
Fretting with the Computer: Designing a Markup Strategy for Digital Critical Editions of Lute Tablatures

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Introduction

- themes of the talk
 - specific: creating an encoding language for digital critical editions of lute tablatures
 - generic: digital critical editions from an information system perspective
 - information content rather than presentation
 - subtext: how can we integrate results from 'computational' into 'mainstream' musicology
 - outline
 - motivation
 - state of the art
 - the critical edition
 - towards some solutions
 - conclusions
 - acknowledgements
 - preliminary work at CCARH, Stanford, 2003
 - EPSRC grant GR/T19308/01 (Visiting Fellowship to Goldsmiths, 2005-6)
 - input from Perry Roland, Lou Burnard, James Cummings
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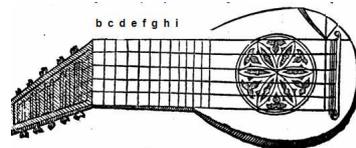
Motivation: the ECOLM project



- ECOLM: Electronic Corpus of Lute Music (www.ecolm.org)
- principal goal: to store and make accessible to scholars, players and others, full-text encodings of sources of music for the Western-European lute..., together with graphical images from manuscripts and printed music, such codicological and paleographical detail as is helpful to the potential users, and bibliographical data...
- current situation:
 - works instances are encoded (in TabCode)
 - encodings can be displayed as graphics and played back
- advantages:
 - encodings can be manipulated
 - the musical content can be searched (in principle)

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French tablature (Lachrimae Pavan, BL Add. 31392)



automatic transcription, chordal



manual transcription, contrapuntal

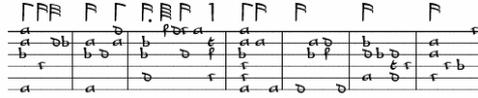


tablature = playing instruction

- lines: courses
- letters: frets
- overall rhythm, no durations
- no concept of melodic line
- no pitch spelling

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TabCode: 1 to 1 mapping



Qa1a2b3a6 Ec4 Sd2 b2

| {bar 2}

Ea2b3a6 d3 Qd1a2

| {bar 3}

E.b2b3d5 Tf1 d1 Ec1d3 a1 He2f3c5

| {bar 4}

Qa1a2b3c4c5a6 Ea2 a6

| {bar 5}

Ed6 a2b3 d2f3 d6

| {bar 6}

Eb2d3a5 b3 d3e4d5 c4

| {bar 7}

Ea2a3c5 c4 b4 c1

- 'tabwords'
- rhythm
 - Q, E, S, etc
- fret
 - a, b, c, d, e, f, etc
- courses
 - 1, 2, 3, 4, 5, 6
- barline, comment, etc.
- full description on ECOLM website
- same encoding system can be used for Italian tablature (1 to 1 mapping)

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Issues in ECOLM

- tablature is a specialist notation: some sort of translation needed for non-specialists
 - partly solved by MIDI playback
 - translation to CMN consists of
 - 1 to 1 (n to 1): mapping to target symbols
 - 1 to n: inference of missing features (pitch spelling, voice leading)
- textcritical information cannot be encoded yet
 - provisions are needed to be able to record
 - editorial decisions and interventions
 - different versions of a work
- in a generic form, such problems occur in many other repertoires

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Static approach: virtual scores

- digital facsimiles
 - many projects, mostly library-oriented
 - virtual restoration: DIAMM
- online editions
 - online access to editions (image-oriented)
 - grassroots: Choral Public Domain Library
 - reproducing existing editions: Variations project (Indiana)
 - planned for Mozart, C.P.E. Bach
 - databases of encoded notation
 - purposes: (dis)play and/or analysis
 - (too) many encoding systems
 - grassroots: MIDI collections
 - derived from scholarly editions: MuseData (CCARH), Humdrum

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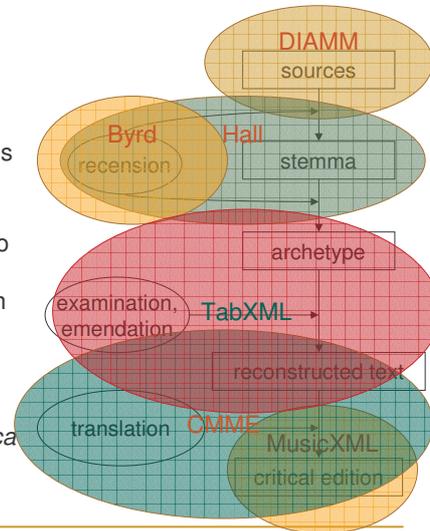
Towards a dynamic approach

- Dynamic approaches
 - (dis)play in different formats
 - ECOLM: code, tablature, MIDI
 - transcription
 - Corpus Mensurabilis Musicae Electronicum
 - encode mensural notation, display CMN, in different ways
 - source comparison
 - Thomas Hall: experiments with stemmatics (1975)
 - Byrd Edition (preliminary work: comparing electronic facsimiles)
 - Online Chopin Variorum Edition: facsimiles of variants, linked
- Examples represent different steps in the editorial process
- Is it possible to take the entire process into account?

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Critical edition: the process

- aim of critical edition: to establish a well-reasoned text of a musical work
 - traditionally, one that comes as closely as possible to the composer's finished text (Lachmann)
- important steps in the process:
 - *recension*: comparison of sources, to reconstruct the archetypal source(s)
 - *examination, emendation*: inspection and correction of the archetype
 - *translation*: creating a modern representation of the reconstructed text. In music, this may involve scoring, transcription to CMN, *musica ficta* etc.



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Limitations

- recension
 - developed for reconstruction of lost originals (genealogical approach)
 - less suitable for situations where authorial sources survive (genetic approach)
 - stemmatics not widely used in music
- emendation, translation
 - how to record grounds for decisions
 - only one, preferred view is easily available
- general
 - work concept: substitution of one editorial text for a multitude of sources presumes that they are indeed instances of the same conceptual entity, the work
 - paradox: critical edition is scholar's understanding of a work, itself expressed as a text
 - is the work the most important category?
 - performance is at least as important as text
 - flexible status of many 'works': adapted for new performance circumstances, etc.
 - reception history: works influenced others through specific instances (cantus firmus, parody, variation, intabulation)
- medium is the ultimate limitation: paper, static, graphics, 2 dimensions

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Computing science approach

- modelling the editorial process
- digital critical edition as an information system
 - database of source information
 - functionality for processing this information
- caution
 - modelling is a reductive process: separates meaningful from non-meaningful, and enforces logic of the model on reality
 - experience: source information is very hard to reduce to a stable model
 - experience of DARMS, SMDL and similar encoding systems
 - Text Encoding Initiative method and experience
 - suitable encoding system must be expressive and extensible, *and reason from the texts of the sources*
 - in principle, this is what TabCode does

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Modelling CMN: sample encoding systems

- DARMS
 - 'the most mature and complete digital representation of musical notation' (Selfridge-Field, 1998)
 - print-oriented, but also used for computer analysis of music
 - encodes only musically relevant aspects of notation
 - layout is automatically derived
- SMDL
 - encodes 'logical domain' of music information: the musical content itself
 - assumes this content is obvious
 - other domains can be linked to SMDL: visual (score), gestural (performance), analytical



```
!G !M4:4 -1W /
```

```
<strestem pointcnt="4">  
<note>4t 0 c</note>
```

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Sample encoding systems (2)



- MusicXML
 - interchange between music printing programs: specifies notation
 - hierarchical model of score
 - e.g. bar is a container for notes->shifting a barline is hard
 - support for textcritical features insofar as they are visible on the printed page

```
<measure number="1">
  <attributes>
    <time>
      <beats>4</beats>
      <beat-type>4</beat-type>
    </time>
    <clef>
      <sign>G</sign>
      <line>2</line>
    </clef>
  </attributes>
  <note>
    <pitch>
      <step>C</step>
      <octave>4</octave>
    </pitch>
    <duration>4</duration>
    <type>whole</type>
  </note>
</measure>
```

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Limitations of existing encoding systems

- examples:
 - DARMS
 - Standard Music Description Language (SMDL)
 - MusicXML
- generally, these encoding systems reason from the finished product
 - assume score (or even *the musical work*) is an undisputed entity
 - support *publication* (and analysis, interchange), not *preparation*
- suitable encoding system must be expressive and extensible, *and reason from the texts of the sources*
 - in principle, this is what TabCode does

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What gain might a digital critical edition offer?

- in principle, many things that cannot be done with printed paper
- integration of score and critical apparatus
 - verification, control at lowest level
- easy access to versions of a work
 - see [Mode 8 demo](#) (skip if necessary)
- multiple presentation modes
 - different presentation styles and notation systems
 - level of editorial addition
 - generation of audio
 - hyperlinking

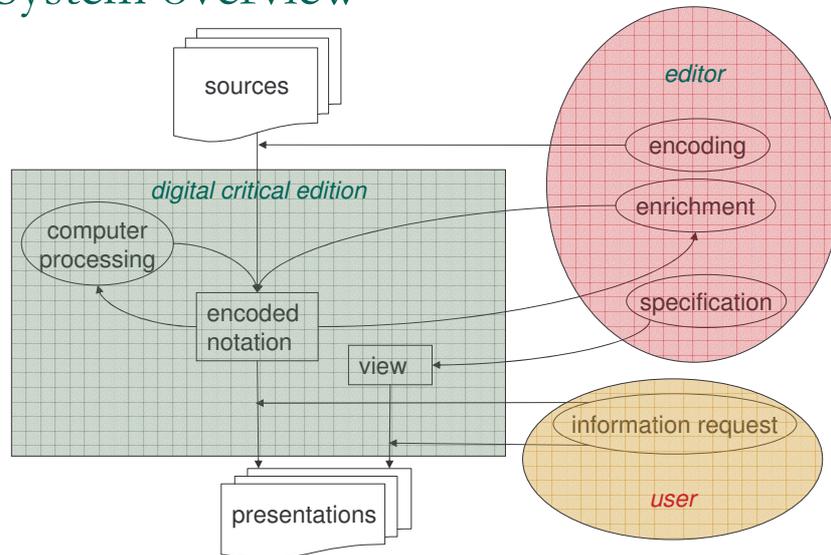
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More advantages

- access to the information content of the sources
 - computer-supported analysis
 - information retrieval
- editing as an ongoing process
 - collaborative editing of the source database
 - defining new views of the database
- economical considerations
 - cheap, easy production
 - cut out publisher
 - can use digital libraries infrastructure
- ideally, a digital critical edition
 - offers a better way of dealing with text-work paradox
 - moves from individual, static to collective, evolving understanding

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System overview



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Requirements

- principle
 - requirements and functionality are fundamental; techniques are secondary
 - common ICT error: present technique, use it to solve any problem
- rest of this talk: partial proof of concept
 - some specific requirements for source encoding
 - provisions for recording editorial interventions in lute tablatures
 - by means of some document analysis
 - example encodings will be skipped

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Example 1 (S.L. Weiss, London Ms.)

The image displays two systems of musical notation. The first system, measures 35-60, shows a correction of a scribe's error. The second system, measures 61-87, shows an uncorrected error. Below the score is a diagram showing the original and corrected notation, and a small piano accompaniment.

- autograph correction of another scribe's error
- an uncorrected error
- what to encode? authorial and editorial correction
- functionality: view source as it was before and after correction; generate apparatus

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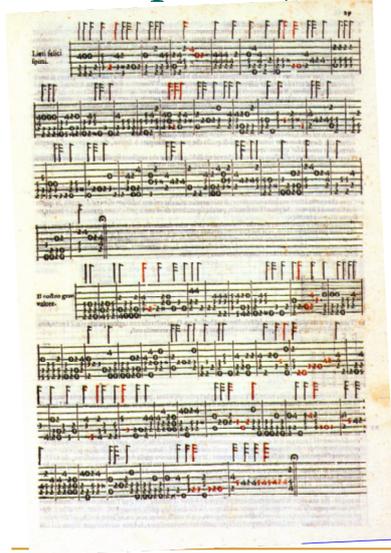
Example 2 (Cambridge UL, Ms Dd 2.11)

The image shows an open manuscript with two pages of musical notation. The pages are heavily damaged with water damage. Red letters A, B, and C are placed over different sections of the music to indicate specific areas of interest.

- partly illegible (water damage)
- 2 version of same piece:
 - ABC
 - AA'BB'CC'
- sections out of order, with intervening materials
- what to encode?
 - uncertain/ supplied information
 - alternative versions
- functionality
 - view editorial decisions
 - view different versions
 - show in document order?

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Example 3 (V. Galilei, Fronimo)



- red characters for ornamented version of same piece (1568)
- colour has disappeared in 1584 edition
- what to encode?
 - colour: its information content
 - differences with 1584 edition
- functionality
 - show each version separately
 - show compound result, in colour
 - show differences with 1584 edition

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Example 4 (Capirola Ms, 1517)



- decorations
- fingering
- colour used for rhythm signs
- what to encode?
 - fingering
 - colour--possibly; does it represent additional information?
 - decorations--context; digital facsimile
- functionality
 - view facsimile
 - digital edition with colours?

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What to encode-categories

- information content of the tablature 'text'
- problems in the source text: errors, missing or illegible information;
- variant readings: scribal corrections, improvements, or explications; versions of the work
- changes to conform to modern usage:
 - mapping: adaptation to modern notational conventions
 - inference: derivation of implicit content. Here: pitch spelling, note duration, voice leading
 - realisation of abbreviations
 - different changes needed for different tasks

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Creating an encoding system: TabXML

- principles
 - start from TabCode
 - integrate results of document analysis
 - modularity: keep TabCode and textcritical markup conceptually separate
 - enables reuse for other notations
- Solution: TabXML
 - TabCode + XML markup
- TEI (Text Encoding Initiative) contribution
 - XML vocabulary for encoding of textual sources
 - contains modules for textcritical editions and many other purposes
 - experiments show that few adaptations are needed (AHC paper, september 2005)
 - obvious advantage: interoperability with texts encoded in TEI markup, e.g. Thesaurus musicarum italicarum (www.euromusicology.org)
- testcase: encode V. Galilei's *Fronimo*

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Example (Fronimo)

(bars 2-4)

```
<app><rdg type="simple">E</rdg><rdg type="variation">S</rdg></app>f3f4d5
<add type="variation">c5</add>
<add type="variation">Q</add>e3d5
Ec3d5d6
Sc5
a5
Qc5 /
a3d5c6
E
Ec2d5c6
Qe3c5c6
f3f4d5 /
c3a5d6
e3e4c6
<app><rdg type="simple">H</rdg><rdg type="variation">E</rdg></app>c2f4d5
<add type="variation">e2 a3 c3</add> /
```



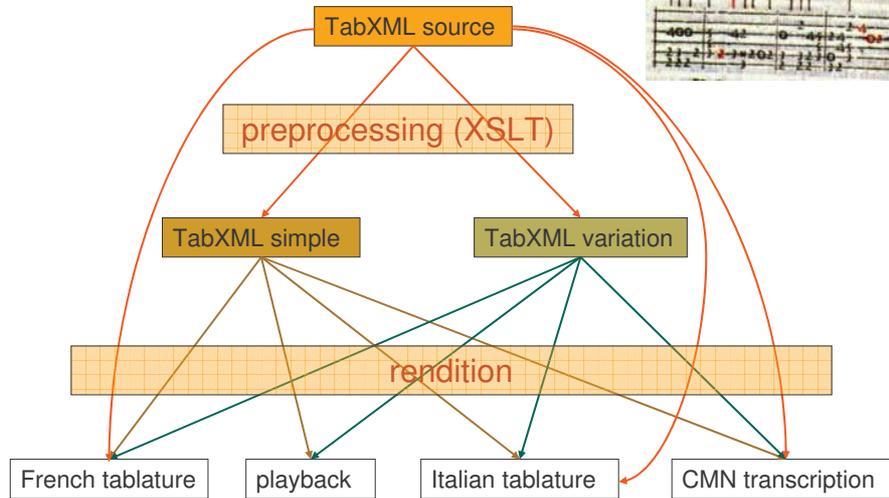
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Explanation

- NB: 'transliteration' to French tablature
 - rendering software displays as Italian
- XML construction 1
 - <add type="variation">Q</add>e3d5
 - new duration symbol added to tabword
- XML construction 2
 - <app><rdg type="simple">E</rdg><rdg type="variation">S</rdg></app>
 - alternative readings, each marked up as <rdg>, together wrapped in an <app> element
- Note that the information content of the colours is encoded, not the colour itself
 - again, rendering software can take care of this

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Processing TabXML



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Conclusion

- Digital critical edition
 - information system
 - database of sources
 - multiple views, no fixed presentation
- Advantages
 - economical
 - deals better with text-work problem
 - collective, dynamic understanding
 - accessibility
 - retrieval
- Application: TabXML
 - preliminary experiments
 - perspective for other notations
- Almost no debate (yet)
 - why???
 - very different in literary computing

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Points for discussion

- concept of digital critical edition
 - database of source information + functionality
 - other approaches?
- suitability
 - for different repertoires
 - for different notations
 - what would we gain/lose
- important requirements
- how to convince mainstream musicology?