Tempo and Mensural Proportion in the Music of the Sixteenth Century

by Stephen A. Kingsbury

Josquin

Introduction

For many modern conductors, the performance of literature from the sixteenth century can seem fraught with nearly insurmountable obstacles. Issues having to do with initial tempo and changes of tempo within the piece, can be some of the most confusing and are some of the least well understood. Discrepancies and contradictions abound in the work of modern musicologists, and the writings of the theorists who experienced the music first-hand. For those willing to wade through the mire of conflicting testimony, the performance of this repertory holds vast rewards. This article focuses on some of the issues relating to tempo and mensural proportion, in hopes of clearing away some of the veil of mystery that has for so long surrounded this repertory.

Tactus

At the most fundamental level, issues of mensuration and mensural proportion stem from the concept of tactus. Also referred to by theorists of the day as measure, full stroke, *mensura, compas, misura, battuta, schlag, ictus, percussion,* and *prasescriptum,*[1] the tactus was viewed as the unit of tempo.[2] In a practical sense, the tactus was illustrated by an up and down movement of the hand, finger, or in the case of instrumentalists whose hands and fingers were engaged in the playing of their instruments, the foot.[3] In contrast to modern conducting gesture, neither the up movement nor the down movement was seen as possessing any rhythmic emphasis. Writers of the day even disagreed about the ordering of the movements; up before down, or down before up.[4]

Tactus was divided into two major types, depending upon the binary or ternary quality of the rhythm. In the context of modern conducting gesture, the binary tactus is the most straightforward. There is a clear correlation with a modern two-beat pattern; the up and down motions each having the same temporal duration. For a ternary tactus, the pattern remains the same except that one of the motions takes twice as long as the other; the result being a pattern that is three "clicks" in length.

There is disagreement among modern scholars about the variability of the tactus. Vaccaro asserts that, "sixteenth-century theory seems to be unaware of the notion of variable tempo."[5] Bank states that it was not until the end of the century that there existed, in addition to a "normal" tempo, "slow" and "quick" tempos.[6] In the "normal" tempo the speed of the tactus was neither too slow, nor too fast. Many theorists of the day related the speed of the tactus to the speed of the pulse. It should be noted that the speed of the pulse is not the speed of the heart, but rather twice as slow. Translated into modern metronome figures, the pulse speed is usually in the range of 60 to 80 beats per minute. This interpretation of an unvarying tactus in the range of 70 beats per minute is supported by Apel,

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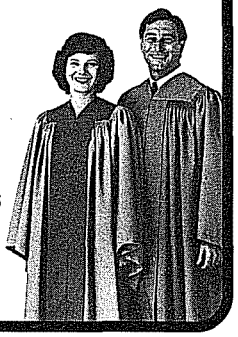
who states that,

> The important fact is that nowhere is a remark to be found [in the writings of the theorists of the day] which would give the slightest justification for the assumption that the duration of a note could be varied according to the text, the character or feeling of the piece, or whatever other romantic ideas a modern conductor may have in his mind if he chooses the 'right' tempo.[7]

He goes on to argue that the only means of changing tempo that would have been available to sixteenth-century composers was mensural proportion.[8] However, in his article on tempo in the *New Groves Dictionary of Music and Musicians,* Robert Donnington argues that the speed of the tactus would have been altered, within limits, to fit the requirements of the music, not vice versa.[9] In support of this interpretation, he offers the work of Nicola Vicentino, who in his *L'antica musica of 1555*

> . . . gave a characterization of the different note values, associating each with a tempo and making a special issue of the point that he was not discussing the relative lengths of notes (which had been described earlier), but rather showing how different note values could be used to produce pieces of different speeds.[10]



Mensuration and Mensuration Signs

Basic Terminology

In the sixteenth-century, mensuration can be viewed as the relationships between the various rhythmic levels. These were indicated, by the presence of signatures, in the music. Donnington described the role of these signatures this way:

> The true function of these signatures was not to indicate time in our modern sense of tempo, but to indicate time in the old sense of mensuration. The only information which they impart directly is the relative time allotted to each note value in proportion to the others.[11]

These relationships occurred on each level of rhythmic structure between a given note value and the note value one level down. On a theoretical level, each of these relationships could be either duple or ternary. Duple relationships were considered to be imperfect, whereas ternary ones were called perfect. According to Apel, "These terms go back to the rhythmic concepts of the thirteenth century, when the ternary division was considered perfect because it consists of 'beginning, middle, and end'."[12] The terms major and minor were also applied, with major being used as a synonym for perfect, while minor referred to an imperfect relationship.

Each level of mensuration was defined by the use of a specific term. The relation of the long to the breve was referred to as *modus.* The relation of the breve to the semibreve was called *tempus,* and the relation of the semibreve to the *minum* was known as *prolatio.* According to the theoretical writings of the day, it was also possible to extend this concept to the level of the *longa* and the *maxima.* The mensuration of the *maxima* was called either *modus maximarum, modus major* or simply *greater mood.* The mensuration of the *longa,* in turn, was referred to as *modus longarum, modus minor* or *lessor mood.* A given mensuration was indicated by an

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appropriate symbol, number or both.

According to Apel, the white mensural system, which served as the notational basis for all music of this period, assumed all mensurations to be duple[13] with the exception of *tempus* and *prolatio*, the character of which was indicated by the presence of an appropriate mensural symbol. In practice this is true for the vast majority of the literature of the period. The quality of the *tempus* is governed by the presence of either a circle, which referred to *tempus perfectum*, or a half circle, meaning *tempus imperfectum*. Concurrently, the quality of the *prolatio* was indicated by the presence, or lack thereof, of a dot in the center of the *tempus* sign. The presence of a dot indicated *prolatio perfecta*, while the absence of a dot indicated an imperfect prolation. However, the theory of the day accounted for the other possible mensurations with symbols that were less common in the actual music of the period. The possibilities that existed at the end of the sixteenth century can be seen in a catalogue of mensuration signs by Thomas Morley (Table 1).[14]

Table 1

O3	= Three longs to a maxim
C3	= Two longs to a maxim
O2	= Three breves to a long
C2	= Two breves to a long
O	= Three semibreves to a breve, 2 breves to a long
2	= Two semibreves to a breve, 2 breves to a long

Tactus and Tempo

Tactus Equivalencies With the Notation

The basic equivalency for the downbeat-upbeat unit of the tactus was the semibreve.[15] As Apel describes;

> The tactus is normally represented by the semibreve . . . with the other notes being multiples or fractions thereof . . . . These normal values of the various notes are called *integer valor*.[16]

For this reason, many Italian theorists of the day referred to music in *integer valor* as being written *alla semibreve*.[17] However, it is not always expected that the semibreve would be the tactus equivalency. According to DeFord, this should only be the case in ¢. In ¢, it should be the breve that is equivalent to the tactus. Further compounding the issue is the fact that within the basic binary and ternary tactus types, there are other categorizations referred to as tactus major and tactus minor. As is stressed by Apel, these terms do not refer to two differing tempi, "but to two different conductor's beats for the same tempo."[18] The issue is not one of tempo, but of the level at which the tactus relates to the rhythmic values of the score.

Tactus minor has two movements of the hand in the place of one in tactus major. According to Collins, tactus major often meant that the tactus was equivalent to the level of the breve in the score, whereas tactus minor had a semibreve equivalency.[19] It was also possible for the tactus to occur *alla minima*, or with a minim equivalency.[20] In truth, "There is disagreement among both ancient and modern theorists as to the place and the effect of the tactus, or pulse, in a given mensuration."[21] For this reason, it is occasionally unclear which note value should receive the tactus equivalency in a given mensuration. In these cases, one must rely on one's musical instinct, much in the manner that the performer of the day would have done. As DeFord notes, for conductors in the sixteenth century;

> The choice of tactus could depend on the preference of the conductor, local custom, the skill of the singers or the rhythmic character of the specific piece.[22]

In much the same manner, these criteria can serve to guide the modern conductor as well.

The Evolution of Notation

Another factor which had a profound impact on the metrical level at which the tactus was applied to the music was with the evolution of notation over the course of the century. On the most basic level, binary signatures came to be standard for most pieces, with ternary signatures used to provide mensural contrast internally.[23] A larger issue was the evolution of the note values. Over the course of the Renaissance period, ever-smaller rhythmic values were added to a composer's pallet. The addition of these smaller rhythmic values had the effect of gradually slowing the speed of the longer notes. According to Donnington, there was a "perpetual tendency for long notes to grow slower as shorter notes are added at the other end of the scale."[24] Chew described it this way:

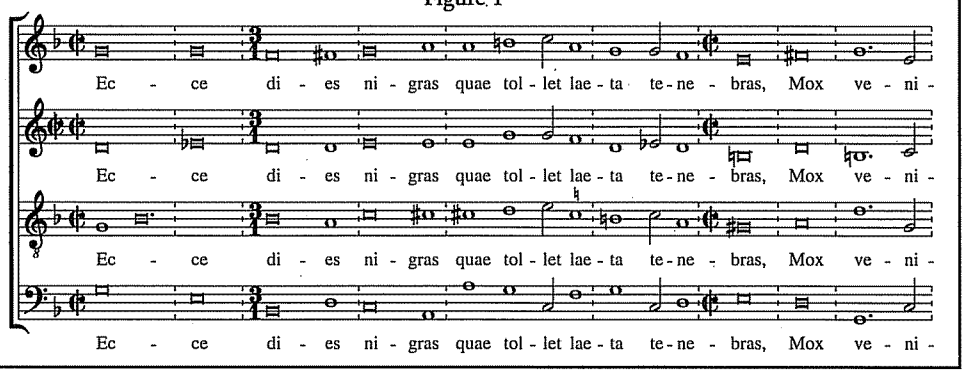
> In medieval notation there was a progressive slowing down of note values, and this continued through the sixteenth century, partly no doubt owing to the proliferation of short note values.[25]

By the midpoint of the sixteenth century, the *minum* had become the normal notational beat equivalency in polyphony.[26] This had the effect of making *modus* become obsolete as a measure of mensuration.[27]

Impact on Mensuration

As was mentioned above, in principle, the normal mensural order specifies that pieces which are notated in ¢ are measured in *breves,* while those which are notated in 𝐜 are measured in *semibreves.*[28] However, as a result of the gradual slowdown of note values, caused by the introduction of ever shorter rhythmic units, had the effect that the "meaningful metrical organization of the *breve* level declined,"[29] blurring the distinction between the two signs. DeFord notes that by circa 1500, pieces which were notated in ¢ often utilized the *semibreve* as the tactus equivalency. By circa 1560, "the semibreve had come to be the normal tactus of both signs."[30] The result of this new dominance of the sign ¢ was that sign 𝐜 became increasingly rare over the course of the century.[31] However, this evolution was not completely linear. In the repertories of some areas, local custom superceded the generalized trend. According to DeFord, "The *breve* tactus continued to be used in some places until well into the seventeenth century."[32] In some music of the last quarter of the century, a *minum* tactus was also a possibility.[33]

Figure 1



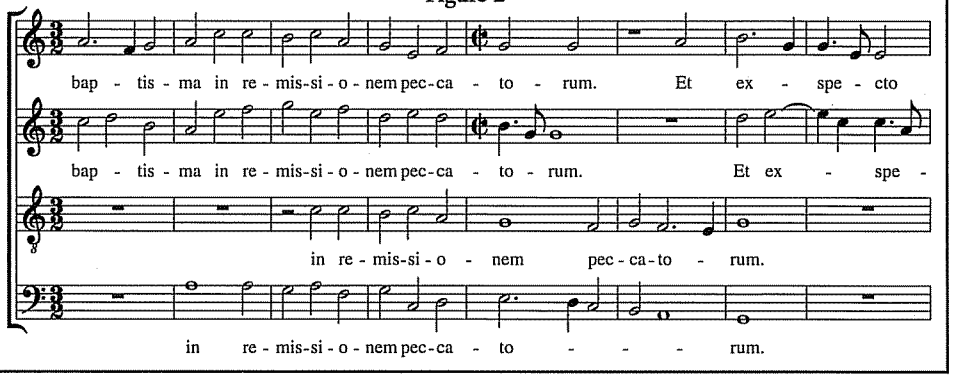
Proportional Relationships Between Various Mensurations

Signs of mensuration were manifest in several different ways in the scores of the period. They could exist at the beginning of a given piece of music, or be used to indicate a change of mensuration within a given movement or section; either within all of the parts simultaneously (such as occurs in the fifth movement of di Lasso's *Prophetiae Sibyllarum* [Figure 1]), or with some number of parts fewer than the totality (such as occurs in the Credo of Josquin's *Missa Pange Lingua* [Figure 2]). The more common of the two treatments is when a mensural change occurs simultaneously in all parts. In theory, mensuration signs were related to each other by mathematical proportion; indicating either augmentation or diminution of a given rhythmic value. Apel relates that although the use of proportional metrical relationships has a long history, which predates the period in question,

> The use of proportions, that is, of the diminution and augmentation of metrical values in certain arithmetic ratios, is a characteristic feature of the Flemish music of the fifteenth and early sixteenth centuries ....[34]

Although the math regarding these proportions was exact, spelling out specific relationships (which either lengthened or diminished the relative length of

Figure 2



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a given note value), these may have been approximated in practice.[35] The general rule for determining these proportions was that "if several proportions appear successively in the same part, their effect is cumulative, each of them referring to the preceding ones, not to the *integer valor.*"[36] Another way of understanding the issue was put forth by theorists such as Tinctoris and Gaffurius, who argued "the mensuration within the proportion derives from the mensuration sign preceding the proportion and not from the proportion itself."[37]

According to Berger, it was Tinctoris, who can be credited with bringing the rhythmic proportions on a par with the harmonic ones. Tinctoris describes twenty-five different proportions, all of which also appear in inversion.[38] To this sizable list, Gaffurius added more. Following Boethus, theorists of the day grouped the various proportions into classifications of species or genera,[39] many of which were too complex to occur in actual practice. The first of these species was referred to as *genus multiplex.* Each proportion in *genus multiplex* is based upon the mathematical proportion n:1, (for example 2:1, 3:1, etc.). These proportions were referred to as *dupla, tripla, quadrupla,* etc. Proportions in the *genus superpatricularis* each contain the prefix *sesqui* in their name. These have the mathematical formula n + 1: n. The *genus superpartiens* is characterized by proportions with the formulae n + 2: n, n + 3: n, n + 4: n, etc. There also existed proportions that were combinations such as *genus multiplex superparticulare* and *genus multiplex superpartiens,* which had the formulae n * m + 1:n and n * m + (2, 3, 4, etc.): n respectively.

The complexity of these proportions became so advanced that many could not be reproduced beyond the theoretical level. Fortunately, by the beginning of the sixteenth century, the situation had been simplified in the realm of the practical. According to Vaccaro,

> The complexity of the interplay of proportions, still highly valued at the end of the fifteenth century, tended to become simplified on the following basis:
> 1) The opposition of binary and ternary subdivisions *Tempus imperfectum* or *perfectum* (subdivision of the breve)
> 2) The interplay of proportions
> Principally, notation in *integer valor, proportio dupla* and *proportio tripla*[40]

For the modern performer, it is key to understand the nature of these relationships. The literal interpretations of some of the more common of these proportions are given in Table 2.

Equivalent Mensuration Signs

It is important to note, before one begins the study of mensural proportions, that not every composer, scribe, or printer used the same symbol for the same mensuration. Thus, there arose multiple signs which indicate identical mensural situations. Some of these mensural synonyms are shown in Table 3. However, Sachs notes that the situation is not as complicated as it might first appear due to the

Table 2

ϕ	Dupla Proportion (diminution) Note values become half of those of O
¢	Dupla Proportion (diminution) Note values become half of those of C
2 over 1	Dupla Proportion (diminution) 𝅗𝅥 = the previous 𝅝
1 over 2	Dupla Proportion (augmentation) 𝅝 = the previous 𝅗𝅥
3 over 1	Tripla Proportion (diminution) 𝅜 = the previous 𝅝
3 over 2 or 3	Sesquialtera Proportion (diminution) 𝅗𝅥𝅗𝅥𝅗𝅥 = the previous 𝅝

Table 3

ↄ	=	¢
O	=	C3
O3	=	C33
O2	=	¢33
O22	=	¢2

nature of the usage of the various symbols. "Symbols with a figure after the circle or semi-circle were used only within a voice part as actual proportions, while *symbols without figures stood as time signatures at the beginning, and had no proportional significance.*"[41] Therefore, those symbols which stand in the score without figures need only be understood in relation to the tactus, while those with figures must be understood in terms of their proportional relationships with the rest of the score.

The Slash

In theory, the slash was a sign of diminution that indicated a proportion of 1:2 between undiminished sign and the sign with a slash through it (see Table 2). Thus, the tempo relation between c and ¢ was 1:2. However, according to DeFord,

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The tempo relationship between the two signs was controversial in theory and quite variable in practice. The traditional view is that the stroke diminishes the note values by half, so that a given value in ¢ lasts half as long as the same notated value in c and a breve tactus in ¢ is the same length as a semibreve tactus in c. In practice, however, the tempo proportion between the two signs in independent pieces was usually less than 2:1, so that a breve tactus in ¢ was somewhat longer, and a semibreve tactus somewhat shorter, than a semibreve tactus in c.[42]

In practice ¢ usually meant slightly faster than c. This practice is supported by the work of Wegman, who argues that the stroke in o and ¢ indicated a semibreve tactus that was "faster by an indeterminate amount than the tactus of the undiminished signs."[43] However, in order for this indeterminate tempo alteration to occur, there either had to be no mensural change within the music, or the change had to occur in all parts. If the change were to occur within the music, in fewer than every part, the relationship would have had to have been a strict 2:1. Schroeder, "maintains that the stroke always meant diminution by half in ¢, but could indicate diminution by a third in o until c. 1540."[44] More light is shed on this situation by Berger who asserts that the "theory of diminution by a third in o was limited to a small number of German theorists and based on a misunderstanding of Johannes de Muris."[45] Fortunately for modern interpreters, the slash was not the only tool available to composers of the day with which they could indicate a 2:1 proportion. The application of a numeric 2 after the mensural symbol was used far more consistently as an indication of the doubling of speed.[46]

Proportions of Three

One of the most common means of achieving compositional contrast within a movement or section of a given work was to contrast sections in triple time with those in duple time. In the sixteenth century, these normally occur such that a ternary passage occurs within the context of a binary work or section of a work. This trend is expounded upon by DeFord, and confirmed by Apel.[47]

After c. 1520 binary signatures became standard for most pieces, and ternary passages within them were notated as *sesquialtera* or triple proportions.[48]

In the period in question, triple propor-

tions are most often understood in terms of their relationship with duple mensurations. Perhaps the most problematic of these relationships is *sesquialtera.*

Sesquialtera proportions are of the *genus superparticularis*, which has the formula n + 1: n. Literally, *sesquialtera* is a proportion of diminution in which three *semibreves* in the *sesquialtera* passage is equivalent to two *semibreves* of the preceding duple mensuration.[49] It is identical in function to *hemeola,* which is indicated by the blackening of the notes, instead of by mensural proportion.[50] *Sesquialtera* is usually indicated by either 3 over 2, or simply by a 3 in the score. Unfortunately, these signs were not always used according to their literal function. DeFord puts forth the problem.

> The signs of these proportions ostensibly specify precise tempo relationships between binary and ternary presages, but in practice they could be interpreted in a variety of ways depending on time, place and musical context, as well as the notation itself.[51]

He goes on to say that,

> Signs of *sesquialtera* are particularly problematic. They could represent not only 3 notes in the time of two, in accordance with their literal meaning, but also triple, duple and indeterminate proportions with the preceding mensuration as follows:[52]
>
> 𝅗𝅥 = 𝅗𝅥
> (*Sesquialtera* proportion)
>
> 𝅝 = 𝅗𝅥
> (Triple proportion)
>
> 𝄽 = 𝅝
> (Duple proportion)
>
> ? = ?
> (Indeterminate proportion)

However, even the literal interpretation of *sesquialtera* is under debate. Collins argues that when a mensuration indicating a *sequialtera* relationship occurs in less than every voice part, it does not produce three equal notes, but rather should be resolved into binary figures.[53] Adding further confusion to the issue was the fact that

> Proportions notated with signs of major *sesquialtera* could be performed either as written, with 3 *semibreves* equivalent to two of the preceding sign, or twice as fast, with 3 *semibreves* equivalent to one, and the latter option became increasingly common throughout the century.[54]

Triple proportions are only slightly less problematic. From the *genus multiplex,* triple proportions have the formula 3:1. Thus, in a triple proportion, three *semibreves* are equivalent to one *semibreve* of the preceding mensuration. *Tripla* proportions are usually indicated by 3 over 1, but could also be indicated simply by a three. However, the three is problematic because the same three that indicates a triple proportion could also be used, and most often was, to indicate a *sesquialtera* relationship.[55]

Conclusions

There are many daunting challenges that face those who would perform the music of the sixteenth century. In order to arrive at a successful and meaningful performance, one must first determine the rate of the tactus in combination with determining the appropriate rhythmic level for the tactus equivalency. Once this is determined, one is faced with the challenge of determining the nature of any mensural changes that occur in the score. At times, this can seem a particularly problematic issue. As Lefferts asserts, mensural practice is a

> Subject that is complex, highly technical and fraught with ambiguity and contradiction, a state of affairs due to the variety of agents who helped develop the mensural system"[56]

DeFord described the situation this way:

> Many theorists from ca. 1470 to ca. 1600 dealt with the issue, often attempting to prescribe regularities that never existed in practice, . . . the systems they propose conflict with one another and with the practices of composers and performers.[57]

The obvious question becomes; where can the would-be performer turn to find the answers to this complex issue? Once all the available information has been examined, invariably, the answer lies in the same place it would have been for the performer in the sixteenth century; the music, and in the good taste and musical intuition of those who performed it.

NOTES

[1] Ephraim Segerman, "Tempo and Tactus after 1500," in *Companion to Medieval and Renaissance Music*, ed. Tess Knighton and David Fallows (New York: Schirmer Books, 1992), 337.

[2] Robert Donington, "Tempo,", in *New Grove Dictionary of Music and Musicians,* 18. ed. Stanley Sadie (London: Macmillan Publishers, 1980), 676.

[3] Gustav Reese, *Music in the Renaissance.* Revised edition. (New York: W.W. Norton, 1959): 180.

[4] Curt Sachs, *Rhythm and Tempo: A Study in Music History.* (New York: W.W. Norton and Co., 1953): 217-18.

[5] Jean-Michel Vaccaro. "Las! Pour vous trop aymer," in *Music Before 1600.* ed. Mark Everist (Oxford: Blackwell Publishers, 1992), 176.

[6] J. A. Bank, *Tactus, Tempo and Notation in Mensural Music from the 13th to the 17th Century.* (Holland: Annie Bank, 1972): 9.

[7] Willi Apel, *The Notation of Polyphonic Music 900-1600.* Revised fifth edition. (Cambridge, Massachusetts: The

Mediaeval Academy of America, 1953): 190.

[8] Apel. 190.

[9] Donington, 676.

[10] Donington, 680.

[11] Robert Donnington, *The Interpretation of Early Music.* New revised edition. (London: Faber and Faber, 1989): 407.

[12] Apel, 96.

[13] Apel, 96.

[14] Sachs, *Rhythm and Tempo: A Study in Music History*: 213.

[15] Anonymous, "Proportions," *New Grove Dictionary of Music and Musicians,* 15. ed. Stanley Sadie (London: Macmillan Publishers, 1980), 307.

[16] Apel, 147.

[17] Anonymous, "Proportions," 307.

[18] Apel, 192.

[19] Michael B. Collins, "The Performance of Sequialtera and Hemiola in the 16th Century," *Journal of the American Musicological Society,* 17 (1964): 7.

[20] Bank, 203.

[21] Anonymous, "Proportions," 306.

[22] Ruth I. DeFord, "Tempo Relationships Between Duple and Triple Time in the Sixteenth Century," in *Early Music History: Studies in Medieval and Early Modern Music,* 14 (1995). ed. Iain Fenlon, 3.

[23] Ibid., 1.

[24] Donington, 405.

[25] Ian D. Bent, David Hiley, Margaret Bent and Geoffrey Chew. "Notation," *New Grove Dictionary of Music and Musicians,* 13. ed. Stanley Sadie (London: Macmillan Publishers, 1980), 381.

[26] Bent, Hiley, Bent and Chew. 381.

[27] Donington *The Interpretation of Early Music*: 405.

[28] DeFord, 2.

[29] DeFord, 4.

[30] DeFord, 3.

[31] Ian D. Bent, David Hiley, Margaret Bent and Geoffrey Chew. 383.

[32] DeFord, 3.

[33] DeFord, 3.

[34] Apel, 145.

[35] Donington. "Tempo," 676.

[36] Apel, 161.

[37] A.M. Busse Berger. "The Origin and Early History of Proportion Signs," *Journal of the American Musicological Society,* 41 (1988), 403.

[38] A.M. Berger. 405-6.

[39] Anonymous, "Proportions," 306-7.

[40] Vaccaro, "Las! Pour vous trop aymer," 176.

[41] Sachs, *Rhythm and Tempo: A Study in Music History*: 211.

[42] DeFord, 4.

[43] DeFord, 4.

[44] DeFord, 4.

[45] DeFord, 4.

[46] David Fallows, "Tempo and Expression Marks", in *New Grove Dictionary of Music and Musicians,* 18. ed. Stanley Sadie (London: Macmillan Publishers, 1980), 680.

[47] Apel, 188-9.

[48] DeFord, "Tempo Relationships Between Duple and Triple Time in the Sixteenth Century," 1.

[49] Donington, *The Interpretation of Early Music*: 406.

[50] Collins, "The Performance of Sequialtera and Hemiola in the 16th Century," 7.

[51] DeFord, 1.

[52] DeFord, 1-2.

[53] Collins, p.

[54] DeFord, 26.

[55] DeFord, 4.

[56] Peter M. Lefferts, "Mensuration and Performance Signs: Origins and Evolution by Anna Marie Busse Berger," *Music and Letters.* 76 (1995).,80.

[57] DeFord, 151.

—CJ—