

# Electronic Corpus of Lute Music



## ECOLM III

Opening historical music resources to  
the world's on-line researchers

# ECOLM

## *Electronic Corpus of Lute Music*

- 1999-2001 *ECOLM (I)* King's College, London  
Laurence Dreyfus (Music) AHRC Research grant
- 2002-2006 *ECOLM II* City University  
Geraint Wiggins (Computing) AHRC Resource Enhancement Scheme
- 2012 *ECOLM III* Goldsmiths, Univ of London  
Tim Crawford (Computing) AHRC Follow-On Funding

# European Lute Music

- Large and important repertory
- Represents over 300 years of music history (roughly 1480-1800)
- Possibly amounts to some 50,000 different pieces in total
- Generally little understood because of its idiosyncratic notation

# ECOLM Motivations

- Make available a large inaccessible repertory little understood by musicians in general
- Allow comparison between lute music and musical repertory in standard notation
- Enhance awareness of historical significance of lute music
- Investigate computer techniques for partially-structured musical data

# www.ecolm.org

The screenshot shows a web browser window with the address bar displaying 'http://www.ecolm.org/'. The page header includes the Goldsmiths University of London logo and the 'ECOLM' title. A left sidebar contains navigation links: Sources, Pieces, People, Clusters, Queries (with sub-links for Simple, Multiple Field, and Query Builder), Log In, Go to Project Page, and Go to ISMS site. The main content area is titled 'Query builder' and contains instructions on using tabcodes and a filter. Below the instructions are two buttons: 'next' and 'refine search'. A table displays search results with 9 items, each showing a tabcode, a description, and a collection reference.

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## ECOLM

**Query builder**

Display a list of pieces containing tabcode like %h1e2%

Number of matching pieces in database: 33

To undo a filter, you will need to use the "back" button on your browser

Displaying items 1 to 25

[next](#) [refine search](#)

1	<a href="#">Recercar decimo. (tab)</a>	in <a href="#">IOAN MARIA INTABOLATURA DE LAUTO DI RECERCARI CANZON FRANCESE [...] M. D. XXXXVI.</a>	
2	<a href="#">Canzon. (tab)</a>	in <a href="#">Testudo Gallo-Germanica: HOC EST: NOVAE ET NUNQUAM ANTEHAC EDITAE [...] Germanis, aliisq</a>	[B-Br Fétis 2.908 C (RP) (Magasin Réserve précieuse : Niv. -2)]
3	<a href="#">Canzonet. 4. Voc. (tab)</a>	in <a href="#">Testudo Gallo-Germanica: HOC EST: NOVAE ET NUNQUAM ANTEHAC EDITAE [...] Germanis, aliisq</a>	[B-Br Fétis 2.908 C (RP) (Magasin Réserve précieuse : Niv. -2)]
4	<a href="#">Cantio Germanica. (tab)</a>	in <a href="#">Testudo Gallo-Germanica: HOC EST: NOVAE ET NUNQUAM ANTEHAC EDITAE [...] Germanis, aliisq</a>	[B-Br Fétis 2.908 C (RP) (Magasin Réserve précieuse : Niv. -2)]
5	<a href="#">Pavana prima. (tab)</a>	in <a href="#">Testudo Gallo-Germanica: HOC EST: NOVAE ET NUNQUAM ANTEHAC EDITAE [...] Germanis, aliisq</a>	[B-Br Fétis 2.908 C (RP) (Magasin Réserve précieuse : Niv. -2)]
6	<a href="#">Pavana secunda (tab)</a>	in <a href="#">Testudo Gallo-Germanica: HOC EST: NOVAE ET NUNQUAM ANTEHAC EDITAE [...] Germanis, aliisq</a>	[B-Br Fétis 2.908 C (RP) (Magasin Réserve précieuse : Niv. -2)]
7	<a href="#">Pavana tertia. (tab)</a>	in <a href="#">Testudo Gallo-Germanica: HOC EST: NOVAE ET NUNQUAM ANTEHAC EDITAE [...] Germanis, aliisq</a>	[B-Br Fétis 2.908 C (RP) (Magasin Réserve précieuse : Niv. -2)]
8	<a href="#">Passomezi in G sol re ut b. dur. debebat esse variatio prima, sed est secunda. (tab)</a>	in <a href="#">Testudo Gallo-Germanica: HOC EST: NOVAE ET NUNQUAM ANTEHAC EDITAE [...] Germanis, aliisq</a>	[B-Br Fétis 2.908 C (RP) (Magasin Réserve précieuse : Niv. -2)]
9	<a href="#">Variatio 1. (tab)</a>	in <a href="#">Testudo Gallo-Germanica: HOC EST: NOVAE ET NUNQUAM ANTEHAC EDITAE [...] Germanis, aliisq</a>	[B-Br Fétis 2.908 C (RP) (Magasin Réserve précieuse : Niv. -2)]


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## ECOLM

- Sources
- Pieces
  - Main
  - Bibliography
- People
- Clusters
- Queries
- Log In
- Go to Project Page
- Go to ISMS site



The image displays a handwritten musical score for two pieces, 'Recercar nono' and 'Recercar decimo'. The notation is complex, featuring multiple staves with various rhythmic values (e.g., 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000).

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### 10. Recercar decimo

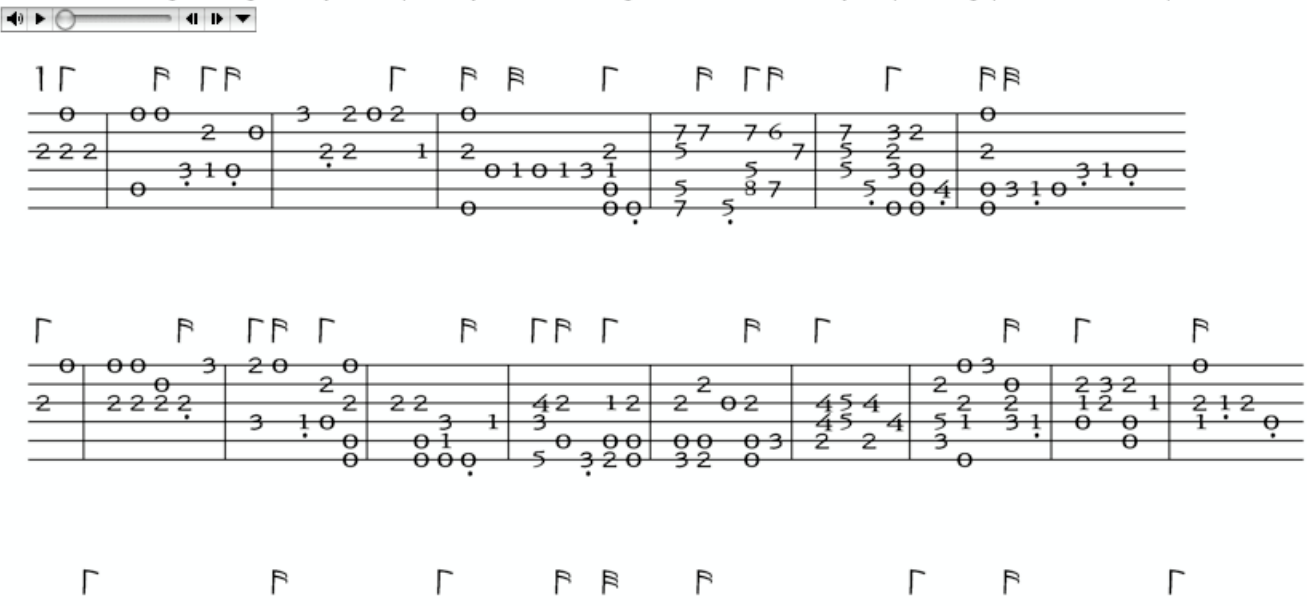
in [IOAN MARIA INTABOLATURA DE LAUTO DI RECERCARI CANZON FRANCESE \[...\] M. D. XXXXVI.](#)

**Start:** Gathering: B3r System: 4 [View Image](#)

**Continuation:** Gathering: B3v [View Image](#)

**Finish:** Gathering: B4r [View Image](#)

[Encoding submitted on 20th April, 2007.](#) This encoding has only received a limited amount of editing and is considered draft quality (level: Draft).  
Tablature rendering is being actively developed may show minor bugs from time to time. If you spot a bug, please let a developer know..



# Early Music Online

JISC Rapid Digitisation project (3 months)

PI: Stephen Rose (RHUL)

Partners:

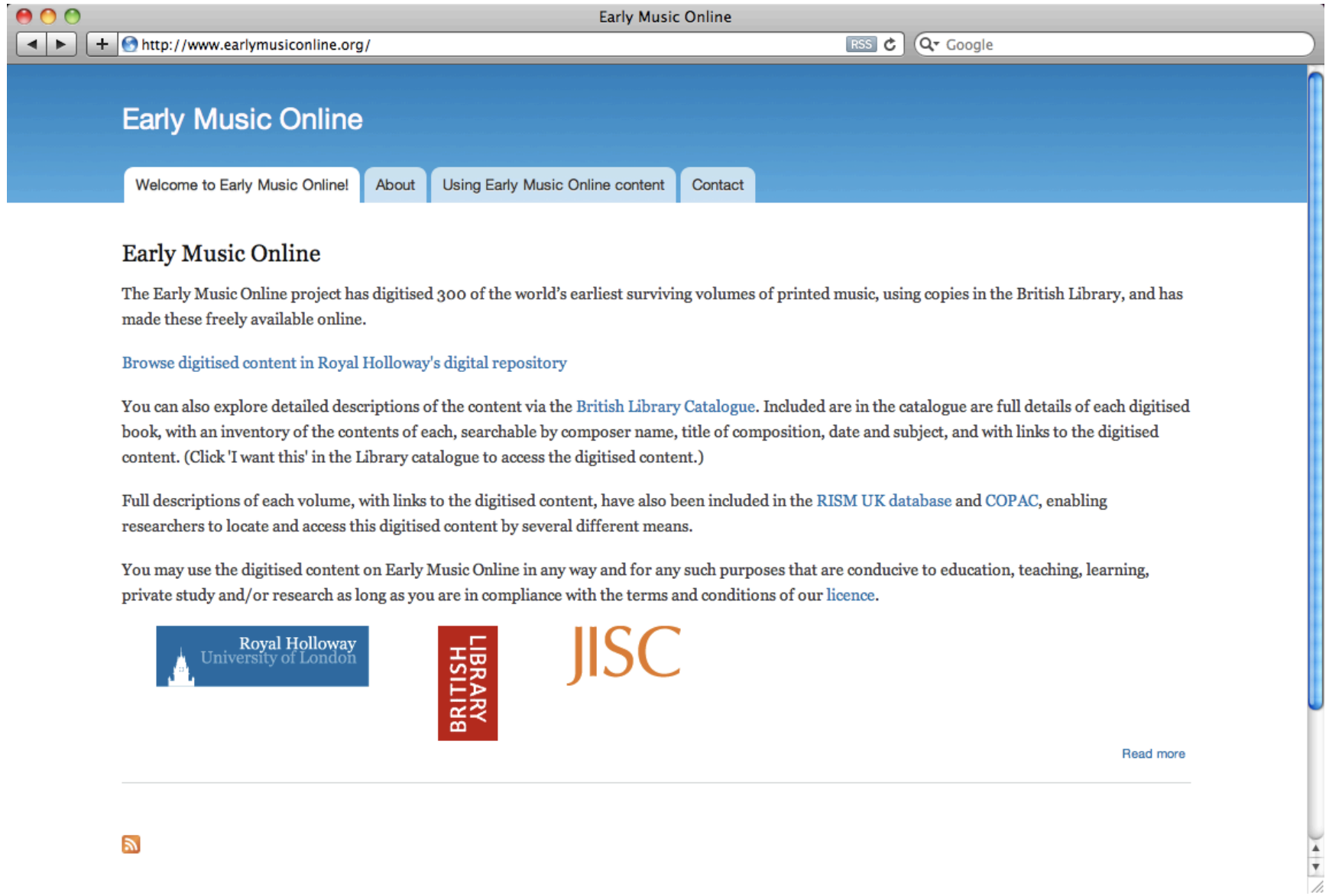
- British Library
- Royal Holloway, University of London
- RISM-UK

300 books of music printed before 1600

Will expand (one day) to include all 2,000 such books owned by the BL



# www.earlymusiconline.org



# A few figures

EMO: 300 books of music printed before 1600 including 27 lute books and 4 keyboard tablature books

- Approximately 9771 separate musical items
- 8863 unique titles (including spelling variants)
- 1667 unique composer attributions

After authority control (by heroic BL cataloguers):

- 971 unique personal names (incl. owners, etc.)

**NB No way to do authority control for work titles!**

# Adrian Willaert

<i>Adr. Vuillart</i>	<i>Adrian Willart</i>	<i>Adrianus Williard</i>
<i>Adri. Vuillart</i>	<i>Adriano</i>	<i>Adrien vvillart</i>
<i>Adrian Villart.</i>	<i>Adriano Vuigliart</i>	<i>... etc.</i>
<i>Adrian. Vuillart</i>	<i>Adriano VVillaert</i>	
<i>Adrian vuillart</i>	<i>Adrianus</i>	
<i>Adrian. Vvillaert</i>	<i>Adrianus Vuillart</i>	
<i>Adrian. VVillart.</i>	<i>Adrianus VVillart</i>	
<i>[Adrian Willaert]</i>	<i>Adrianus Willart</i>	

# Titles vary a lot, too!

*Ahime che nel partir mi manca il core*

*Ahime dou'e 'l bel uiso*

*Ahime dou'el bel uiso*

*Ahime dov'è 'l bel viso*

*Ahime dov'e'l bel viso*

*Ahime pur s'avicina*

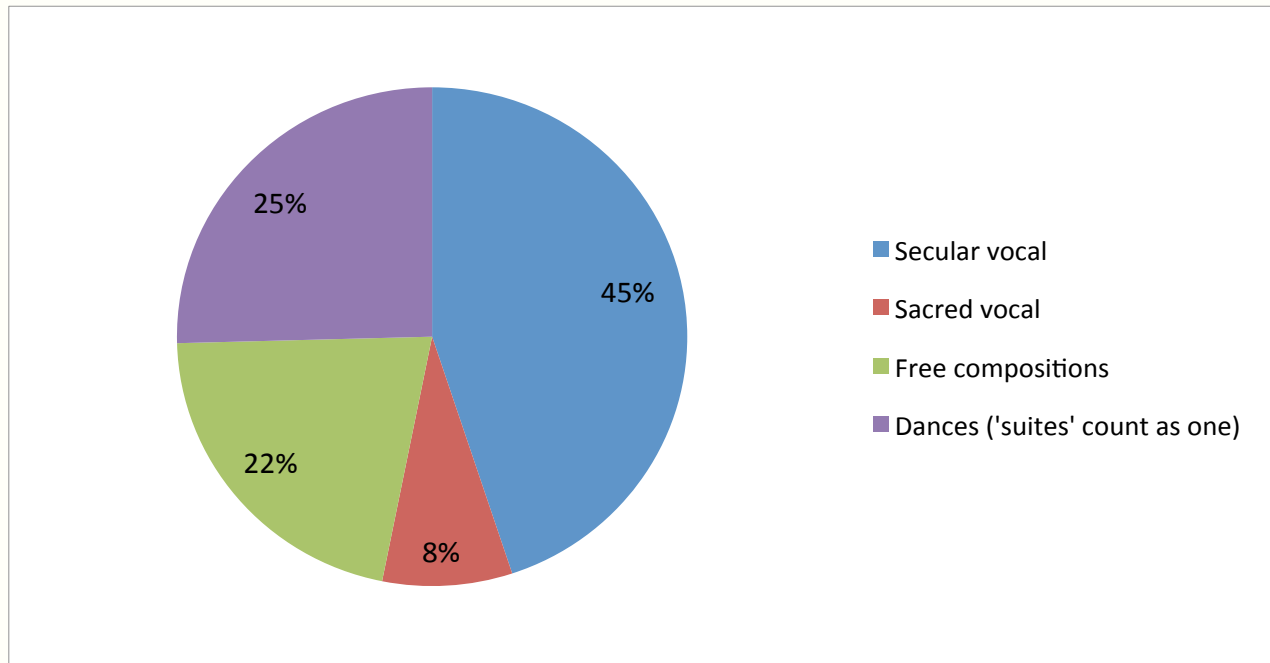
*Ahime tal fu d'Amore*

*Ahimè, dov'è 'l bel viso*

**But the music can be recognised automatically ...**

# EMO/ECOLM overlap

	Secular vocal	Sacred vocal	Free compositions	Dances ('suites' count as one)	Total (mostly from Brown)
<i>Totals</i>	486	89	232	275	1082



**About half the printed lute repertoire consists of arrangements of vocal music**

# EMO/ECOLM overlap

- There are approximately 363 tablature titles which also appear in EMO vocal sources
- How many concordances?
- To find out, we need to ...

# EMO/ECOLM overlap

- Convert book-level metadata (from BL catalogue records)
- Obtain piece-level metadata (for lute music) from Howard Mayer Brown, *Instrumental Music Printed before 1600* (Harvard, 1965)
- Ingest both sets into ECOLM database
- From title information, select sources most likely to contain lute/vocal concordances
- Test and compare the music for each case

# Automatic Encoding

- Use optical methods (OMR, OTR)
- Will never be 100% perfect
- Use experts to correct output
- Feed back what we learn from correction into the recognition mechanisms



# Two levels of Correction

## **OCR Recognition error-correction:**

*NB We aim here at a diplomatic reproduction of each source, including all errors, typos, etc.*

- Expert readers of lute tablature do correction
- One system (line) of tablature at a time
- Randomised 'double-entry' system selection
- Always keep a copy of uncorrected version for comparison
- Allows us to monitor recognition accuracy

# Two levels of Correction

## **‘Editorial’ correction:**

- Correct printing errors (changes are still recorded automatically)
  - a) for musical coherence
  - b) for performance
- Critical editions (using the error-correction and edition data to create editorial apparatus)

# ECOLM Database

- Finished complete pieces will be ingested into the ECOLM database
- Maintain links with the original images (by system/page/book)
- Establish potential cross-links with vocal models by metadata

# Presentation

The present ECOLM system can do:

- Page display/printing
- MIDI playback
- Save as PDF, MIDI file, etc.
- Limited transcription into standard notation

***All of these can be improved!***

# What we will soon be able to do

## Search & Discovery

- Content-based search and analysis
- Lute/vocal-model matching (at piece and phrase levels)
- Search in and from audio collections

***We have done tests establishing that all of these are possible, but there is more work to be done!***

# [www.ecolm.org](http://www.ecolm.org)



Arts & Humanities  
Research Council



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