

## Reviews: Digital and Multimedia Scholarship

**Thesaurus Musicarum Latinarum (TML).** Giuliano Di Bacco, Project Director; The Center for the History of Music Theory and Literature, Indiana University Jacobs School of Music. URL: <http://www.chmtl.indiana.edu/tml/>

The Thesaurus Musicarum Latinarum (TML), subtitled an “Online Archive of Music Theory in Latin,” is among the handful of online resources that early music scholars consult with frequency—the other two being the Digital Image Archive of Medieval Music (DIAMM, an image archive and catalog of manuscripts transmitting medieval polyphony) and the Cantus database (a searchable catalog of plainchant).<sup>1</sup> All three were first developed in the earliest days of web-based scholarly resources, and all three have shed their HTML 2.0 look-and-feel courtesy of recent updates to their interface design. This review considers the newest version of the TML, released in 2017, focusing both on the improvements in usability and functionality of the 2017 version, and on the aims and scope of the TML project in general.

The TML’s purpose, as stated on its home page, is “to give *free access to and make searchable* every known Latin text on music from the late antiquity to the seventeenth century, in multiple editions and in transcriptions from original sources” (my emphasis). While the TML’s primary audience is identified as musicologists, the home page indicates that the resource will be of use to anyone “interested in documenting the broader intersections of music with the humanities and the sciences within the Western tradition.” The TML corpus comprises writings on music in Latin from the late Greco-Roman through the early modern periods, traversing the philosophical, the speculative, and the practical. One can browse through definitions of music and musicians and their place in society; cosmological and metaphysical discussions—for example, of the music of the spheres; the story of Pythagoras’s discovery of the ratios of the consonances; a variety of methods for reproducing pitch arrays on the monochord; technical definitions of pitch, mode, melody, phrasing, rhythm, notation, and form; discussions of various genres and styles of music compositions; descriptions of musical instruments; and passages on musical tastes and aesthetics. The information transmitted in these writings “plays a

1. DIAMM, <https://www.diamm.ac.uk/>; Cantus, <http://cantusdatabase.org/>.

fundamental role in our ability to reconstruct, understand, and ultimately perform the music of the past.”<sup>2</sup>

Originally developed to perform a task that a collection of machine-readable texts makes possible, the TML also enables rapid and comprehensive searches for terminology across its corpus. The “access” aspect is important: ideally anyone with an Internet connection (and knowledge of Latin) could read the full texts of these treatises on the TML, treatises previously accessible only to those with reading privileges at a good research library. And since the texts are machine-readable, their presentation can be adjusted to suit the individual reader; for example, the TML’s texts can be read by a screen-reader.<sup>3</sup>

Begun in 1990 by Thomas J. Mathiesen, with support from Indiana University and the Jacobs School of Music and funding from the National Endowment for the Humanities from 1992 to 1995, the TML project is now under the direction of Giuliano Di Bacco.<sup>4</sup> This resource would not exist but for many hours of transcription and proofreading by the seventy-five contributors acknowledged on the “Browse by Contributor” page.<sup>5</sup> Oliver Ellsworth, Andreas Giger, Stephen Hayes, Peter Lefferts, Angela Mariani, Peter Slemmon, and Bradley Jon Tucker deserve special mention, each having made a huge number of contributions to the project.

In the early days, the text files of the TML corpus were distributed via FTP and on CD-ROM. Mathiesen and his team released the web version in 1998, though for several years the data files were concurrently available for bulk download by individual users. The core of the corpus is its transcriptions of Latin theory already available in modern print editions, including those edited by Edmond de Coussemaker in the nineteenth century,<sup>6</sup> those edited in the *Corpus scriptorum de musica* series published by the American Institute of Musicology, the publications of the *Greek and Latin Music Theory* series at the University of Nebraska, and various other editions published as stand-alone volumes or as appendices to peer-reviewed articles in a variety of musicological journals. In the early 2000s, a number of treatises were

2. Giuliano Di Bacco, “A Brief Introduction,” TML, last update June 2017, <http://www.chmtl.indiana.edu/tml/about/introduction>. Unless otherwise noted, the links cited in this review were accessed in June 2019.

3. According to the HTML 4.01 specification, to enable the correct pronunciation the language should be flagged in the code with the appropriate value for the @lang attribute, although the TML currently fails to follow this specification.

4. The technical and editorial staff are listed as follows: “Michael McClimon, Dana Barron, Sebastian Bisciglia, Daniel Bishop, with warm thanks to Magda Dragu, Bill Guerin, Adam Hochstetter, Elizabeth Elmi, Chelsey Hamm, and Molly Ryan”: “TML People,” TML, <http://www.chmtl.indiana.edu/tml/about/people>.

5. “Browse by Contributor,” TML, <http://www.chmtl.indiana.edu/tml/browse/contributors>.

6. *Scriptorum de musica medii aevi nova series a Gerbertina altera*, ed. Charles-Edmond-Henri de Coussemaker, 4 vols. (Paris: Durand, 1864–76; reprint, Hildesheim: Olms, 1963).

added to the TML that were transcribed by project team members directly from the medieval manuscripts. The “Browse by Source” page lists all the print editions and manuscript sources for the current corpus.<sup>7</sup> The numbers that indicate the scope of the current corpus are summarized as follows: “As of June 2017, the archive contains over 8 million words and 18,000 graphics for around 950 unique titles in multiple versions, from 328 printed and 42 manuscript sources,” and a list of “Titles for future inclusion in the TML” on the same web page lists a further ninety-five items.<sup>8</sup>

## Basic Principles and Structure

The structure of the TML is relatively simple: it is a collection of HTML pages with associated metadata. In general, each HTML page is a transcription of a single medieval theory treatise.<sup>9</sup> In the original TML these HTML pages were organized into nine directories according to date (third–fifth, sixth–eighth, ninth–eleventh, twelfth, thirteenth, fourteenth, fifteenth, sixteenth, and seventeenth centuries), and this organization still informs the “Browse: by century” section of the main navigation menu in the 2017 edition. At the outer realms of this corpus lie texts such as Censorinus’s *De die natali liber*, written in the third century, and Christiaan Huygens’s *Novus cyclus harmonicus*, published in 1724.<sup>10</sup>

Two crucial decisions were made at the beginning of the project that facilitated the rapid transcription of texts, and simplified their presentation online.<sup>11</sup> First, only the edited text of each treatise has been transcribed (or, in the case of manuscripts, transcribed as found in the individual manuscript source), without any further editorial intervention. Any additional text included in the print edition—the introduction, any commentary or notes, and the critical apparatus—was not transcribed.<sup>12</sup> Second, music examples are presented in one of two ways: simple single-line examples, especially those that do not specify pitch, were recorded using a custom-based system of codes,<sup>13</sup> while more complex music examples or diagrams are provided

7. “Browse by Source,” TML, <http://www.chmtl.indiana.edu/tml/browse/sources>.

8. “Content,” TML, <http://www.chmtl.indiana.edu/tml/about/content>.

9. Lengthy treatises—that is, those originally published in multivolume print editions—are split up into several HTML files.

10. “Censorinus: *De die natali liber*,” TML, <http://www.chmtl.indiana.edu/tml/3rd-5th/CENDIE>; “Huygens, Christiaan: *Novus cyclus harmonicus*,” TML, <http://www.chmtl.indiana.edu/tml/17th/HUYNOV>.

11. For more information, see “Editorial Policies,” TML, <http://www.chmtl.indiana.edu/tml/about/policies>.

12. The policies regarding the orthography of the sources are outlined in an embedded PDF document: “Principles of Orthography,” TML, <http://www.chmtl.indiana.edu/tml/documents/orthography>.

13. Also outlined in an embedded PDF: “Table of Codes for Noteshapes, Rests, Ligatures, Mensuration Signs, Clefs, and Miscellaneous Figures,” TML, <http://www.chmtl.indiana.edu/tml/documents/codes>.

on the TML as .gif images scanned from the original print editions or manuscripts. In other words, the more complex music examples and diagrams have not been encoded in a machine-readable format.<sup>14</sup>

The 2017 edition of the TML consists of a design update and some new features relating to its browse and search functionality. The new design is aesthetically pleasing, and its serif fonts on a light background make lengthy texts easy to read. A simple and user-friendly interface is well laid out with intuitive menu and navigation features, new buttons with filtering options, pop-up information windows, and collapsible and expandable texts. No user account or log-in is required, and the content of the 2017 edition is made available for further use under a Creative Commons license.<sup>15</sup>

### Browsing the TML

While the number of unique titles contained in the archive is given as 950 (see above), this number represents a smaller number of actual treatises, since each separate edition of a treatise (including manuscript transcriptions) is counted as a unique title. Consider, for example, the treatises of the fourteenth-century French astronomer and music theorist Jean des Murs, known in Latin as Johannes de Muris. The “Browse” menu offers a number of different options: by author, contributor, incipit, source, title, and century. Selecting the author Johannes de Muris from the “Browse by Author” page renders a result set of thirty-three unique items ostensibly “by” Johannes de Muris (see Figure 1).<sup>16</sup> Several items in this result set have identical titles: two items have the title *Compendium musicae practicae*, nine have the title *Musica speculativa*, and six have the title *Libellus cantus mensurabilis*. Clicking the [+] symbol to the left of each title makes the full reference for the transcription’s source viewable (either the bibliographic reference for the print edition, or the manuscript shelf number): thus we see that the six items titled *Libellus cantus mensurabilis* comprise the Coussemaker edition and five manuscript transcriptions (see Figure 2).<sup>17</sup> Three additional items related to the *Libellus* are found within this result set. The item *Libellus cantus mensurabilis [fragmentum]* is a fragmentary manuscript transmission of the same text, and two items at the top of

14. In the old TML, a new window opened for each music example or diagram; in the 2017 edition, the images are now navigable as an image gallery that opens in the same window as the transcribed treatise.

15. “Creative Commons: Attribution 4.0 International (CC BY 4.0),” Creative Commons website, <https://creativecommons.org/licenses/by/4.0/>.

16. “Browse by Author,” TML, <http://www.chmtl.indiana.edu/tml/browse/authors>.

17. The unique TML identifier, a combination of uppercase letters relating to the author and source, is found in parentheses to the right of each title: the Coussemaker edition, for example, has the identifier MURLIB.



### Texts found for authors selected

#### Johannes de Muris

- [+] *Ars discantus data a Magistro Iohanne de Muris abbreviando* (MURAD)
- [+] *Ars contrapuncti* (MURASC)
- [+] *Ars discantus* (MURASD)
- [+] *Ars practica mensurabilis cantus secundum Iohannem de Muris (Recensio A)* (MURAKSA)
- [+] *Ars practica mensurabilis cantus secundum Iohannem de Muris (Recensio B)* (MURASPB)
- [+] *Compendium musicae practicae* (MURCOM)
- [+] *Compendium musicae practicae* (MURCOMP\_MBAVRI14)
- [+] *De numeris, qui musicas retinent consonantias, secundum Ptolomaeum de Parisius* (MURDEN)
- [+] *Tractatus de proportionibus* (MURDEP)
- [+] *Musica speculativa* (MURISAP)
- [+] *Musica speculativa* (MURISW3)
- [+] *Libellus cantus mensurabilis [fragmentum]* (MURLCM\_MBAVB307)
- [+] *Libellus cantus mensurabilis* (MURLIB)
- [+] *Libellus cantus mensurabilis* (MURLIB\_MFABII19)
- [+] *Libellus cantus mensurabilis* (MURLIB\_MMBAH165)
- [+] *Libellus cantus mensurabilis* (MURLIB\_MMBAI20)
- [+] *Libellus cantus mensurabilis* (MURLIB\_MBAVRI14)
- [+] *Libellus cantus mensurabilis* (MURLIB\_MVB8-85)
- [+] *Musica speculativa* (MURMSP)
- [+] *Musica speculativa* (MURMSPE)
- [+] *Musica speculativa* (MURMSPE\_MBBRI457)
- [+] *Musica speculativa* (MURMSPEC\_MVB8-24)
- [+] *Musica speculativa* (MURMSPEW)
- [+] *Tractatus de musica* (MURMUS)
- [+] *Musica Johannis de Muris abbreviata* (MURMUSAB)
- [+] *Musica speculativa* (MURMUSI)
- [+] *Musica speculativa* (MURMUSM\_MMBAH165)
- [+] *Notitia artis musicae* (MURNOT)
- [+] *De practica musica, seu de mensurabili* (MURPRA)
- [+] *Quaestiones super partes musicae* (MURQUAE)
- [+] *Speculum musicae, Liber primus* (MURSP)
- [+] *Summa* (MURSUM)
- [+] *De tonis* (MURTON)

**Figure 1** Screenshot from TML, showing the results of a search for texts by Johannes de Muris, accessed from <http://www.chmtl.indiana.edu/tml/browse/authors>. This figure appears in color in the online version of the *Journal*.

the list with titles beginning *Ars practica mensurabilis cantus* are also transcriptions of the *Libellus* treatise (in two distinct versions), in this case from the most recent and most authoritative edition by Christian Berkold.<sup>18</sup> Clicking on the first of the *Ars practica* texts, and then clicking the

18. *Ars practica mensurabilis cantus secundum Iohannem de Muris: Die Recensio maior des sogenannten "Libellus practice cantus mensurabilis,"* ed. Christian Berkold, Bayerische Akademie der Wissenschaften, Veröffentlichungen der Musikhistorischen Kommission 14 (Munich: Bayerische Akademie der Wissenschaften, C. H. Beck, 1999).

- [+] *Ars practica mensurabilis cantus secundum Iohannem de Muris (Recensio A)*(MURARSPA)
  - [+] *Ars practica mensurabilis cantus secundum Iohannem de Muris (Recensio B)*(MURARSPB)
  - [+] *Compendium musicae practicae* (MURCOM)
  - [+] *Compendium musicae practicae* (MURCOMP\_MEAVRII4)
  - [+] *De numeris, qui musicas retinent consonantias, secundum Ptolomaeum de Parisius* (MURDEN)
  - [+] *Tractatus de proportionibus* (MURDEP)
  - [+] *Musica speculativa* (MURISAPP)
  - [+] *Musica speculativa* (MURISW3)
  - [+] *Libellus cantus mensurabilis [fragmentum]*(MURLCM\_MEAVB307)
- Source: Vatican City, Biblioteca Apostolica Vaticana, MS Barb. lat. 307, f. 31v.
- [+] *Libellus cantus mensurabilis* (MURLIB)
- Source: *Scriptorium de musica medii aevi nova series a Gerbertina altera*, 4 vols., ed. Edmond de Coussemaker (Paris: Durand, 1864-76; reprint ed., Hildesheim: Olms, 1963), 3:46-58.
- [+] *Libellus cantus mensurabilis* (MURLIB\_MEABII19)
- Source: Florence, Biblioteca Medicea Laurenziana, MS Ashburnham 1119, ff. 57r-65v.
- [+] *Libellus cantus mensurabilis* (MURLIBI\_MMBAHI65)
- Source: Milan, Biblioteca Ambrosiana, MS H.165.inf, ff. 18v-22v.
- [+] *Libellus cantus mensurabilis* (MURLIB\_MMBAI201)
- Source: Milan, Biblioteca Ambrosiana, MS L.20.inf, ff. 31r-34v.
- [+] *Libellus cantus mensurabilis* (MURLIB\_MEAVRII4)
- Source: Vatican City, Biblioteca Apostolica Vaticana, MS Reg. lat. 1146, ff. 35r-46r.
- [+] *Libellus cantus mensurabilis* (MURLIB\_MVEM8-85)
- Source: Venice, Biblioteca Nazionale Marciana, MS lat. VIII.85 (3579), ff. 11r-23v.

**Figure 2** Screenshot from TML, showing the source references for Johannes de Muris's *Libellus cantus mensurabilis*, accessed from <http://www.chmnd.indiana.edu/tml/browse/authors>. This figure appears in color in the online version of the **Journal**.

THESAVRVS MVSICARVM LATINARVM

Menu Home Copyright Notice Quick search

**Johannes de Muris**  
*Ars practica mensurabilis cantus secundum Iohannem de Muris (Recensio A)*

Source: *Ars practica mensurabilis cantus secundum Iohannem de Muris: Die Recensio maior des sogenannten "Libellus practice cantus mensurabilis"*, ed. Christian Berkold, Bayerische Akademie der Wissenschaften, Veröffentlichungen der Musikhistorischen Kommission, Band 14 (Munich: Bayerische Akademie der Wissenschaften / C. H. Beck, 1999), 3–79.

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Electronic version prepared by Peter Slemon, Travis Yeager, and Thomas J. Mathiesen for the *Thesaurus Musicarum Latinarum*, 2007.

Image Gallery TML notes Concordances

» **TML Notes**

Cf. MURARSPB, MURLIB, MURLIBF, MURLIBM, MURLIBM1, and MURLIBV-85. [TJM]

» **Concordances**

→ We have found the following concordances with the *Lexicon musicum Latinum* and the *Répertoire International des Sources Musicales*

[1] IOH. MUR. Lib.  
 Iohannes de Muris: *Ars practica mensurabilis cantus* (= *Libellus cantus mensurabilis*)

[5] *Ars practica mensurabilis cantus secundum Iohannem de Muris*

Quilibet in arte practica mensurabilis cantus erudiri mediocriter affectans ea scribat diligenter, que sequuntur summarie compilata secundum magistrum Iohannem de Muris.

Actions  
☐ Highlight matches

**Figure 3** Screenshot from TML, showing the page for Johannes de Muris’s *Ars practica mensurabilis cantus* . . . (*Recensio A*) with “TML Notes” and “Concordances,” <http://www.chmtl.indiana.edu/tml/14th/MURARSPA>. This figure appears in color in the online version of the *Journal*.

“TML Notes” and the “Concordances” buttons, informs the user “*Ars practica mensurabilis cantus* (= *Libellus cantus mensurabilis*)” and that “TJM” (Thomas J. Mathiesen) advises the user to “Cf. MURARSPB, MURLIB, MURLIBF, MURLIBM, MURLIBM1, and MURLIBV-85” (see Figure 3). These are cross-references to six transcriptions of the *Libellus* in the TML.<sup>19</sup>

Less expert users, however, encountering the list of the thirty-three items “by” Johannes de Muris via the “Browse by Author” page, have no intuitive way of deciphering the actual number of unique treatises by Johannes de Muris, or which might be the best version to read. They also might not be aware that several of these thirty-three items are no longer thought to be written by Johannes de Muris: the Grove article on Muris attributes just

19. The links for two of the *Libellus* items (MURLCM\_MBAVB307 and MURLIBR\_MBAVR114) are not included for some reason.

three music treatises securely to him.<sup>20</sup> If the box “Include *LmL* authors” is checked in the “Actions” menu on the right sidebar of the “Browse by Author” page, a filtered list is returned with the TML transcriptions grouped by the treatise titles attributed to Johannes de Muris in the *Lexicon musicum Latinum medii aevi* (LmL) database (see Figure 4), although again this function would not be immediately obvious to a nonexpert.<sup>21</sup> While some of this attribution information is available by clicking through to each text transcription and clicking the “TML Notes” button, perhaps a new release of the TML could include some visual differentiation in the “Browse by Author” results page, possibly by highlighting the most authoritative edition of a particular treatise, and/or placing check marks next to texts securely attributed to a particular author.

The contextual information included in the TML is deliberately sparse. A TML user who wants to know more about Johannes de Muris will need to look elsewhere: the purpose of the TML is for discovering and then reading theory treatises. Without the appropriate contextual background, however, navigating the numerous anonymous works in the TML corpus is difficult, even for the more experienced user. The “Browse by Author” page lists the generic author “Anonymous,” and selecting this checkbox returns the hundreds of titles attributed in the TML corpus to “Anonymous.” The “Browse by Author” page also lists individually the authors named as Anonymous 1–7 (with Arabic numerals) and Anonymous I–XII (with Roman numerals), and one other author known as “Anonymous OP” (see Figure 5).<sup>22</sup> Anonymous IV is not the famous “Anonymous Four” who features in music history surveys as the only witness to the compositional activities of Léonin and Pérotin; this Anonymous IV is the fourth anonymous text of the third volume of Coussemaker’s edition, which is a treatise on fourteenth-century *ars nova* notation titled *Compendium artis mensurabilis tam veteris quam novae* and concordant with the text given the siglum “ANON. Paris. II” in the LmL.<sup>23</sup> The historiographer of Notre-Dame polyphony and teacher of modal notation may be found by checking the box “Anonymous 4” in the list of anonymous

20. Lawrence Gushee, C. Matthew Balensuela, and Jeffrey Dean, “Muris, Johannes de,” Grove Music Online, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/14237>.

21. “Lexicon musicum Latinum medii aevi (LmL),” Bayerische Akademie der Wissenschaften website, <http://www.lml.badw-muenchen.de/das-projekt.html>.

22. The TML uses Arabic numerals for the anonymous authors in Volume 1 of Coussemaker’s *Scriptorum de musica medii aevi*; the Roman numerals are used for the anonymous authors in Volume 3.

23. “Anonymous IV: *Compendium artis mensurabilis tam veteris quam novae*,” TML, <http://www.chmtl.indiana.edu/tml/15th/ANO4COM>. Frustratingly, this treatise is still located in the “15th century” directory, even though it is copied in a Parisian manuscript whose copying date is given in RISM as ca. 1350 (Paris, Bibliothèque nationale, latin 15128).





### Texts found associated to LmL authors selected ③

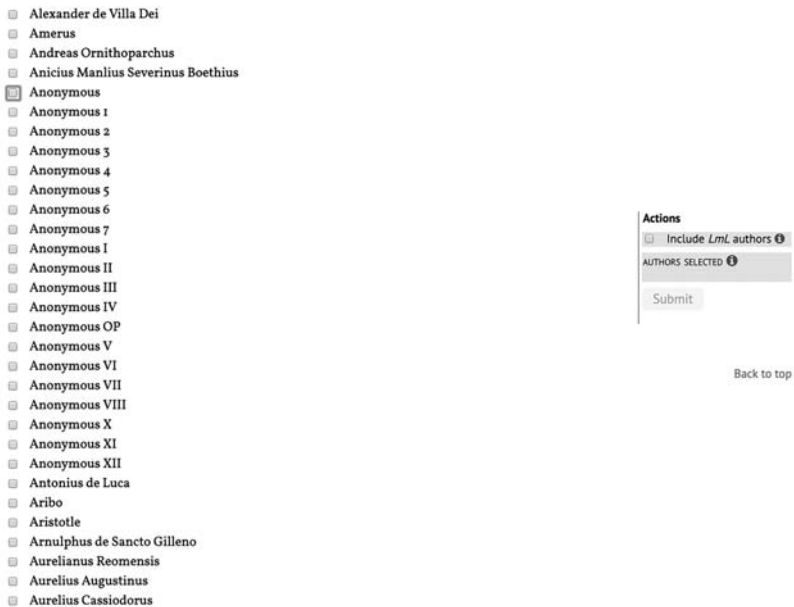
#### Iohannes de Muris

- **LmL: "IOH. MUR. comp., *Compendium musicae practicae*"**  
 TML concordances found:  
*[Compendium musicae]*(ANOQUAE\_MPBNI474)  
*Compendium musicae practicae*(MURCOM)  
*Compendium musicae practicae*(MURCOMP\_MBAVR114)  
*Quaestiones super partes musicae*(MURQUAE)
- **LmL: "IOH. MUR. contr., *Ars contrapuncti*"**  
 TML concordances found:  
*Ars contrapuncti*(MURARSC)
- **LmL: "IOH. MUR. Lib., *Ars practica mensurabilis cantus (= Libellus cantus mensurabilis)*"**  
 TML concordances found:  
*Ars practica mensurabilis cantus secundum Iohannem de Muris (Recensio A)*(MURARSPA)  
*Ars practica mensurabilis cantus secundum Iohannem de Muris (Recensio B)*(MURARSPB)  
*Libellus cantus mensurabilis [fragmentum]*(MURLCM\_MBAVB307)  
*Libellus cantus mensurabilis*(MURLIB)  
*Libellus cantus mensurabilis*(MURLIB\_MFART119)  
*Libellus cantus mensurabilis*(MURLIB1\_MBAHI65)  
*Libellus cantus mensurabilis*(MURLIB1\_MBAI201)  
*Libellus cantus mensurabilis*(MURLIB\_MBAVR114)  
*Libellus cantus mensurabilis*(MURLIB\_MVB8-85)
- **LmL: "IOH. MUR. not., *Notitia artis musicae*"**  
 TML concordances found:  
*[Compendium musicae]*(ANOQUAE\_MPBNI474)  
*Ars discantus data a Magistro Iohanne de Muris abbreviando*(MURAD)  
*Musica speculativa*(MURMUSM\_MBAHI65)  
*Notitia artis musicae*(MURNOT)  
*De practica musica, seu de mensurabili*(MURPRA)
- **LmL: "IOH. MUR. spec., *Musica speculativa*"**  
 TML concordances found:  
*Musica speculativa*(MURISAP)  
*Musica speculativa*(MURISW3)  
*Musica speculativa*(MURMSP)  
*Musica speculativa*(MURMSPE)  
*Musica speculativa*(MURMSPEB\_MBBRI457)  
*Musica speculativa*(MURMSPEC\_MVB8-24)  
*Musica speculativa*(MURMSPEW)  
*Tractatus de musica*(MURMUS)  
*Musica Iohannis de Muris abbreviata*(MURMUSAB)  
*Musica speculativa*(MURMUSI)  
*Musica speculativa*(MURMUSM\_MBAHI65)

**Figure 4** Screenshot from TML, showing the list of treatise titles attributed to Johannes de Muris in the LmL database, accessed from <http://www.chmtl.indiana.edu/tml/browse/authors>. This figure appears in color in the online version of the **Journal**.

authors: he is identical with the author labeled in the LmL as "ANON. Couss. IV" (see Figure 6).<sup>24</sup>

24. "Anonymous 4: *[Musica]*," TML, <http://www.chmtl.indiana.edu/tml/13th/ANO4MUS>.



**Figure 5** Screenshot from TML, showing the list of authors named “Anonymous” on the “Browse by Author” page, <http://www.chmtl.indiana.edu/tml/browse/authors>. This figure appears in color in the online version of the *Journal*.

These examples highlight a set of overlapping problems confronting any reader of Latin music theory: in addition to the issues of dating and attribution, treatises that are frequently transmitted anonymously in the medieval sources in several different versions, often without specific titles, are cited in the scholarly literature in a variety of (mostly ad hoc) formats. Two new reference lists included in the 2017 TML mitigate some of these problems of citation and discovery. First, a complete concordance between the TML transcriptions and Matthew Balensuela’s list of anonymous theoretical works compiled for Grove Music Online is provided in the main navigation menu under “Extras.”<sup>25</sup> Second, the page “Concordances with the *Lexicon musicum Latinum*” gives the unique siglum used for each music theory treatise cataloged in the LmL.<sup>26</sup> Expanding each siglum by clicking the [+] symbol gives the LmL author, title, and incipit together with a link (or links) to the associated transcription(s) in the TML.<sup>27</sup>

25. “Concordances with Grove’s ‘Anonymous Theoretical Writings,’” TML, [http://www.chmtl.indiana.edu/tml/concordances/grove\\_anonymous](http://www.chmtl.indiana.edu/tml/concordances/grove_anonymous). See also C. Matthew Balensuela, “Anonymous Theoretical Works,” in Grove Music Online, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/00969>.

26. “Concordances with the *Lexicon musicum Latinum*,” TML, <http://www.chmtl.indiana.edu/tml/concordances/lml>.

27. The “Actions” list in the right sidebar on this page allows the treatises to be sorted and formatted according to these four options.



## Searching the TML

Other than browsing through the content and locating a specific treatise to read, the other primary use of the TML is to search for terms across the entire corpus of transcribed texts. There are two options: a “Quick search” bar present on every page that allows searches across the entire corpus; and the “Search” option within the main navigation menu, where searches can be filtered (using “Search options” in the right sidebar) by date (century) and/or source type (print edition or manuscript).

The “Search the TML” page includes a bullet list of hints for searching; an example will best demonstrate the flexibility (and some of the quirks) of this process. My search was for references to mensuration signs, specifically the circle symbol used in mensural notation to indicate perfect (triple) time. The most directed kind of search is performed by enclosing the search phrase (“*circulus rotundus*”) in double quotation marks: this returns 16 results. Entering the same phrase without double quotation marks returns 23 results and is a more flexible way of searching, since it will return instances of either “*circulus rotundus*” or “*rotundus circulus*.” If I want to make sure my search includes all forms of this phrase, regardless of declension (that is, if I also want to see matches for “*circulum rotundum*”), I can add an asterisk to each term (“*circul\* rotund\**,” again without quotation marks); this method, however, returns 137 results—a bit unwieldy, since my result set now contains references to “*b rotundum*,” a common way of referring to the pitch B $\flat$  in Latin music theory. Using the right sidebar to filter the results to the thirteenth–fifteenth centuries is somewhat helpful—reducing the result set to 84—and browsing through using the “Show matches” function for each individual treatise allows for a fairly quick review of the results.

What I would really like is some sort of “Shopping cart” function, in order to fine-tune and save my final result set. Each of the searches described above returns passages not present in one of the other searches. And even within the most specific set of search results there are several duplicate passages, since, as mentioned above, most treatises have two or more versions in the TML corpus. The sixteen results for “*circulus rotundus*” actually represent passages containing the term in just nine treatises. I would propose the addition of a checkbox next to each search result item, so that, as I carry out each search, items could be added to a personal “Shopping cart.” These passages could then be downloaded from my “Shopping cart” together with their bibliographic citations as a .txt or .csv file. If the authoritative edition of each treatise was flagged in the metadata (as described above), and thus also in the TML display of the search result set, the user’s fine-tuning of the search results could be even more efficient. Other kinds of manipulation of the search results would also be useful: in particular, sorting the result set by date or author, in ascending or descending order.

## Future Plans

The most dreaded moment of any software development meeting is the point at which nonprogrammers excitedly start suggesting feature after feature, so I will refrain from any further “really neat” suggestions here.<sup>28</sup> One of the pleasures of using the TML is actually its pared-down functionality and the simplicity of its user interface. At its core it is a directory of folders and files, and thus any computer user intuitively knows how to browse and search it.

Nonetheless, the editors of the 2017 edition position this release as “the first product of a plan that calls for the creation of an even more advanced resource, capable of sophisticated queries on text and eventually music.”<sup>29</sup> In addition to the ninety-five new titles proposed for inclusion, other plans listed on the website include the provision of new higher-resolution graphics files for the music examples and diagrams, new search functionalities, and annotations for each transcription. Most ambitiously, this “future edition of the TML” will feature “text and music encoded in TEI (Text Encoding Initiative) and MEI (Music Encoding Initiative), *the full delivery of which will depend on availability of funds.*”<sup>30</sup> In closing, I include some final thoughts on the challenges and opportunities that might attend the TML’s future.

## Challenges and Opportunities

In December 2015, the TML disappeared. The victim of a malicious cyber-attack, the site was off-line for several weeks. TML users were thus made acutely aware of their reliance on it. And for those scholars already suspicious of the ephemeral nature of digital content, their worst fears were confirmed. In her discussion of the reluctant scholarly embrace of digital content, Kathleen Fitzpatrick writes, “This is the kind of scenario that sets off warning bells for many traditional scholars; the idea of a book’s protocols suddenly becoming obsolete—the ink fading from the page, the pages refusing to turn—[is] unthinkable.”<sup>31</sup> In truth, though, as Fitzpatrick observes, digital content stored on hard drives is actually very durable. And the TML content, of course, was not actually lost: the site resurfaced the following year with a better user interface, as a beta version of the new edition eventually released in 2017. But the question lingers: how can the preservation of and consistent access to the TML corpus be ensured for the next generation of

28. See “Feature Creep,” Wikipedia: The Free Encyclopedia, [https://en.wikipedia.org/wiki/Feature\\_creep](https://en.wikipedia.org/wiki/Feature_creep).

29. Di Bacco, “A Brief Introduction.”

30. “Future Plans,” TML, [http://www.chmtl.indiana.edu/tml/about/future\\_plans](http://www.chmtl.indiana.edu/tml/about/future_plans) (my emphasis).

31. Kathleen Fitzpatrick, *Planned Obsolescence: Publishing, Technology, and the Future of the Academy* (New York: New York University Press, 2011), 122.

scholars? Fitzpatrick describes the preservation of digital content as fundamentally a social rather than a technical problem, requiring funding and community buy-in: “scholars who collaborate with one another, or with larger institutions, will be more likely to produce digital work that will be preserved.”<sup>32</sup> Digitized archives require “a commitment to an ongoing series of costs,”<sup>33</sup> the maintenance of which is probably better suited institutionally to a university library than to a department or school. What steps could the TML project team take to implement a social solution that ensures continued access to its content into the future?

Thanks to the collaborative efforts of the committed group of scholars who have worked with the TML project team since the early 1990s, most of the digitization, at least with respect to the corpus of Latin theory published in print editions, is complete, albeit in HTML, which encodes only the text characters and formatting. If such a digitization project were begun today, the content would likely be encoded following community-based standards for encoding text and music, such as the TEI and the MEI. But while the stated plans for a future edition of the TML include new encodings of the transcribed text and music examples in TEI and MEI, as the TML project team acknowledges, this would require a significant new influx of funds. Such an effort would be relatively time-intensive, and would not result in an immediate difference for the end-user without the development of new tools that could leverage these standards-based encodings. In order to guarantee continued access to the digital content of completed projects, including those begun decades earlier whose format and design may not align with currently accepted standards, and where funds may not be available for continuous maintenance or updating, Fitzpatrick argues for what she terms a “*planned* obsolescence” through initiatives such as the Mellon-supported CLOCKSS project (“Lots of Copies Keep Stuff Safe”). CLOCKSS provides a secure but lightweight long-term infrastructure for the preservation of electronic scholarship (electronic articles and e-books).<sup>34</sup> Should the TML consider depositing its current corpus in a sustainable long-term archive, and move beyond its digitization efforts toward a new phase of development that would attract a new and expanded user base?

The crossroads at which the TML now stands is one familiar to other humanities computing projects that emerged in the late 1980s and early 1990s. Consider, for example, the Perseus Digital Library (Tufts University; Gregory R. Crane, Editor-in-Chief), begun in 1985, a project that assembles

32. *Ibid.*, 126.

33. *Ibid.*, 153.

34. According to the website, the archive currently has “26,000 serials titles and 183,000 book titles preserved, in progress or committed for preservation by CLOCKSS”: “What’s in CLOCKSS?,” CLOCKSS, accessed June 14, 2019, <https://clockss.org/whats-in-clockss/>.

machine-readable versions of Greco-Roman texts. Of their mission, the Perseus editors write,

We do not know what form such fundamental instruments as editions, lexica, encyclopedias, atlases, diagrams, museum catalogues, and archaeological site reports will assume [in the future], but we know that the infrastructure that we design now will materially enable or constrict how the next generation will be able to read languages from the past, scrutinize ancient artifacts, and explore the historical spaces.<sup>35</sup>

This acknowledgment indicates that, given the ever-changing processes deployed over the last few thousand years for recording, disseminating, and collecting texts, project goals focusing on comprehensiveness and preservation are only ever partially attainable. The newest iteration of Perseus is the Perseids Project, which moves away from digitization and “aims to support access to scholarship in Classics for students and members of the public at all levels of competence. [It provides] a suite of tools that foster language acquisition, facilitate working with documents, and encourage research.”<sup>36</sup>

What sorts of tools and interfaces could the TML provide that would allow for more interactive participation by its user base, which must of necessity be broader than a small coterie of medieval and Renaissance specialists with an interest in Latin music theory? One suggestion might be to develop a standardized model for the addition of new TML content that would allow scholars working on new editions and translations to easily contribute their work to the TML project, while still retaining ownership of their own scholarly content (and allow them to publish this content on their personal websites, for example, or to store their “TML publications” within their own institutional repositories). Another possibility could be the development of case studies and tools for using the TML in the classroom. How could, for example, music history students engage more directly with the words of Anonymous 4 on the history of music at Notre-Dame cathedral? How might the discussions of interval species in the treatises of Boethius, Hucbald, and Guido be incorporated into introductory music theory classes? Can we teach our students to sing thirteenth-century motets from the original notation using Franco of Cologne’s treatise to explain the basic rules? What would be especially useful in a teaching context is a tool to link and display passages from the TML alongside English translations of the passages in question. Such uses of the TML would be possible if the TML incorporated protocols to allow its content (individual texts, specific passages, music examples, and queries)

35. “Research,” Perseus Digital Library, <http://www.perseus.tufts.edu/hopper/research>.

36. Home page, The Perseids Project, <https://www.perseids.org/>.

to be directly referenced and interoperable within online teaching tools and other web-based applications.<sup>37</sup>

Technologies of digitization are developing at a rapid pace, and may soon not require human transcribers. Several projects currently under development use a combination of computer vision and computer-based deep learning to recognize the paleographic features of a whole range of handwritten documents from ancient languages copied on papyrus to modern-day scripts: two key projects are Transkribus at the University of Innsbruck and eScripta at Université Paris Sciences et Lettres (PSL).<sup>38</sup> When entire handwritten manuscripts and collections can be read with a high level of accuracy by computers, research questions will emerge from that data that we have not yet thought of asking. Yet the TML project team's careful and methodical thinking-through of the issues—browsing, searching, cataloging, encoding, cross-referencing—related to creating a digital archive of Latin music theory has laid the crucial groundwork for the way these music writings will be read and understood by future generations. I am in awe of what the team has achieved to date. The TML has had a huge impact on my own scholarship and on the field of musicology in general. These concluding thoughts are not intended in any way as a criticism of the TML or of its developmental priorities to date. No doubt the forward-thinking TML project team has already considered several of these ideas; many of its current users, myself included, look forward to playing a more active role in its growth over the coming years.

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The Global Jukebox has a venerable history and significant aims. Its central principle is what founder Alan Lomax named “cultural equity,” “the right of

37. For citing specific passages in digital texts, see, for example, the Canonical Text Services (CTS) specification, developed as part of the architecture for the Homer Multitext project (“As many Homers as you please”), <http://www.homermultitext.org/>. For encoded music, Raffaele Vigiante's Enhancing Music Notation Addressability (EMA) project creates a system for citing specific passages within a music document in a digital environment, so that passages of notation can be found and retrieved by other applications: “Enhancing Music Notation Addressability,” Maryland Institute for Technology in the Humanities website, <https://mith.umd.edu/research/enhancing-music-notation-addressability/>.

38. Transkribus, <https://transkribus.eu/Transkribus/>; eScripta: Digital Tools and Techniques for the Study of Ancient Writing, <https://escripta.hypotheses.org/>.