be very precise in our definition of a problem.

Only with this innovative approach to computer analysis can we feasibly hope to accomplish a complete and objective analysis of accidentals across the whole spectrum of fifteenth-century music.

7.2. Accidentals: Recommendations

There are two ways of thinking about the meaning of high or low rates of signing; neither is generally based on concrete evidence, but rather on a general personal impression of the psychological factors involved:

1. If something is obvious to all concerned, it need not be indicated; therefore, a high rate of signing indicates a lack of confidence on the part of the scribes in the universal acceptance of the *ficta*-rule concerned;
2. One indicates not only that which it is necessary to indicate (the un-obvious), but also that which is important; therefore, a high rate of signing indicates an acceptance of the *ficta*-rule concerned as an important one.

In my own conclusions and the recommendations given below, I tend towards the second interpretation, based on the fact that clear patterns emerge in an analysis of the pitch notation of Buxheim: the rates of signing are sufficiently high in the letter-notation of the lower voices that we can begin to make suppositions about a graded set of priorities underlying certain common *ficta*-decisions, such as cadential sharps and peak-notes. These apparent priorities tend to be in consonance with an informed-intuitive sense of what might be considered important factors in such decisions. Our very ability to discern these patterns suggests that there was both rhyme *and* reason to the intabulators' choice of pitches in the lower voices, and we can take the pitch content fairly literally.

The applicability of these guidelines to *vocal* rather than keyboard music comes from both the fact that the keyboard player did not exist in a separate musical space from the singer (even when player and singer were not combined in the same musician, he at least drew most of his pieces from the vocal repertoire), and the much simpler fact that this manuscript is the best source of information we have:

it contains nearly twice as many accidentals as mensural sources, it is in a notation that is much more precise as to intended pitch, and is the largest manuscript of its kind. Analysis of Buxheim has brought us much closer than ever before to the actual musical practice of a specific fifteenth-century musician or group of musicians.

I therefore summarise my conclusions from these analyses into a set of recommendations for musical practise:

Signatures and mode (Section 3):

Pieces fall into four modal groups (dorian, phrygian, lydian, mixolydian) that are in consonance with the eight-mode system. Modes on C and A are transpositions of the regular modal finals F, G, E, and D, and G-dorian is a transposition of D-dorian. The tenor is most important in determining the mode in operation: conflicting signatures can be explained by the *musica ficta* needs of the other voices. The presence of illegal augmented fourths and diminished fifths in a particular source for a piece suggests that signature flats are missing (Section 6.3).

Leading tones (Section 5.1):

We have a degree of choice when deciding whether or not to raise the leading-tone of a cadential progression. Our choice should be influenced by our perception of the relative importance of the cadence, where the following factors play a rôle:

a. position as final cadence
b. arrival on a long note in one or more structural voices
c. arrival at the beginning of a mensural unit
d. cadential pitch in relation to the final (in general, $\hat{1}$ and $\hat{5}$ receive more sharps.)
e. voice-leading type of the third voice

Double leading tones (Section 5.3):

In a parallel-contratenor voice-leading situation on C, D, F, and G, we should generally raise both leading-tone and double-leading-tone, unless the D-progression is in a C-dorian piece.

Phrygian progressions (Section 5.5):

Parallel-contratenor voice-leading situations on A and E are phrygian, according to Buxheim. In dorian pieces, cadences to the second degree are always phrygian, and cadences to the fifth degree may be dorian or phrygian.

Phrygian vs. dorian cadences on the same pitch (Section 5.5):

A- and D-progressions are generally *either* phrygian *or* dorian in any given piece. A possible indicator of using the *other* type is changing the category of voice-leading in the third voice, even when this different voice-leading category could theoretically support both types of cadence. For example, if most A-cadences in a piece have falling-fourth contratenors (phrygian), the use of leaping-contratenor voice-leading at some cadences indicate that these nevertheless ought to be dorian.

Peak notes (Section 6.1):

Generally, flattened peak notes are a result of the signature. The sixth degree can also be flattened in transpositions of the dorian mode, but this is relatively infrequent and therefore optional. A stepwise approach to the peak note might be a positive indicator for adding a flat.

Pre-cadential lowered thirds (Section 6.2):

Like other peak notes, pre-cadential lowered thirds are a product of the mode, that is to say, the final-signature combination of the tenor. On occasion, the sixth degree of dorian pieces (the third above cadences to the fourth degree) may also be lowered: this alteration is not notated in C-dorian pieces, however.

Melodic outlines (Section 6.3.1):

Melodic tritone and diminished-fifth outlines ought to be corrected when they

are *descending*: they are a product of omitted signatures. *Ascending* tritone outlines ought to be corrected, but occasional diminished fifths are permissible.

Melodic skips (Section 6.3.2):

Melodic tritone and diminished-fifth skips are to be corrected with flats. A preponderance of these illegal intervals is also an indicator of a forgotten signature.

Illegal harmonic tritones and diminished fifths (Section 6.3.3):

Harmonic tritones and diminished fifths should likewise be corrected with flats.

Buxheim:

The top voice in the notation of Buxheim is not complete as far as accidentals are concerned; we are obliged to add more accidentals as suggested by the patterns of the lower voices.

7.2.1. Pieces with Recommended Accidentals

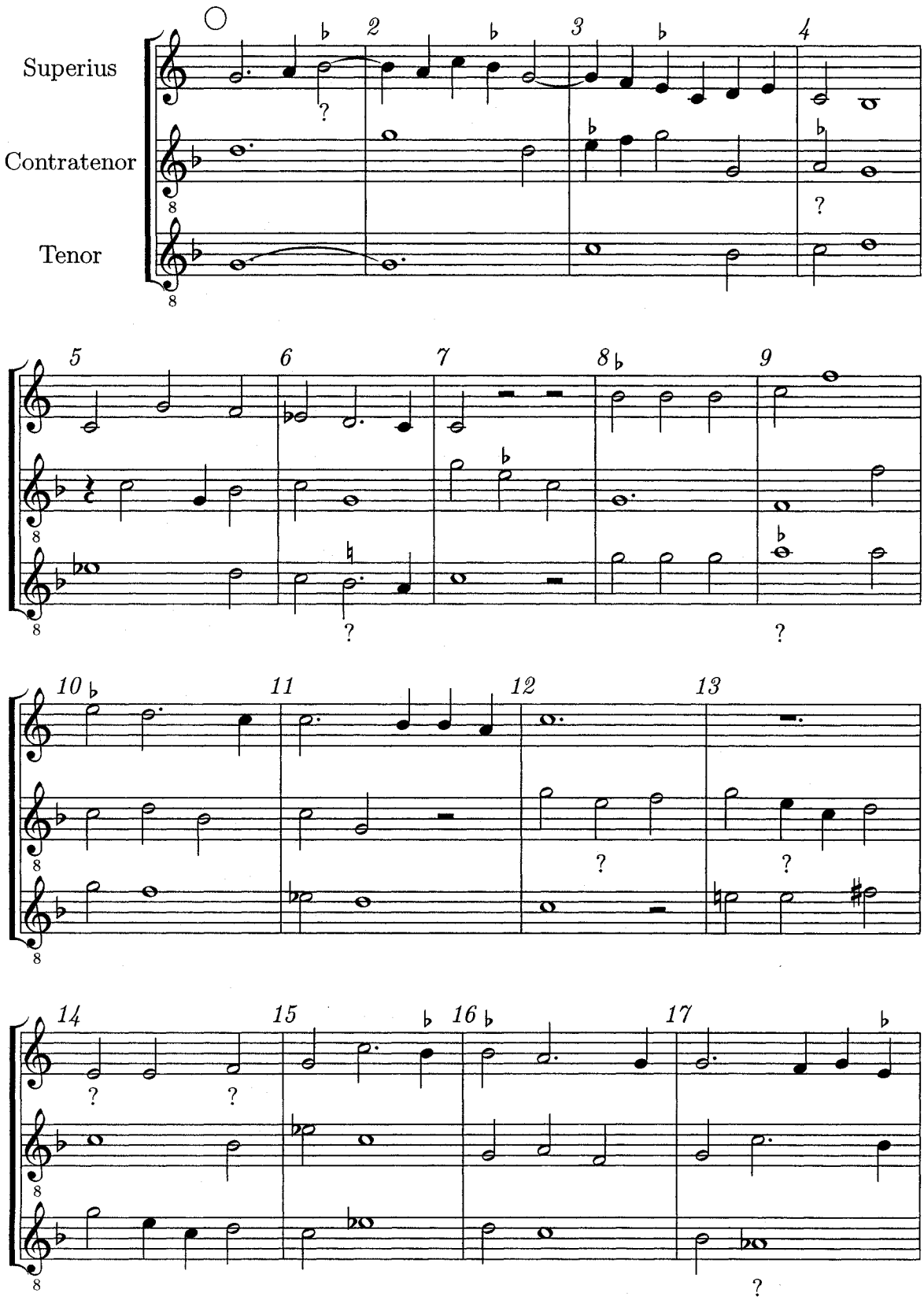
To illustrate these recommendations, I include a piece from Buxheim, its model, and a chanson not present in Buxheim, with indications of the alterations I would apply. After each piece, alterations marked with "?" are briefly discussed.

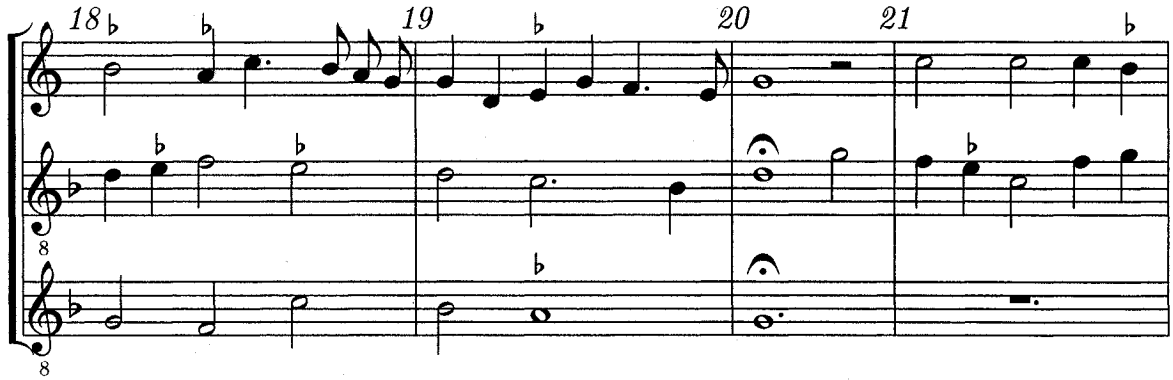
Mille bonjours (Buxheim No. 127, Model: Figure 36 and Intabulation: Figure 37) was chosen due to its peculiarity: none of its sources transmit signatures that fit with its C-dorian categorisation (see pp. 69 and 76), and a comparison with Buxheim (transposed to G-dorian) is especially fruitful: several places demonstrate the range of choices available to us. The piece is transcribed here from EscB, because this source has the most accidentals for comparison, but reference is made in the discussion to the accidentals transmitted in the other sources (MuEm and PC).

Added accidentals are intended to last for the whole measure, as per modern convention. These accidentals were added to EscB *without* looking at the Buxheim intabulation; discrepancies with Buxheim are discussed in the text.

Binchois's *Mort en merchy* (Figure 38) was chosen to provide a contrast with *Mille bonjours*: it is an F-lydian, untransposed piece, and there is no Buxheim intabulation to guide us. In his edition, based on the chanson's only source MuEm, Rehm offers no suggestions for added accidentals [Binchois, 1957, p. 28]. Using this example, I will show how I would proceed when encountering an unfamiliar piece.

Figure 36. Du Fay: *Mille bonjours*, EscB 26–27

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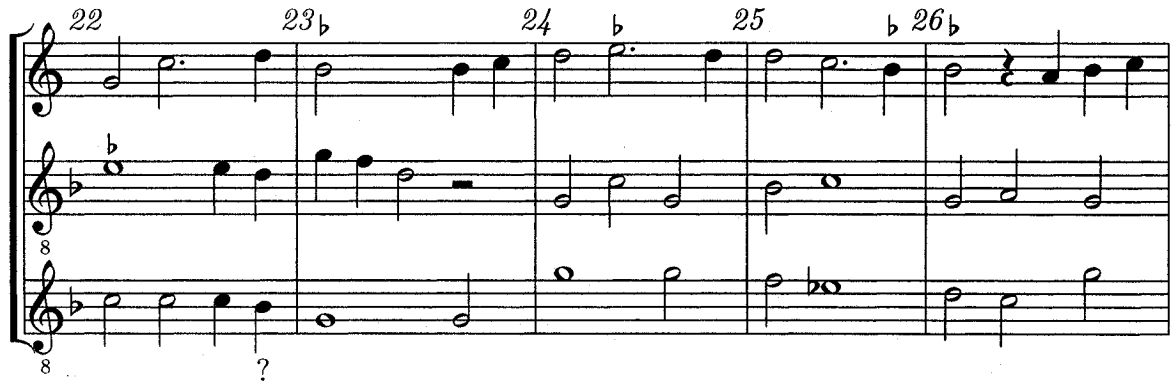
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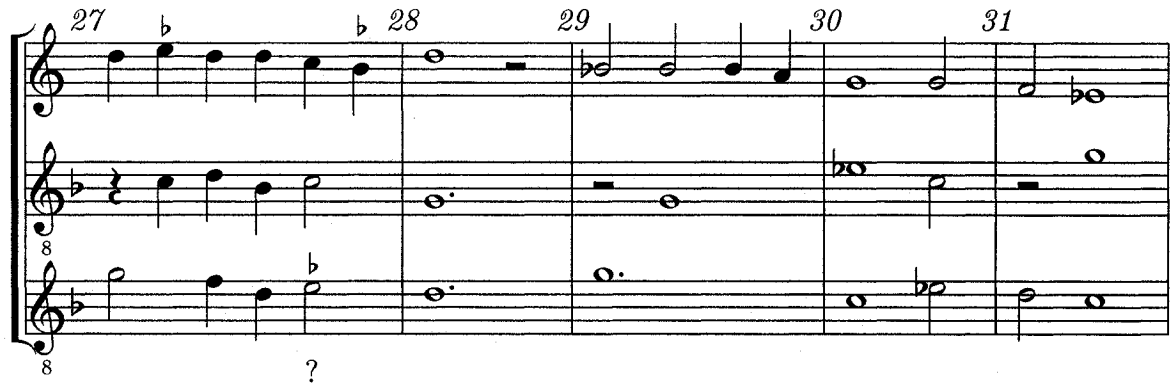
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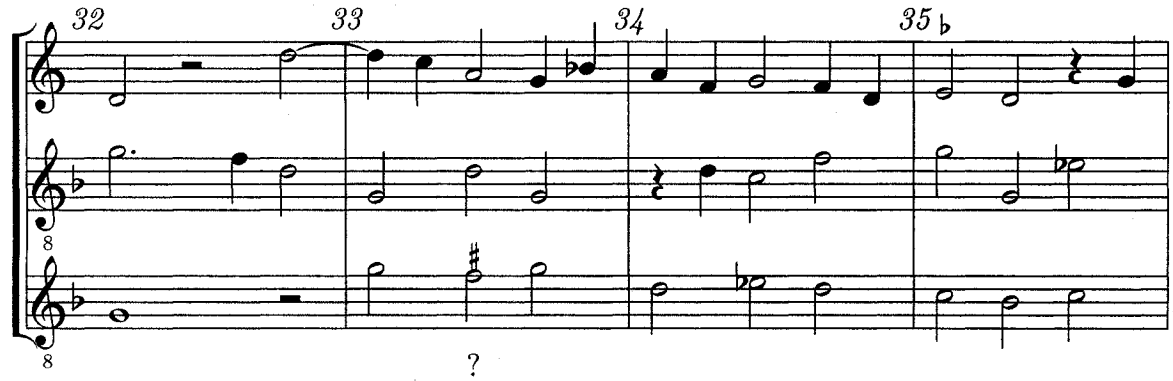
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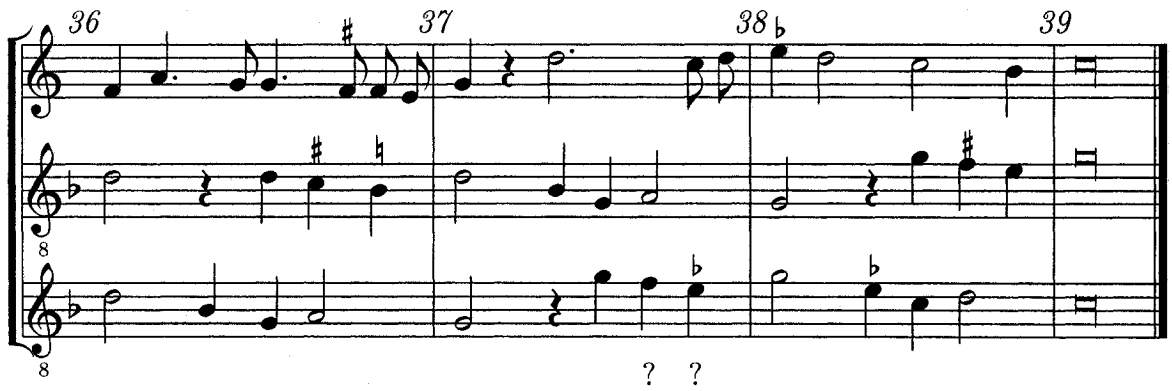


Most of my suggested alterations in *Mille bonjours* are added E♭s and B♭s, in keeping with the C-dorian categorisation of the piece. A few places deserve special mention, in particular because they demonstrate the choices we now have the authority to make. A few unresolved issues arise, pointing the way for future research (Section 8.3).

? m. 1: If I did not know the Buxheim intabulation of this piece (Figure 37), in which this note is raised (to F♯, since the intabulation is transposed), I would definitely put B♭ here, in keeping with the mode. Another mensural source of this piece (PC) actually has a signed B♭ in this spot. Apparently, we have a choice, based on how important we think the motion to C is. In Buxheim, the F♯ is *immediately* followed by G, which might have influenced the choice to raise the F.

? m. 4: ♭$\hat{6}$ as an upper neighbour to $\hat{5}$ occurs in C-dorian pieces, and this place does receive an A♭ in PC, so we might choose to flatten it here (this alteration is not in Buxheim).

? m. 6: How important is this cadential progression? It is only a 3–1 progression, but has a leaping contratenor. I would raise the leading tone in the tenor (as in Buxheim), because leaping-contratenor progressions appear to be very strong.

? m. 9: Similar to m. 4 (this alteration is also made in Buxheim).

? **mm. 12–14:** The tenor F♯ of m. 13 is also present in MuEm, as is a superius F♯ in m. 14. All three mensural concordances have signed E♭s in m. 15. The most problematic decision is what to do about the superius F in m. 14: if we raise it, as in MuEm, we cause a nasty clash with the contratenor B♭. If we raise the contratenor B♭ to compensate, we cause a diminished-fourth leap to the E♭ in the next measure. MuEm notwithstanding, I would keep F♮, and forego the exact imitation (that is also what the Buxheim intabulator does: see Figure 37).

? **mm. 17–20:** At first glance, this situation looks like it will be a cadential progression to G; however, the superius leaps to B instead of G. In Buxheim, where the superius *does* complete the cadence, this progression has a *major* descending step (transposed, with E♮). Neither MuEm nor PC has an A♭ here, and if we choose to sing A♮, we should also sing E♮ and B♮ in the superius, followed by a dorian cadence to G in m. 20. I think the purpose of the A♭ in EscB is to force E♭ and B♭ in the superius, in which case we can continue this passage with flats, to a phrygian cadence on G in m. 20 (in Buxheim, this cadence *must* be dorian, because of the signed double leading tone). In Section 5.5, we observed that cadences to the fifth degree in dorian pieces may be dorian *or* phrygian. This passage allows for both possibilities, and the EscB scribe has chosen one option, and the Buxheim scribe the other. We have the authority to make a choice here. I lean towards the phrygian solution, because the following phrase (leading to a phrygian cadence on D in m. 28 with a signed E♭ in m. 25) returns to the flat side, and reading the previous phrase with flats provides more modal uniformity.

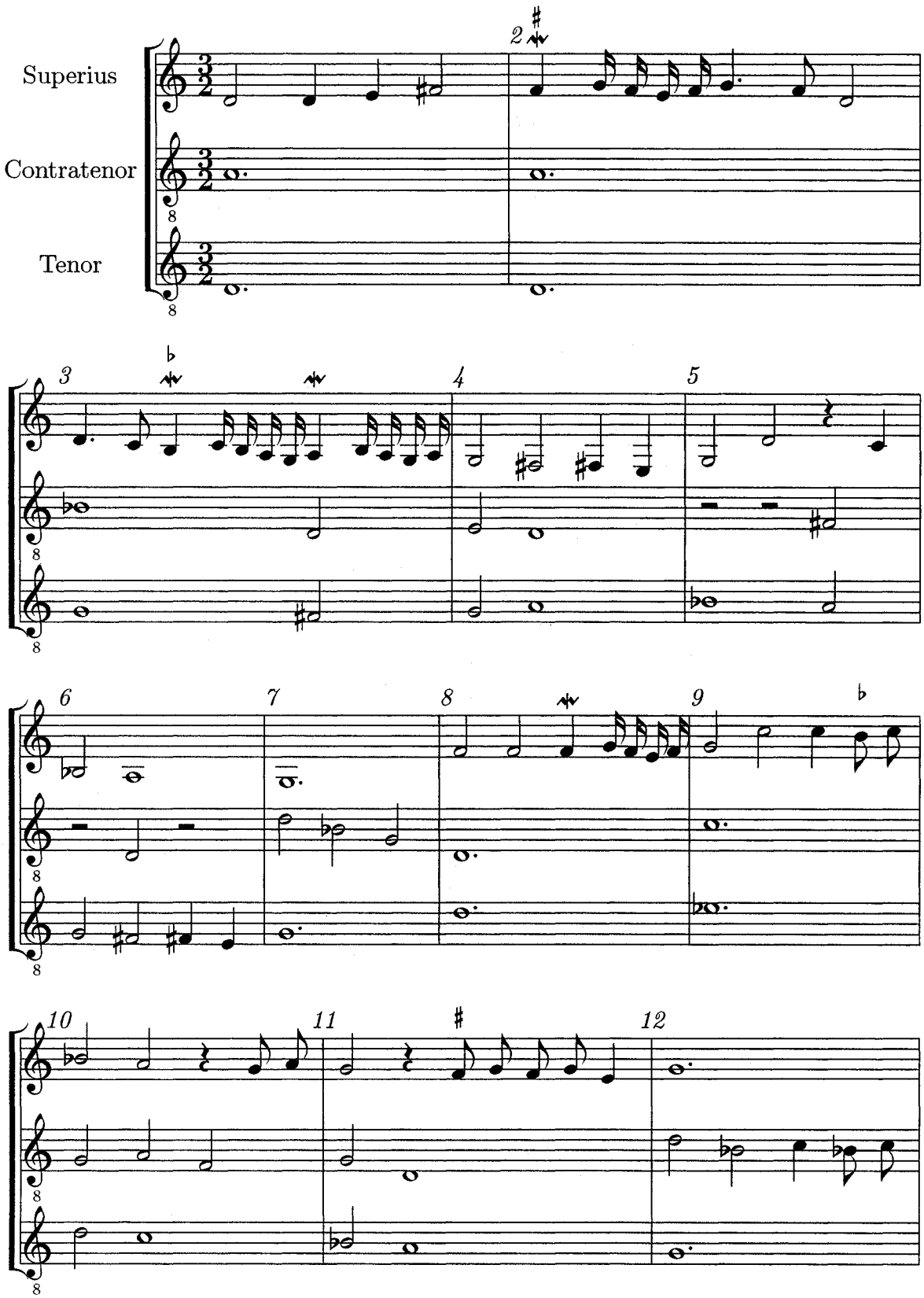
? **m. 22:** Buxheim has F♯ (equivalent to B♮) here; see the discussion following Figure 37.

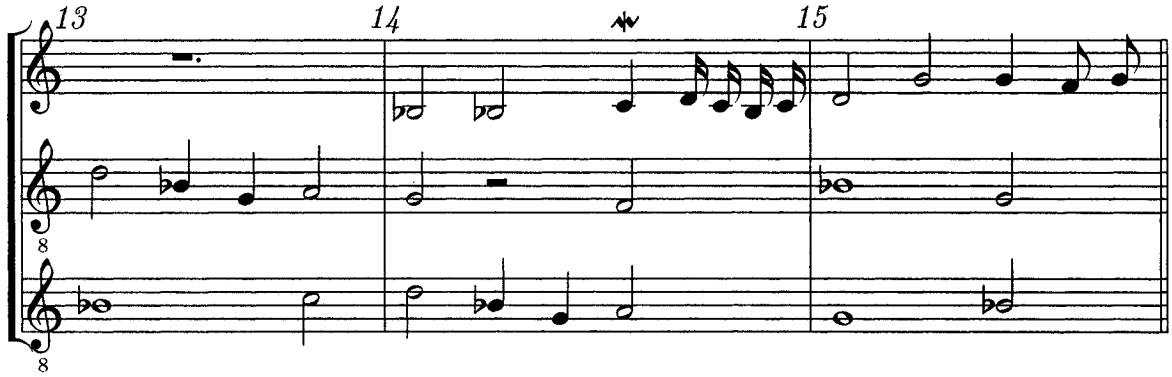
? **m. 28:** Cadences to the second degree in dorian modes are phrygian, and this progression has a falling-fourth structure: we should add an E♭, and B♭ in the superius.

? **m. 33:** We might choose to raise this F: technically, this is a *bassizans* TS 3–1 progression, in a weak part of the mensural unit. This is a weak progression, not necessarily requiring a sharp. In Buxheim and MuEm, this note is raised. The B♮ in m. 35 is also raised in Buxheim (where it is an F♯); see Figure 37 for further discussion.

? **m. 37:** Here, we have a similar choice as in m. 33: a rather weak progression (TC 3–1, deceptive voice-leading in superius, immediately preceding the final cadence). Do we sing F♯, E or F. E♭? The Buxheim intabulator chooses to put B♭ (transposed E♭) in keeping with the perceived signature, and ignoring the diminished fifth caused against the contratenor. Since the note in question is an *echappée*, I might follow his lead.

Figure 37. Du Fay: *Mille bon jores*, Buxheim No. 127

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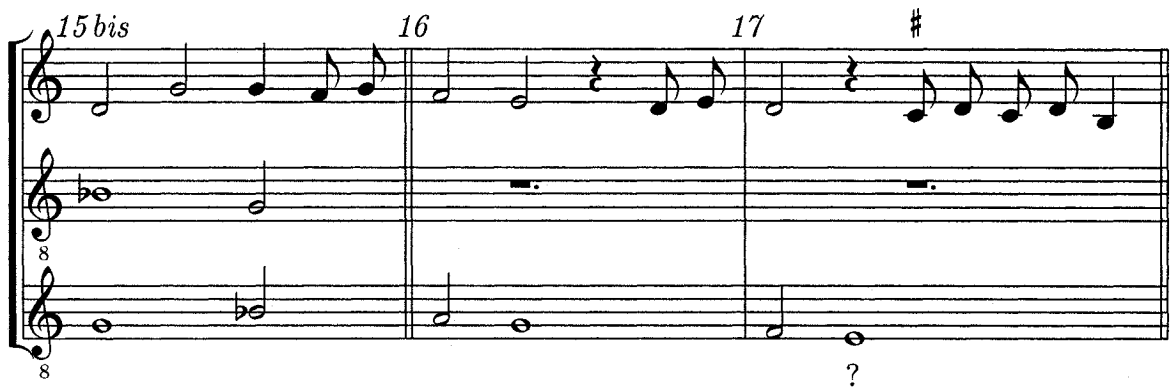
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17
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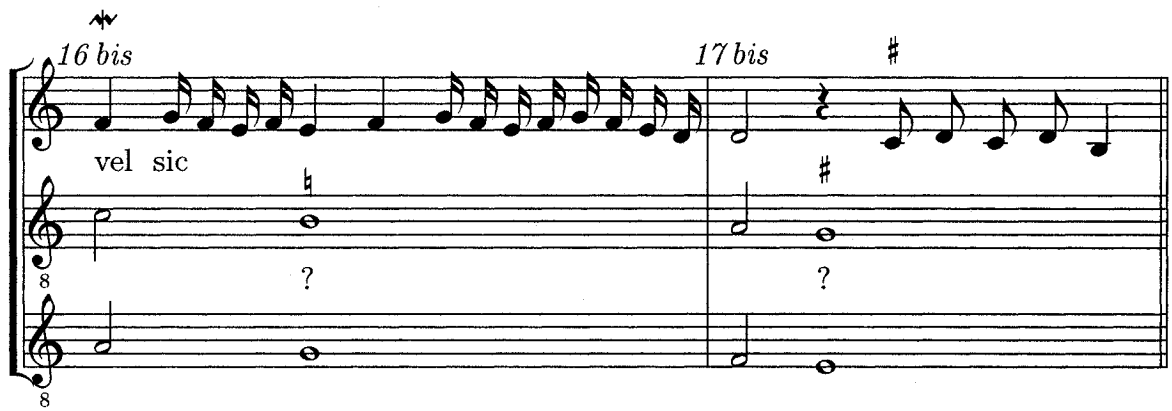
16 bis
17 bis
vel sic
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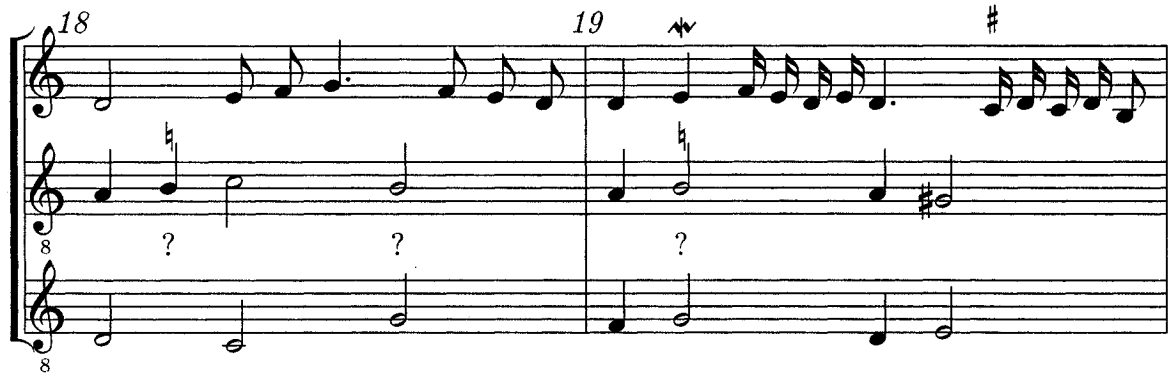
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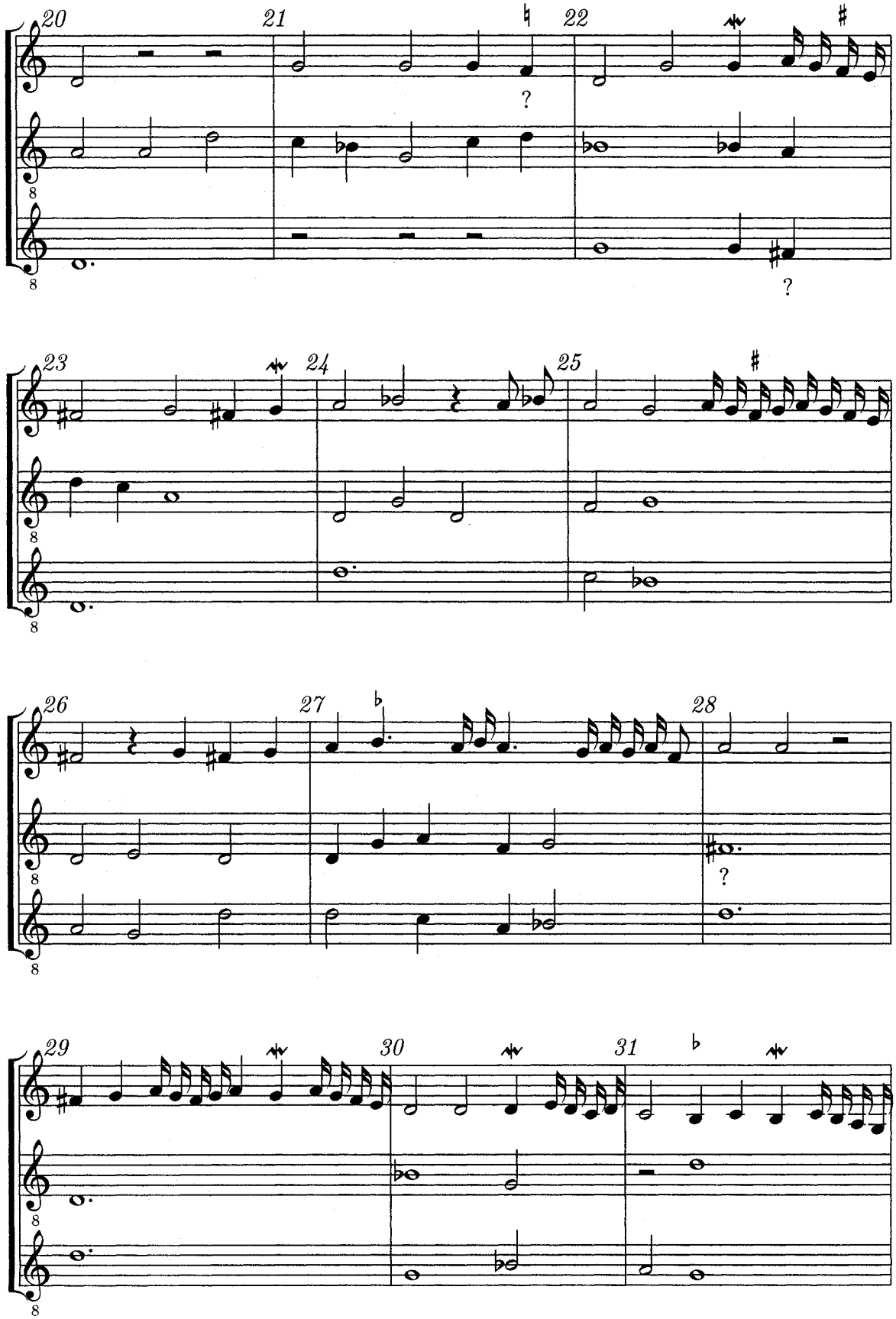
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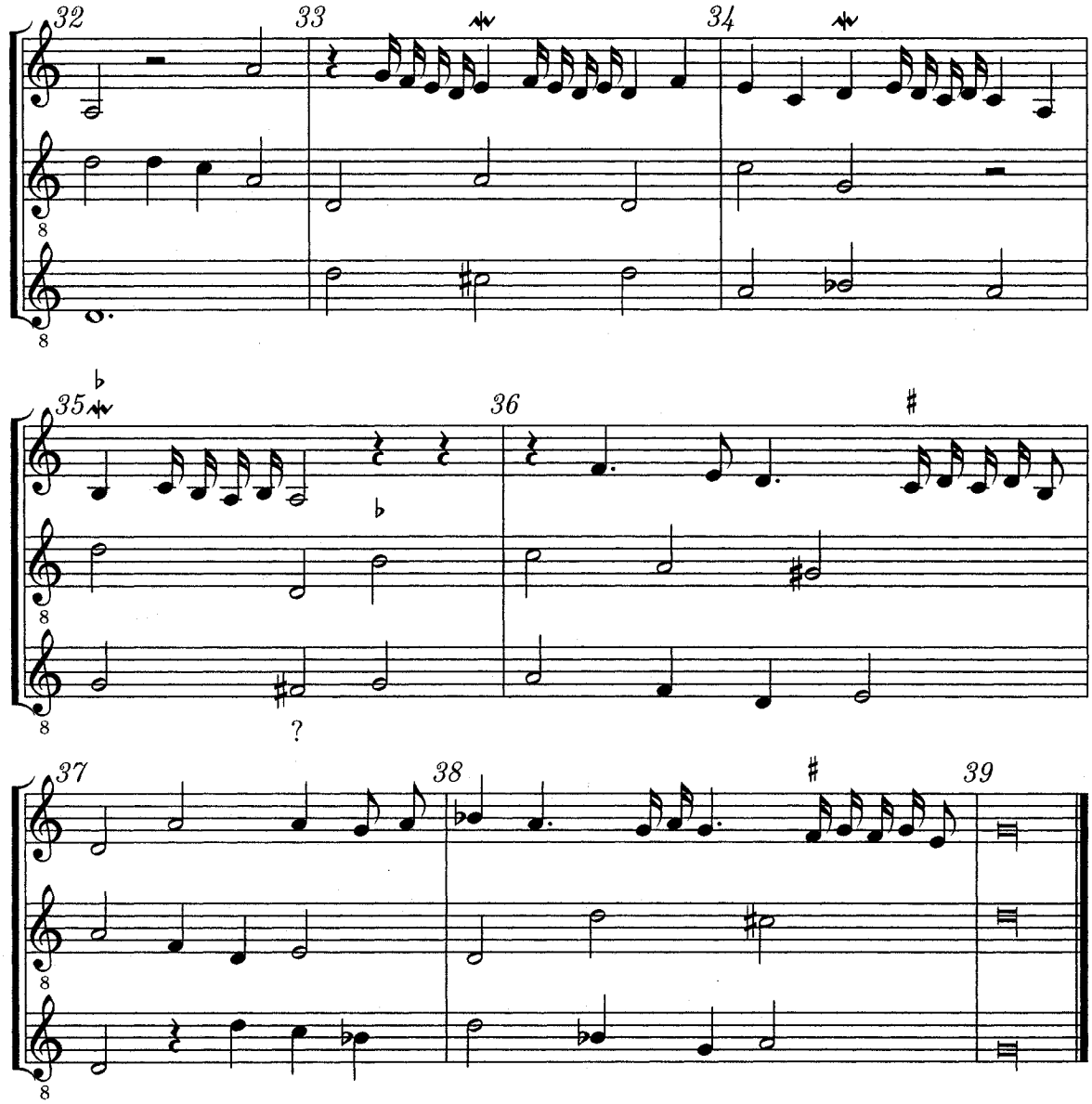


The intabulation of *Mille bonjours* requires very few alterations. The lower voices consistently use B♭, making the perceived signature clearly G-dorian. Most of the proposed alterations are either added B♭s in the superius (mm. 3, 9, 30, 34 and 38), or raised leading tones at cadences (mm. 11, 18, 20, 22, 39 and 42). (As before, added accidentals are intended to apply for the rest of the measure.) A few alterations were mentioned in the discussion of the model (following Figure 36). There are two places where repetitions of measures are inserted: at m. 15*bis*, the scribe seems to have accidentally repeated the previous measure, and the scribe offers an alternative

version of mm. 16–17 at 16*bis*–17*bis* (*vel sic*).

? **m. 17/17*bis*:** In one concordance of the model (EscB), the tenor E of m. 17 is actually flat (see Figure 36, m. 17, A♭, and discussion following); however, in the model, this passage is not actually a cadential progression (no 6–8, since superius leaps up a fifth to B(♭) instead of to G). In Buxheim, the passage has been rewritten to become cadential and dorian. We must decide if we consider this altered progression to D strong enough to warrant a leading tone (and double leading tone), given that it is almost immediately followed by another progression to D (the medial cadence, at mm. 22–23).

? **mm. 16*bis*–19:** Here we are faced with the same problem as in the model: do we keep the raised third degree of the mode (B♮) in the contratenor, making the whole passage appear D-dorian? The superius has been rewritten somewhat in relation to the model. In m. 22, in particular, adding a B♭ would force an E♭ in the superius, which would seem very strange given the dorian cadence to D immediately following. I would thus keep B♮ for these places.

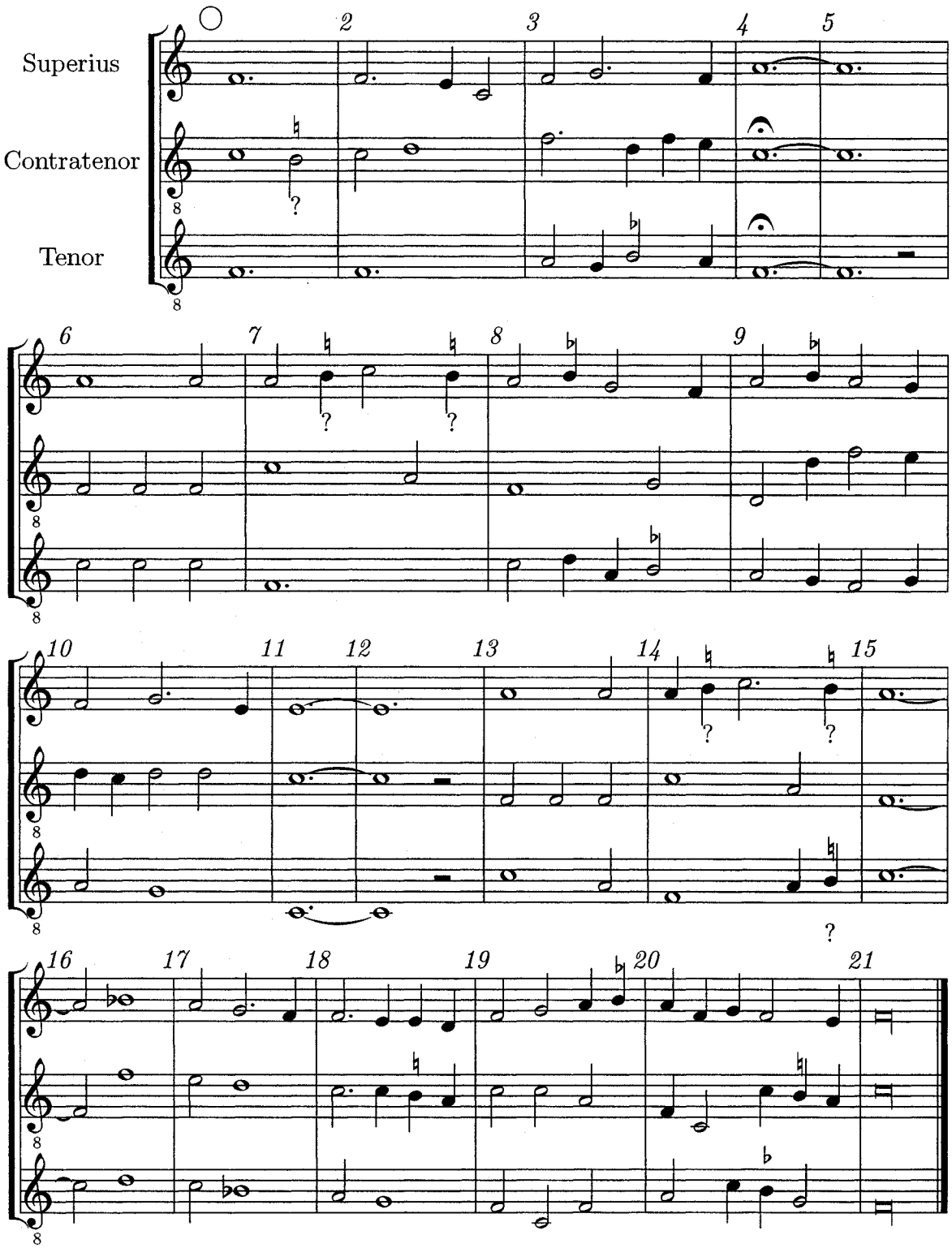
? **mm. 21–22:** In this problematic passage (already alluded to in the discussion of the model), the intabulator has chosen to use a *minor* third in the almost-imitation of the contratenor (mm. 20–21), but alter the tenor to use a *major* third (m. 22, in accordance with the unaltered superius of the model, Figure 36, m. 21). Since adding an F♯ to the superius in m. 21 would produce an augmented-fifth *mi-contra-fa* with the contratenor B♭, I would play the passage as notated, the inexact imitation and tenor F♯ notwithstanding.

? **m. 28:** This passage, a cadence in the model which we said ought to be phrygian (see Figure 36), has been reworked in a very strange way: although it

appears as though there will indeed be a phrygian cadence to A, the arrival in m. 28 is a long D-triad. What is going on here? The expected falling-fourth structure would result in a D in the contratenor, giving us a D-sonority without a third (although this is an A-cadence). The intabulator apparently felt that a nice D-sonority *with raised third* was more important here than proper 6–8 cadential voice leading, abandoning the expected tenor step B♭–A, and leaping to D instead (or perhaps he felt that the voice-leading was implied strongly enough that it could be ignored this once): this triad may have sounded especially pure in the temperament of the instruments at his disposal. Such strange progressions are not currently identified by CADFIND.

? m. 35: What is the purpose of this F♯? It does not fit any of the propinquity categories investigated, appearing simply to parallel the D–C♯–D semitone-motion of the progression in m. 33. Possibly this D-triad, like the one in m. 28, sounded especially nice in the temperament of the instruments available to the intabulator.

Figure 38. Binchois: *Mort en merchy*, MuEm 126'



In its only source (MuEm) *Mort en merchy* has no signature flats, and a few internally signed flats in the tenor and superius.

Our first task should be to determine the mode of the piece, since this can tell us several things about likely accidentals. F-pieces in Buxheim generally have B♭s in the tenor and the contratenor—when the contratenor has fewer flats, this can usually be explained through cadential B♮s. We can check if there are vertical problems that might be explained by missing signature flats. How many flats should we add here?

In the tenor, there are five B's. Two B's need flats to correct descending tritone outlines: **mm. 3 and m. 8**. The B♭ in m. 8 would then be part of a phrygian falling-fourth progression on A: the third degree of lydian modes receives a phrygian cadence. The status of the third B (in **m. 14**) is a little uncertain: if it were B♮ due to its ascent to C (as perhaps suggested by the fourth, internally signed B♭ [**m. 17**] in the descent), it would conflict with the simultaneously-attacked B in the superius, which by application of the same idea (part of the descent) ought to be B♭ (this B is discussed further below). The fifth B (**m. 20**) is altogether strange. If this note is correct (and not in fact a mistranscribed A), it is problematic both against the superius F and the tenor C, being simultaneously attacked. If we give it a flat, we can at least repair the diminished fifth against the superius. Altogether, it appears that the tenor should have a signature flat. The mode of this tenor is clearly F-lydian, giving us license to add B♭s as required in the other voices.

There are only three B's in the contratenor. Those in **mm. 18 and 20** ought to be B♮s, because they are the double leading tones in parallel-contratenor progressions. The first B (**m. 1**) could conceivably be a B♭, but there is no pressing reason to make it so: as a lower neighbour, the tritone is perfectly acceptable. In addition, we have seen several examples of raised lower neighbour tones (e.g. Figure 37, m. 35), suggesting that this is a subcategory worth investigating in more detail. Thus, there is no need for a signature flat in the contratenor.

In the superius, there are 8 B's. Three, in **mm. 8, 9, and 19**, require flats to

correct descending tritone outlines. The four B's in **mm. 7 and 14** are the most uncertain. Both times, there is an ascent to C and a descent back to A, followed by a B that must be flat (in m. 8 it must correct a descending tritone outline; in m. 16 it is internally signed on an upper neighbour and corrects a vertical tritone). If we assume a rule that favours B♮ when ascending to C and B♭ descending, a conflict arises with the tenor in m. 14 (as mentioned above). If we keep B♮ in the superius in m. 14, to match a rising B♮ in the tenor, the B♭ of m. 16 is explained: we have just sung B♮, and need a warning that our next B must have a flat against the contratenor F. Altogether, the superius could have a signature flat, or not, depending on our liking for ascending B♮s: all the absolutely-necessary flats are either melodically obvious (tritone outlines), or are already signed internally (m. 16).

Having determined the mode of the piece as F-lydian, the main rules influencing our decisions in this piece were the correction of melodic tritones and the use of double leading tones at cadences.

7.3. Future Research

Now that I have recorded Buxheim and its concordances in Humdrum notation and developed tools and methods for the computerised analysis of specific contrapuntal contexts, we can use this data set for many other projects. As the study progressed, refinements to the questions posed at the beginning suggested themselves, as well as new questions.

1. A detailed study of ornamentation could be made, including a comparison of the improvisational practice taught by the *fundamenta* with the ornamental practice espoused in the intabulations. This requires techniques (especially with respect to similarity measures) best acquired through close collaboration with specialists in music imformation retrieval.

2. In a collaborative study with Ian Knopke (see Section 2.11), a beginning has been made in using computerised techniques to evaluate cadential strength based on a balancing of various cadential features (labelled by PHRASEFIND). I would like to incorporate a typology of cadential ornaments into this study. Also, medial cadences could be described and added to the CADFIND algorithm.

3. There seems to be a very clear relationship between cadential ornaments and cadential strength. Most of the time, Buxheim intabulations preserve the phrase and cadential structure of their models. Sometimes, however, a cadence between phrases is glossed over with ornaments, a cadence is moved to a different pitch or to a later point, or a formerly unremarkable 6–8 progression seems to be elevated to cadential status by especially interesting ornaments. This implies that once the text is removed, the form becomes slightly more fluid; that is, surface concerns of ornamental patterns or sequences are at least

sometimes allowed to overcome the original phrase structure. This invites us to study the circumstances under which this is allowed to happen. Are some pitches more likely to have cadences weakened and others more likely to have cadences strengthened? Are these changes related at all to the final of the piece? Is a cadence more likely to be deferred because of a continued sequential ornament pattern than because of an irregular line? Some cadential ornaments are more elaborate. Perhaps there is a correlation between cadential weight and ornament type? The tools developed for this study will allow us to investigate these questions. In other cases, we have no model for a Buxheim intabulation, although we suspect there must have been one (e.g. No. 101 *Eschlave*, which was pointed out in the Introduction for its surface similarity to Binchois's *Esclave puist yl devenir*). Often, it is surprisingly difficult to guess at the phrase structure of the original from the intabulation: "which of these 6–8 progressions in close proximity is a phrase end, and which is internal?", especially in light of the formal fluidity suggested above. I would like to know if there is sufficient difference between cadences based on phrase-ends and cadences occurring in the middle of a text phrase to let us guess at the structure of the model from the intabulation.

4. Two situations falling under Brothers's "propinquity" heading have yet to be examined: are harmonic thirds expanding to fifths regularly made major? Is there always a harmonic reason for adding a sharp to a passage, or could it be a product of an ascending melodic line?
5. Harmonic corrections were subdivided into different types of contrapuntal situations. More of these situations could be extracted and examined. In that context, it may be possible to suggest priorities when a horizontal and a vertical correction are in conflict.
6. Having suggested in concord with other scholars such as Thomas Brothers

that some flats are too obvious to be notated, I would like to know what sorts of circumstances might prompt a scribe to notate such a flat anyway.

7. How exactly is the notation of accidentals reflected in imitative passages? Do we follow the principle of *varietas delectat*, or do we assimilate one passage to another?
8. A refinement of the modal classifications by taking into account ranges could be pursued. In the context of mode, how is the admixture of foreign species of fourth and fifth related to form?

Fortunately, the data set of Buxheim and its concordances is ready and waiting to be investigated for these and other issues.

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INVENTORY

- Concordant mansucripts are given only for the *first* Buxheim concordance of each title.
- *See also* refers either to other concordances within Buxheim, or (in the case of *Cantus firmus* settings) to other settings of the same tenor within Buxheim.
- *Standard Title* refers to the title under which the piece is listed in [Fallows, 1999] (where applicable), or to a standardised spelling of the tenor.
- *Form* refers to the model (where applicable), and is presented in the format used in [Fallows, 1999] or [Cumming, 1999].
- A *?* preceding any entry indicates uncertainty.
- Manuscripts not included in the data are indicated with an asterisk. A note in parentheses following the entry explains the omission (if there is no note, the manuscript was unavailable).
- Only polyphonic concordances are included, unless otherwise indicated.

Bux. No.	See also	Buxheim Title Standard Title	Composer	Concord. MSS	Mensur.	Form (Fallows)	Type in Bux.
1		Jhesu bone	anon.		C	?R	?intabulation
2		O florens rosa mater Christi	anon.		C	?B4+4	?intabulation
3		Damadame De madame O Beata Maria filia	?Puyllois	EscB Schedel Strahov Tr90	O	R5:8	intabulation
4	175	W. I. b. d. d. V. Sequitur In mentem veniunt cucumeres Wann ich betracht die vasenacht	anon.		C-dot	B	?intabulation
5		Mir ist zerstört Mir ist tzustort	anon.	Schedel	O	B8+8:(2/3)	intabulation
6		Min Liebste zart Min lieby zart	anon.	Glog* (other setting) Schedel* (other setting) Spec* (other setting)	O	?8	?intabulation, tenor setting
7		Gedenck daran du werdes ein Gedenck dar an du werdess ein	anon.	Schedel	O	B4+4:8	intabulation
8		In wunnigklichem schertzen Bey wunniklichem schertzen	anon.	Schedel	O	B4+7:(3/2)	intabulation
9		Min fröud stet ungemessen	anon.		O	?B?4+3	?intabulation
10		Ach guter gesell was ziehstu mich Ihesus Christus nostra salus	anon.	Spec CZ12580* CZHK*	O	?7	intabulation

11	226	Leuseruituer Le serviteur	Du Fay	FR2794 M3154 BerK Col (Fr) Cord Dijon EscB MC Pav Per431 Pix Porto RCG Tr90 Wolf	O	R5:8	intabulation
12		Möcht ich din begern Möcht ich din wegern	anon.	Loch	O	4+4:(3)	?intabulation
13		Iste tenor adhuc semel Scilicet In alio choro etc. Möcht ich din begern	anon.		O	4+4:(3)	?intabulation
14	15 219	Wolhin lass vögelin sorgen	anon.		O	?6	?intabulation
15	14 219	Wolhin lass vögelin sorgen adhuc semel Wolhin lass vögelin sorgen	anon.		O	?6	?intabulation
16	17 18 168 169 170 202	Geloymors Je loe amours	Binchois	Loch* (T only) NYB Ox Pz Stras* (S opening)	C-dot	B9:10	intabulation
17	16 18 168 169 170 202	Jeloymors m. C. C. b. In Cytaris vel etiam In Organis 3m notarum Je loe amours	Binchois		C-dot	B9:10	intabulation
18	16 17 168 169 170 202	Je loy mors Je loe amours	Binchois		C-dot	B9:10	intabulation

19	20 203	Ein fröuwlin edel von natuer Ein vrouleen edel von naturen	anon.	Loch M9659*	O	R4:8	intabulation
20	19 203	Ein frouwlin edel von natuer Ein vrouleen edel von naturen	anon.		O	R4:8	intabulation
21		Min trutt geselle etc. Mein traut geselle	anon.	Loch	O	10:8	intabulation ?of tenor setting
22		Frow myn willen nym in güt Ach meyden du vil sene pein	anon.	Loch* (T only)	O	6	?intabulation
23		Der Sumer, etc. Der Summer	anon.	Loch Loch Tr93	O	?	intabulation
24		Magnificat octavi toni etc.	anon.		O		CF setting
25		Min hertz das hatt sich ser gefrowet	anon.		O	?8	?intabulation
26		O werder trost etc.	anon.		O	?4	?intabulation
27	28 29	Leucht leucht wunniglich Leucht leucht	anon.		O	?6	?intabulation
28	27 29	Leucht leucht wunnigklichen Leucht leucht	anon.		O	?6	?intabulation
29	27 28	Leucht leucht wunniglicher sinnen Zin Leucht leucht	anon.		O	?6	?intabulation
30	31	Parleregart Par le regard	Du Fay	BerK Col (Fr) Cop17* (T only) EscB Laborde M9659* MC Mellon Pav Pix Porto Tr93 Wolf	O	R4:8	intabulation
31	30	Ad huc semel Parleregart etc. Par le regard	Du Fay		O	R4:8	intabulation
32	33 34	Der winter will hin wichen der wab mir huwer also lang Der winter will hin weichen	anon.	WRuI-F-687 Loch	O	11:(3/2)	intabulation

33	32 34	Der winter will hin wichen Der winter will hin weichen	anon.		O	11:(3/2)	intabulation
34	32 33	Der winter Der winter will hin weichen	anon.		O	11:(3/2)	intabulation
35		Gaudeamus	anon.		O		CF settting
36		Rorate celi desuper et nubes pl.	anon.		O		CF setting
37	51 52 89 90 91 92 93 217	Vil lieber zit uff diser erde Une foys avant que morir	anon.	Br9085* (basse danse) clm29775/6 Loch LoTit P10660* Rostock* (T only)	C-dot	R5:8	?intabulation ?basse danse
38	137 138 139	Conlacrime m C. C. Con lagreme	Ciconia	BQ15* (fragment) F-Pn it. 568 I-Pu 656* (T opening X2) Loch Mancini* (T only) PC III* (T only)	C	Ba4/2:11/7	intabulation
39	104	O Rosa bella O rosa bella	?Bedyngham ?Dunstaple	BerK Col (Fr) Cord Dijon EscB Leipzig 1084* MC* (C only) Pav Pix Porto Rp98Th. 4 RU1411 Tr89 Tr90 Tr93* (C only) Wolf	C/O	Ba2/2:11	intabulation
40	158	Sub tuam protectionem	Dunstaple	Aosta BQ 15 Mod Tr92	C/O	Eng. cant. motet I	intabulation

41	224 68 69 70	Sequitur Benedicite Allmächtig Got herr Jhesu Christ	Monk of Salzburg	Loch Loch* (T only)	O	6:8	tenor setting
42	129 130	Min freud mocht sich wol meren Myn fröud möcht sich wol meren etc.	anon.	Loch* (T only)	O	4+5:7/6	?intabulation
43		Portigaler Or me veult	Du Fay	M3224* Mellon MuEm MuEm MuEm Stras	O	B10:10	intabulation
44		Surtontes Sur toutes fleurs la non pareille	Puyllois	Pix Schedel	C	R4:8	intabulation
45		Crist ist erstanden Christus surrexit	anon.	MuEm*	O		CF setting, ?intabulation
46		Cristus surrexit Christ ist erstanden	Brassart		O	?	intabulation
47		Magnificat primi toni cum differentia Magnificat primi toni	anon.		O		CF setting
48	49 50 94 95 96	Ellend Elend du hast umbfangen mich	anon.	Loch Loch* (T only)	O	7:(4/2)	intabulation
49	48 50 94 95 96	Sequitur adhuc semel Ellend und Jamer Elend du hast umbfangen mich	anon.		O	7:(4/2)	intabulation
50	48 49 94 95 96	Ellend ist gemeyn Elend du hast umbfangen mich	anon.		O	7:(4/2)	intabulation

51	37 52 89 90 91 92 93 217	Vil lieber zit Une foys avant que morir	anon.		C-dot	R5:8	?intabulation ?basse danse
52	37 51 89 90 91 92 93 217	Vil lieber zit. Jo goetz. Une foys avant que morir	anon.		C-dot	R5:8	?intabulation ?basse danse
53		Praeambulum super G	anon.		?		free keyboard
54	55 56 57	Longus tenor Collinetto	anon.	Cornazano* (basse danse)	O		basse danse
55	54 56 57	Sequitur adhuc semel Longus tenor 4or notarum Collinetto	anon.		Cut-C		basse danse
56	54 55 57	Collinit 3um notarum Collinetto	anon.		O		basse danse
57	54 55 56	Sequitur adhuc semel Collinit 4or notarum Collinetto	anon.		Cut-C		basse danse
58		Praeambulum Super ff	anon.		?		free keyboard
59	60	Dulongesux Dueil angoisseux rage demesuree	Binchois	M902 EscA EscB M9659* (C end only) Mancini MuEm RU1411 Tr88	Cut-O	B10:10	intabulation
60	59	Sequitur adhuc semel Dulongesux Dueil angoisseux rage demesuree	Binchois		Cut-O	B10:10	intabulation

61		Piusque mammor Puis que m'amour m'a prins en desplaysir	Dunstaple	EscA Leipzig 1236* LoTit Tr88	O	R4:10	intabulation
62		Mombin Imperfay Mon bien Imparfait	anon.	EscB	Cut-C	R5:5	intabulation
63		Thun Jors To iours	anon.	BerK Per431 Sibton Abbey* (4 C's only)	O	?R5	intabulation
64		Kem mir ein trost	anon.	Loch* (T only)	O	4+4:(4/3)	?tenor setting
65		Zum nuwen Jare sy dir gesagt	anon.		O	?8	?intabulation
66		Begib mich nit myn höchster hort. vich Begib mich nit mein hochster hort	anon.	Schedel	O	B4+3:8/10	intabulation
67	181	Min hertz Inhohen fröuden Mein hercz in hohen freuden	?Putenheim	Loch* (T only) Ber40021* (setting of similar T) cgm5249/75* (monophonic) Loch* (setting of similar T) Schedel* (setting of similar T) Strahov* (setting of similar T)	O	?	?intabulation
68	224 41 69 70	Benedicite Allmächtig Got herr Jhesu Christ	Monk of Salzburg		O	6:8	tenor setting
69	224 41 68 70	Aliud Benedicite Allmächtig Got herr Jhesu Christ	Monk of Salzburg		O	6:8	tenor setting
70	224 41 68 69	Aliud Benedicite Allmächtig Got herr Jhesu Christ	Monk of Salzburg		O	6:8	tenor setting

71		Sequitur Amen (?extension to Allmächtig Got herr Jhesu Christ)	anon.		O		?tenor setting
72	73	Salue regina misericordie Salve regina	anon.		O	verses	tenor setting
73	72	Salue Regina Misericordie Salve regina	anon.		O	verses	tenor setting
74		Maria tu solacium Ave mater o Maria	anon.	BU Kras Ven145 WolkB	O	8:8/7	intabulation
75		Virginem mire pulchritudinis A discort	anon.	Faenza 1 Kras M3725* Nl-Uu 37 Rei 2 Stras* (S opening only) Vipiteno* (S opening only) W5094* (T 2nda pars only)	O/C/O	B9:10	intabulation
76		Veni virgo	anon.		O	?	?intabulation
77		Magnificat Octavi toni Magnificat octavi toni	anon.		O		migrating setting
78		Ympnus Veni creator spiritus Veni creator spiritus	anon.		Cut-C		tenor setting
79–80	81–82	Modocomo Bystu die rechte Ma doulce amour	anon.	Br9085* (basse danse) Toulouze* (basse danse)	O	?V	basse danse
81–82	79–80	Modocomor Ma doulce amour	anon.		O	?V	basse danse

83	255	Selefatze ay pale Se la face ay pale	Du Fay	EscB Lab 1 NYB Ox Pav RU1411 Schedel Stras* Tr89 Wolf	O	B10:5	intabulation
84		Des meygen Zyt die Des meyen zit die fört daher	anon.		O	?B4+3	?tenor setting
85		Min hertz hatt lange etc. Mein hercz	anon.	Loch* (T only)	O	7:8	tenor setting
86		Ein güt selig Jar wünsch ich dir 4or Ein gut selig Jar	anon.	Loch* (T only) Namur* (T only)	Cut-C	4:(4)	tenor setting
87		Es für ein buer Ins holtze	anon.		O	B2+3	?tenor setting, ?intabulation
88	172	Ich sah ein bild in Blauwer weyt Ich sach ein bild in blauwer weyt	anon.	Loch* (T only) clm29775/7* (dissimilar)	O	3:(4)	?tenor setting
89	37 51 52 90 91 92 93 217	Annavasanna. 4or Une foys avant que morir	anon.		Cut-C	R5:8	?intabulation ?basse danse
90	37 51 52 89 91 92 93 217	Annavasanna. 3um Une foys avant que morir	anon.		C-dot	R5:8	?intabulation ?basse danse

91	37 51 52 89 90 92 93 217	Anna vasanna 3um Une foys avant que morir	anon.	C-dot	R5:8	?intabulation ?basse danse
92	37 51 52 89 90 91 93 217	Anna vasanna Une foys avant que morir	anon.	C-dot	R5:8	?intabulation ?basse danse
93	37 51 52 89 90 91 92 217	Vil lieber zit uff. Une foys avant que morir	anon.	C-dot	R5:8	?intabulation ?basse danse
94	48 49 50 95 96	Ellend Elend du hast umbfangen mich	anon.	O	7:(4/2)	intabulation
95	48 49 50 94 96	Aliud Ellend. Elend du hast umbfangen mich	anon.	O	7:(4/2)	intabulation
96	48 49 50 94 95	Ellend. Elend du hast umbfangen mich	anon.	O	7:(4/2)	intabulation
96a		Bonus tactus super fedcd	anon.	O		fundamentum

97	205 207 208 209 98	Wasz ich begynn etc. Was ich begynne mit schimpf oder mit schercz	anon.	clm29775/7* (other setting) Loch* (T only) WRuI-F-687* (other setting)	O	4+4:(4)	tenor setting
98	205 207 208 209 97	Was ich begynn Was ich begynne mit schimpf oder mit schercz	anon.		O	4+4:(4)	tenor setting
99		Ich beger nit mer. m C. p. Ich beger nit mer	Paumann		O	?	?intabulation
100	218	Wach uff myn hort. Wach auff mein hort es leucht dort her	setting ?Paumann	Loch Loch* (T only) Rostock* (T only) Rostock* (T only) WolkA* (different S) WolkB* (different S)	O	6:(4/3)	tenor setting
101		Eschlave	anon.		O	R?5:10	?intabulation
102		Aliud Esclaphe Esclave puist yl devenir	Binchois	EscA EscB MuEm RU1411 Stras*	O	R4:8	intabulation
103		O rosa bella O rosa bella (2)	anon.	Tr90 Tr93* (C only)	O/?C	Ba2/2:11	intabulation
104	39	O rosa bella	?Bedyngham ?Dunstaple		C/O	Ba2/2:11	intabulation
105		Signit	anon.		O		?intabulation
106		Entrepris Entrepris suis par grant lyesse	Brollo	BQ16 Glog Ox 3 Schedel Strahov Tr89* (C only)	O	R5:8	intabulation
107		Der füterer	?Füterer		O	?5	?intabulation
108		Die suss nachtigall	anon.		O	?B?6+4	?intabulation

109		Recht begirlich Recht girlich gir mir kumer pringt	anon.	Schedel	O	B4+2:8	intabulation
110		Boumgartner Paumgartner	?Paumgartner	Loch	O	?5	?intabulation
111		Creature Creature la plus belle	anon.	FR2356 Pix	O	R4:7	intabulation
112		Praeambulum super d	anon.		C		free keyboard
113		Wilhelmus Legrant Legrant	Legrant	Loch	O	?R5:8	?intabulation
114		Geÿtes	anon.		O	?R?4	?intabulation
115		Ein buer gein holze Jacobus viletti Ein buer gein holze	Villette (Viletti)		C	?R?5	?intabulation
116		Franckurgenti etc. Franc cueur gentil sur toutes gracieuse	Du Fay	EscB Tr92 2 Tr93	O	R4:10	intabulation
117	199	Vierhundert Jare A son plaisir volentiers serviroye	Fontaine	MuEm Ox 5 Pz Stras* (S opening X2) WolkA WolkB	O	R4:10	intabulation
118	119 212	Mi ut re ut e c d c Mi ut re ut	anon.		O		fundamentum/ tenor setting
119	118 212	Aliud mi ut re ut E c d c Mi ut re ut	anon.		O		fundamentum/ tenor setting
120		Arrogamer	anon.		O	?B4+?6:?8	?intabulation
121		Gragrandolor J'ay grant dolour	Du Fay	Stras*	O	R?5	intabulation
122		Sanssoblier Sans oublyer sans faire departye	Gemblaco	Ox 2	O	R5:10	intabulation
123		Quatuons	anon.		O	?R4	?intabulation

124		Fortune Gentil madonna	Bedyngham	M5023 BerK Col (Fr) Cord EscB MC Mellon 2 Pav Pix Schedel Spec Tr93* (C end only) TurinBov W243	O	2/5:11/7	intabulation
125		Fates moÿ Faites moy scavoir de la belle	anon.	Cord	O	R4:8	intabulation
126		Der einen lieben bulen hatt	anon.		O	?5	?intabulation
127		Mille bon Jors Mille bonjours je vous presente	Du Fay	EscB MuEm PC 4 Stras* (twice)	O	R4:8	intabulation
128		Qui vult messite Qui veut mesdire si mesdie	Binchois	Rei 3	O	R4:8	intabulation
129	42 130	Myn fröud möcht sich wol meren Min freud mocht sich wol meren	anon.		O	4+5:7/6	?intabulation
130	42 129	Min froud möcht sich wol meren Min freud mocht sich wol meren	anon.		O	4+5:7/6	?intabulation
131	132	Ellend Ich bin Hin ist myn trost 4or notarum Ellend ich bin hin ist myn trost	anon.		Cut-C	?	tenor setting
132	131	Ellend ich bin hin ist myn trost. 3m. Ellend ich bin hin ist myn trost	anon.		O	?	tenor setting
133	134	Lardant desier L'ardant desier	anon.	Stras* (S opening only)	C	?V	intabulation
134	133	Lardant desier L'ardant desier	anon.		C	?V	intabulation
135	136	Stüblin etc. Je languis	anon.	Loch* (T only) Toulouze* (T only) RL3014* (T only)	O	?V	basse danse

136	135	Stüblin Je languis	anon.		O	?V	basse danse
137	138 139 38	Conlacrime Con lagreme	Ciconia		C	Ba4/2:11/7	intabulation
138	137 139 38	Conlacrime Con lagreme	Ciconia		C	Ba4/2:11/7	intabulation
139	137 138 38	Conlacrime Con lagreme	Ciconia		C	Ba4/2:11/7	intabulation
140	141 142	Ich bin bÿ Ir Sie weyszt nit darbin Ich bin by ir sie weiszt nit darumb	anon.	clm29775/4 Loch* (monophonic)	O	4:(4)	?tenor setting, ?basse danse
141	140 142	Ich bin by Ir Sie weszt nit darumb Ich bin by ir sie weiszt nit darumb	anon.		O	4:(4)	?tenor setting, ?basse danse
142	140 141	Ich bin by ir Ich bin by ir sie weiszt nit darumb	anon.		O	4:(4)	?tenor setting, ?basse danse
143	144 196	Adyen matres belle Adieu mes tres belles amours	Binchois	EscA MuEm Stras* Tr92	O	R4:8	intabulation
144	143 196	Adyen matres belle Adieu mes tres belles amours	Binchois		O	R4:8	intabulation
145	198	Luffil Love wolle I withoute eny variaunce	anon.	Loch* (T only) MuEm* Ox1393* (other setting of T)	O	4:(5)	intabulation
146		Des klaffers nyt tuet mich myden etc. Des klaffers neyden tut mich meiden	anon.	Loch Loch Loch* (monophonic)	O	6+3:(2/3)	intabulation
147		Gedencken mir vil senen bringt	anon.		O	?4	?intabulation
148		Spyra	anon.		O	?3	?intabulation
149		Salue sancta parens etc. Salve sancta parens (LU 1263)	anon.		O		tenor setting
150		Kyrieleyson de S. maria v. Kyrie Missa IX Cum jubilo	anon.		C	verses	migrating setting

151		Et in terra pax hominibus de S. maria Sanctus Missa IX Cum jubilo	anon.		O/C	verses	migrating setting
152		Kyrieleyson pascale Kyrie Missa I Lux et origo	anon.		O	verses (single)	tenor setting
153–155	251	Kyrieleison Angelicum Kyrie Missa IV Cunctipotens genitor Deus	anon.		C	verses	tenor setting
156		Sanctus Angelicum Sanctus Missa IV Cunctipotens genitor Deus	anon.		O	verses (single)	migrating setting
157		Sequitur Kyrieleyson de Apostolis Kyrie Missa XIV Jesu redemptor	anon.		C	verses	tenor setting
158	40	Sub tuam protectionem	Dunstaple		C/O	Eng. cant. motet I	intabulation
159	160 238a 258	Aue regina Ave regina celorum/mater regis angelorum [I]	Frye	FR2794 M5023 BerK Bratislava Col (Fr) Glog Laborde Magl.112bis Mont.-Bellay Per431 Polizzi Generosa* (T opening only) R. J. Grog Schedel Spec Tr90 Tr90 Verona757 Wolf	O	6:8	intabulation
160	159 238a 258	Aue regina Ave regina celorum/mater regis angelorum [I]	Frye		O	6:8	intabulation
161		Descendi Inortum micum Descendi in ortum meum	Plummer	Mod Olc89 Tr90 Tr90* (S only)	C	Eng. cant. motet II	intabulation
162		Jo. Tonrroutt Touront 1	Touront		O	?6	?intabulation
163		Pange Lingua etc. Pange lingua	Touront	Tr88	O	?	intabulation

164		Nach din Lieby stett mir myn synn	anon.		O	?6:(4)	?intabulation
165		Christus surrexit Crist ist erstanden	anon.		O		CF setting, ?intabulation
166		?Xristos surrexit mala nos texit Et quos dilexit Hosad celos vexit ?Crist is erstanden	anon.		O		?CF setting, ?intabulation
167		Dies est Leticie In ortu regali Der tag der ist so freuden reich	anon.	Tr88* (other setting)	O	10:(4/3)	tenor setting
168	16 17 18 169 170 202	Inicium Jeloemors Je loe amours	Binchois		C-dot	B9:10	intabulation
169	16 17 18 168 170 202	Aliud Inicium Jeloemors Je loe amours	Binchois		C-dot	B9:10	intabulation
170	16 17 18 168 169 202	Sequitur terciun Inicium Jeloemors. Je loe amours	Binchois		C-dot	B9:10	intabulation
171		Sebelle anglicum Se belle	Bedyngham	Tr90* Tr93*	O	?R4	intabulation
172	88	Ich sach ein bild. Ich sach ein bild in blauwer weyt	anon.		O	3:(4)	?tenor setting
173		Trinck und gib mir auch	anon.		O	?	?intabulation
174		Die vasznacht bringt trurig Zit	anon.		?C	?B?4+4	?intabulation
175	4	Wann ich betracht die vasenacht W. I. b. d. d. V. Sequitur In mentem veniunt cucumeres	anon.		C-dot	B	?intabulation
176		Gantz itel truw	anon.		O	?4	?intabulation

177		Der dickel mit siner höuwerin	?Ritlingen		?C	?	?intabulation
178		Ad primum morsum	anon.		C	?9:(4+4)	?intabulation
179		Die ich erwelt und mir gevelt	anon.		O	?6	?intabulation
180		Ob lieb din lieb	anon.		O	?6	?intabulation
181	67	Min hertz Inhohen fröuden Mein hercz in hohen freuden	?Putenheim		O	?	intabulation
182		Es fur ein buwer Ins holtze	anon.		?O	?B2+3	?intabulation
183		Ker uber her zu mir ker her	anon.		?C	?	?intabulation
184		Einiger trost	anon.		O	?5	?intabulation
185		Allegalea	anon.		C	?	?intabulation
186		Woluff gesell von hynnen W. K. Woluff gesell von hynnen	W. K.		O	?B4+4:(3)	?tenor setting
187		Min synn die sind mir trübt W. K. Min synn die sind mir trübt	W. K.		C	?9	?intabulation
188		Füren Jo myn hertz dz brindt Myn hertz dz brindt	Füren		?O	?	?intabulation
189		Incipit Fundamentum M. C. P. C.	Paumann	Loch (Redeuntes in C)	O	little bits	fundamentum
189a		Concordancie M. C. P. C.	Paumann			little bits	fundamentum/ intervals
189b		Fundamentalis punctus	?Paumann		O	little bits	fundamentum/ cadences
189		Bonus tactus	anon.		O		fundamentum
190		Sequitur aliud fundamentum	anon.		O	little bits	fundamentum
191		Praeambulum super G vel super C et c	anon.		?		free keyboard
192		Min lieby zart Min Liebste zart	anon.		O	?8	?intabulation

193		Ich lass nit ab Ich lasz nit ab es mag anders nicht	anon.	Schedel* (other setting)	O	?6:(2/4)	intabulation
194		Praeambulum super C	anon.		?		free keyboard
195		Praeambulum super F	anon.		?		free keyboard
196	143 144	Adyen matres Adieu mes tres belles amours	Binchois		O	R4:8	intabulation
197		Hertz mut und all myn synn	anon.		O	?9:(3)	?intabulation
198	145	Luffile Love wolle I withoute eny variaunce	anon.		O	4:(5)	intabulation
199	117	Vierhundert Jar uff diser erde A son plaisir	Fontaine		O	R4:10	intabulation
200	201	O gloriosa domina	anon.		O		?tenor setting
201	200	O gloriosa domina	anon.		O		?tenor setting
202	16 17 18 168 169 170	Jeloemors Je loe amours	Binchois		C-dot	B9:10	intabulation
203	19 20	Ein fröulin edel von natuer Ein vrouleen edel von naturen	anon.		O	R4:8	intabulation
204		Biss wolgemüt trut liebstes fröulin	anon.		O	?5	?intabulation
205	207 208 209 97 98	Was ich begynn 6 2 12 notarum Was ich begynne mit schimpf oder mit schercz	anon.		Cut-C	4+4:(4)	tenor setting
206		Sequitur praeambulum super C vel G vel c	anon.		?		free keyboard

207	205 208 209 97 98	Secunda mensura. Wasz ich begynne 4or notarum Was ich begynne mit schimpf oder mit schercz	anon.		Cut-C	4+4:(4)	tenor setting
208	205 207 209 97 98	Tercia mensura wasz ich begynn 3m notarum Was ich begynne mit schimpf oder mit schercz	anon.		O	4+4:(4)	tenor setting
209	205 207 208 97 98	Wasz ich begynn 3m notarum Was ich begynne mit schimpf oder mit schercz	anon.		O	4+4:(4)	tenor setting
210		Praeambulum super F	anon.		?		free keyboard
211		O regina gloriae	anon.		O		?tenor setting, ?intabulation
212	118 119	My ut re ut E c d c Mi ut re ut	anon.		O		fundamentum/ tenor setting
213		Des meyen zit die fört daher Des meygen Zyt die	anon.		O	?B4+3	?tenor setting
214		Mit gantzem willen etc. Mit ganczen willen wünsch ich dir	anon.	Ð-ERu 564* Loch Loch* (T only) WRuI-F-687	O	B4+4:(4)	tenor setting
215		Möcht mich gedencken bringen da hin Mocht gedencken mich	anon.	Loch* (monophonic)	O	3:(4)	tenor setting
216		Praeambulum super C	anon.		?		free keyboard
217	37 51 52 89 90 91 92 93	Vil lieber zit Une foys avant que morir	anon.		C-dot	R5:8	?intabulation ?basse danse

218	100	Wach uff myn hört Wach auff mein hort es leucht dort her	setting ?Paumann		O	6:(4/3)	tenor setting
219	14 15	Wolhin lass vögelin sorgen	anon.		O	?6	?intabulation
220		Lieblich vernüwet	anon.		?O	?5	?intabulation
221		Lieb ist aller welt ein meisterinne	anon.		C	?5	?intabulation
222		Patrem omnipotentem Credo Missa IV Cunctipotens genitor Deus	anon.		O		migrating setting
223		Sequitur Losa hennsslin etc. Losa hennsslin	anon.		O/C	?	?intabulation
224	41 68 69 70	Benedicite Allmächtig Got herr Jhesu Christ	Monk of Salzburg		O	6:8	tenor setting
225		O Intemerata virginitas O intemerata castitatis et in eternum benedicta	anon.	Schedel SlHBVIII9 Strahov	O/C	?B	intabulation
225a		Bonus tactus	anon.		?		fundamentum
226	11	Leuseruituer Le serviteur	Du Fay		O	R5:8	intabulation
227		Bekenne myn klag die mir an lyt Wiplich figur in dime schur	Paumann	Schedel	C	9:(4)	?intabulation
228		Pulcherrima de virgine	anon.		C	?7	?intabulation
229	243	Sig seld und heil Sig seld und heil im herzen geil	anon.	Parma 1158 Schedel	O	B?10:4	intabulation
230		? (Touront 2)	Touront	Strahov	C	?6	intabulation
231	232a 232c 233a 233b 234a 235a	(Fundamentum) Fundamentum organizandi	?Paumann		O	little bits	fundamentum
232		Praeambulum super C	?Paumann		C		free keyboard

232a	231 232c 233a 233b 234a 235a	(Fundamentum) Fundamentum organizandi	?Paumann	O	little bits	fundamentum
232b	112	Praeambulum super d	?Paumann	?O		free keyboard
232c	231 232a 233a 233b 234a 235a	(Fundamentum) Fundamentum organizandi	?Paumann	O	little bits	fundamentum
233		Praeambulum super mi	?Paumann	?O		free keyboard
233a	231 232a 232c 233b 234a 235a	(Fundamentum) Fundamentum organizandi	?Paumann	O	little bits	fundamentum
233b	231 232a 232c 233a 234a 235a	(Fundamentum) Fundamentum organizandi	?Paumann	C	little bits	fundamentum
234		Praeambulum super F	?Paumann	?C		free keyboard
234a	231 232a 232c 233a 233b 235a	(Fundamentum) Fundamentum organizandi	?Paumann	C	little bits	fundamentum
235		Praeambulum super F	?Paumann	?C		free keyboard

235a	231 232a 232c 233a 233b 234a	(Fundamentum) Fundamentum organizandi	?Paumann		?O	little bits	fundamentum
236		Sequitur fundamentum magistri Conradi paumann Contrapuncti	Paumann		?	little bits	fundamentum
236a		(Fundamentum 236a) Fundamentum 236a	Paumann		O	little bits	fundamentum
237		Wunschlichen schon Wuenschlichen schön ist ir gestalt	anon.	M3154* (dissimilar) Schedel Strahov	O	B4+2:(4)	intabulation
238		Es ist vor als gewesen Scherz	anon.		??O	?B	?intabulation
238a	159 160 258	? Ave regina celorum/mater regis angelorum [I]	Frye		O	6:8	intabulation
239		?	anon.		??O	?B	?intabulation
240		Praeambulum super sol	anon.		?		free keyboard
241–242		Praeambulum super Re	anon.		O		free keyboard
243	229	(Sig seld und heil) Sig seld und heil im herzen geil	anon.		O	B?10:4	intabulation
244		(Praeambulum super F) Praeambulum super F	anon.		?		?free keyboard
245		?	anon.		??O	?	?intabulation
246		(Seh hin mein hercz) Seh hin mein hercz du auserweltes mein	anon.	Glog Schedel	O	B4+4:(5/3/4)	intabulation
247		Die wie lang	anon.		?O	?B	?intabulation
248		Magnificat 8 toni	anon.		?		tenor setting

249		Seyd ich dich hertzlieb Seit ich dich hercz lib leiden muss	anon.	Ber40021* (S&T in other setting) Col (Fr) Glog Schedel	O	7:(4/2)	intabulation
249a		(Zu aller czeit) Zu aller czeit in gedanckes gir	Ruslein	Glog Schedel	O	B4+3:(4)	intabulation
250	256	Salve Radix Josophanie Le souvenir de vous me tue	Morton	F176 Cop1848 FR2356 BQ16 App. Cop Cord Dijon Laborde Per431 Pix Spinacino II Uppsala76a Wolf	O	R4:8	intabulation
251		Kyrieleison Angelicum Kyrie Missa IV Cunctipotens genitor Deus	anon.		?	verses	tenor setting
252		Tant apart Tout a par moy affin qu'on ne me voye	Frye	FR2356 BerK Col (Fr) Cord Laborde Mellon Niv Wolf	O	R5:10	intabulation
253–254		?	anon.		C	?R5	?intabulation
255	83	Se le phase pale Se la face ay pale	Du Fay		O	B10:5	intabulation
256	250	Lesouenir Le souvenir de vous me tue	Morton		O	R4:8	intabulation

257		asoirolg o O gloriosa regina mundi succurre nobis pia	Touront	FR2356 M5023 P676 BQ16 App. Cape Col (Fr) F27 Per 431 Pix RCas Spec Strahov Tr91 Verona757	O	?	intabulation
258	159 160 238a	Aue regina Ave regina celorum/mater regis angelorum [I]	Frye		O	6:8	intabulation
259	239 245 253	?	anon.		Cut-C	?R4	?chanson

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