Musicology Centred Design

CIRMMT Distinguished Lecture
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Abstract

I have spent most of my professional life in the vague but exciting interdisciplinary area between computing and music research known as computer applications in musicology, music information retrieval, music informatics and digital musicology (and various other terms). Developments since the late nineteen-eighties, when I became interested in the field, have been enormous. These were made possible not just by the very considerable efforts of large numbers of very devoted researchers, but also by contextual factors like the emergence of the world wide web; cheap, powerful and portable devices; the advent of social media and digitization of cultural heritage.

Despite this blossoming state of affairs, I have a number of worries that, taken together, seem to indicate that something radical needs to happen. Here are some:

1. a strong focus on development of new technologies on the one hand and a lack of uptake of these amongst the intended users on the other
2. glass ceilings everywhere: the performance of computational methods for many tasks remains lower than desirable despite continuous research efforts
3. a very serious lack of accessible high-quality data
4. an implicit but fairly insistent message to musicology that science knows how to do things better
5. an increasing disciplinary divide, affecting conference and publication infrastructure, social networks, communication and disciplinary values

There is a certain tradition of HCD in digital humanities, but in digital musicology only a handful of studies of user needs, workplace anthropology and adoption of technology seem to have been done so far. My claim is that, if we want digital musicology (in the widest sense) to stop being marginal to music research, we need to accomplish this not by creating more and more advanced technology, but by developing a notion of Musicology Centred Design. Starting from an understanding of musicological research, Musicology Centred Design will identify bottlenecks in the research process and guide the creation of suitable technology support to overcome these. Musicology Centred Design doesn't exist yet, but I will present an initial agenda for the creation of this urgently-needed approach to digital musicology.

As a first step, we can already learn a lot from studying some musicological subcommunities that habitually use technology, in areas such as folk song research, lute music research, source studies. It appears that technology needs not be particularly advanced (it can often be quite crude) as long as it serves the basic purpose, is flexible, and provides meaningful results.

This presentation

- structure
  - history of computing in musicology
  - some concerns
  - Musicology Centred Design
  - What Do Musicologists Do All Day?
- a lot of this is preliminary
- take home message?

Forbid creation of new technology for music research

Don’t create technology *for* musicologists, but *with* musicologists

Computational musicology

- term used since at least 1967 (Logemann)
- oldest known study: Bronson 1949 (folk song classification)

- historical development
  - prehistory (before 1960)
  - heroic (1960-1980)
  - crisis and recovery (1980-2000)
  - Internet and MIR (1995-present)
  - towards digital musicology (2005-present)

- just a few success stories and failures
  - elements for my critical assessment

The heroic phase (1960-1980)

- great ambitions
- near-perfect fit with musicological method and practice
  - focus on Western art music
  - music-notation based research
  - importance of source studies and editing
- approach to computing
  - formalisation, automatic processing
  - central role of music encoding

The heroic phase, quantitatively

- bibiliometric research by Miranda Lee Pao (1982)
- 941 items found
- peak of 97 authors in 1970

TABLE 2. AUTHOR PRODUCTIVITY.

No. of Authors	No. of Items	Author Names
1	40	Hiller (1972)
1	34	Mathews (1974)
1	21	Brook (1973)
1	16	Lincoln (1974)
1	14	Pierce (1969)
3	13	La Rue (1970) Risset (1974) Suchoff (1973)

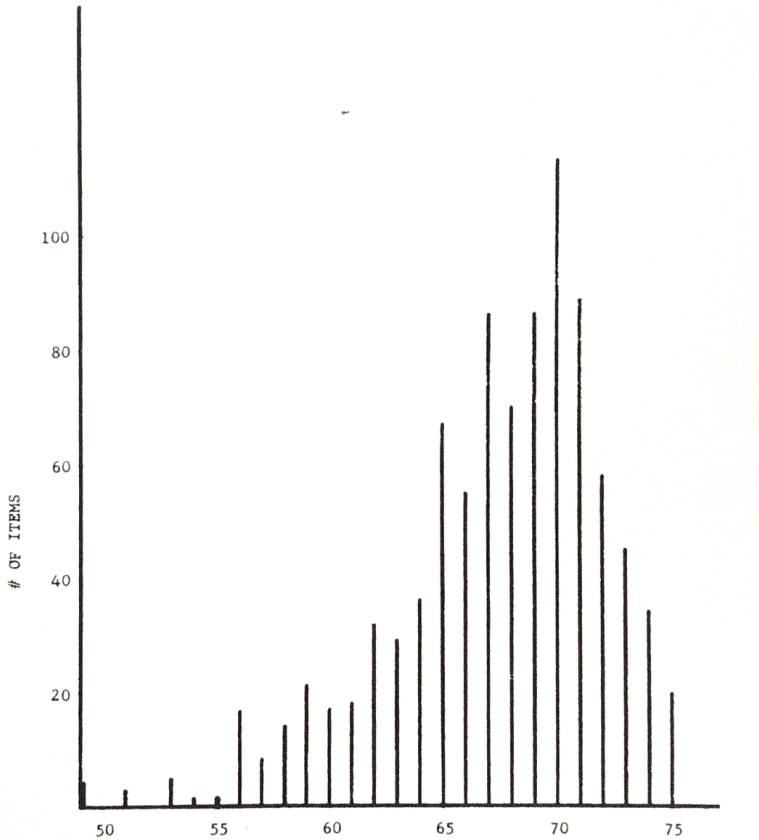
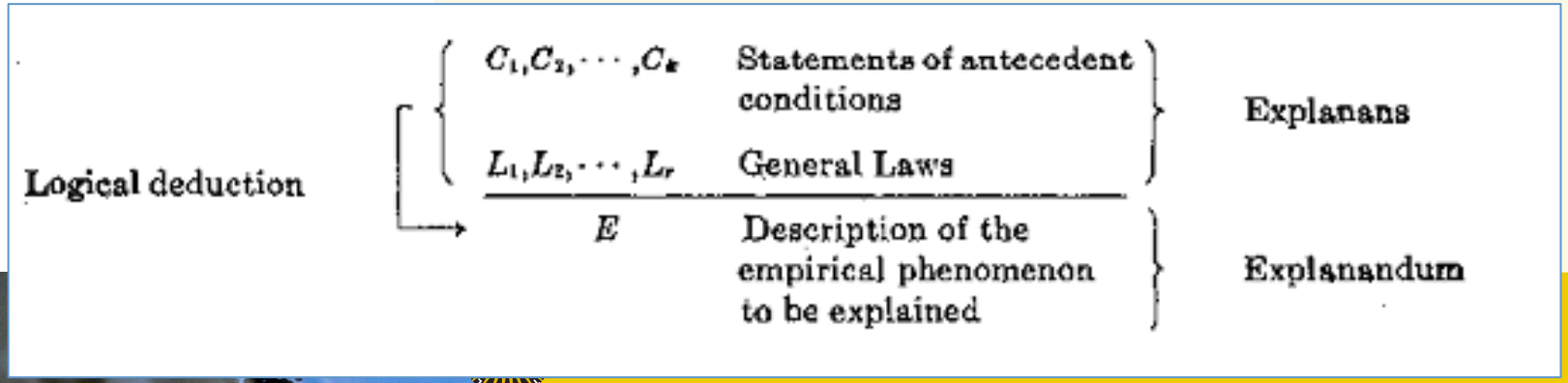


FIGURE 1. NUMBER OF ITEMS PUBLISHED: 1949-1975.

Arthur Mendel (1905-1979)

- the missing name in Pao's list
  - the most important of them all?
  - professor of music, Princeton U
  - editorial boards of Neue Bachausgabe and New Josquin Edition

- reflections on musicological method influenced by
  - revision of chronology of Bach's cantatas
  - the logical empiricism of Carl Hempel



Evidence and Explanation

- keynote at IMS 1961 in New York
- considered the positivist programme for musicology

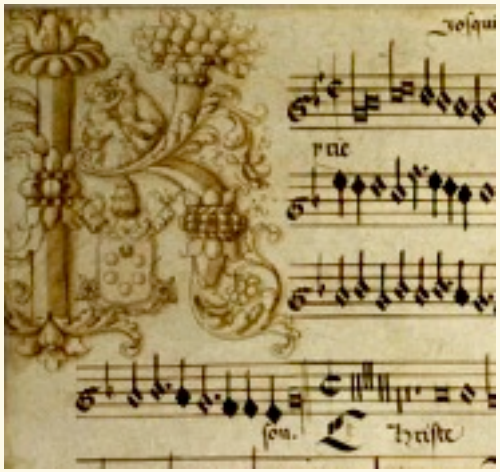
the nature of historical inquiry is scientific (p. 13)

Nothing I have read in any of the attempts to prove the "historian's judgment" exempt from analysis by deductive reasoning seems to me any more successful than such attempts would be on behalf of the physician's art of diagnosis (p. 10)

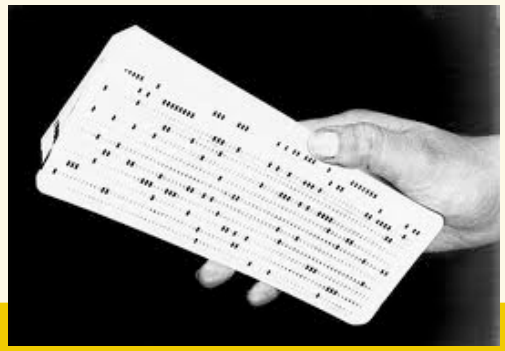
…the aesthetic relation to the musical work exists and is necessary to the music-historian… But… it is certainly not sufficient for explanation (p. 16)

Princeton Josquin Project

- Josquin Desprez (c. 1450-1521) was first composer to be subjected to large-scale computational research
  - maybe part of a (successful) attempt to turn him into a Renaissance genius



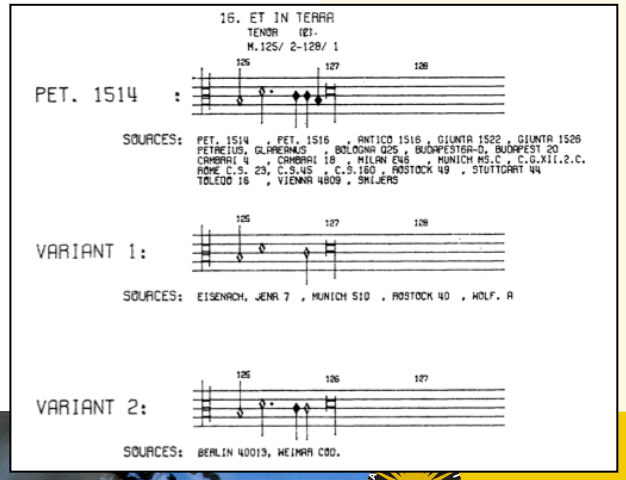
- directed by Arthur Mendel and Lewis Lockwood
- most technical work probably by Michael Kassler
  - punch cards, IML (or Fast Code)
- all (?) works encoded in 1960s-70s

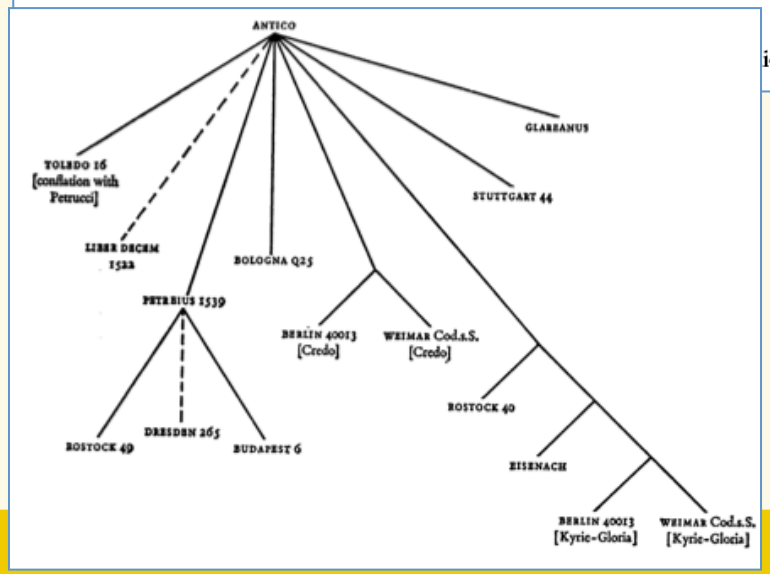


Some ambitions

- composer attribution (Mendel 1969)
- computational analysis of counterpoint (Patrick 1974)
- stemmatics (Hall 1975)
- provide computational infrastructure for New Josquin Edition

MOVEMENT	A:3&6 &4&5	B:TRIADS & INVERSIONS	A/B
Kyrie 1	13	68	0.19
Christe	17	70	0.24
Kyrie 2	12	61	0.20
KYRIE	15	67	0.22
Gloria	24	56	0.43
Qui tollis	14	61	0.23
GLORIA	19	56	0.34
Credo	16	59	0.27
Et incarnatus	14	79	0.18
Et in spiritum	8	75	0.11
Confiteor	25	45	0.55
CREDO	15	66	0.23
Sanctus	31	49	0.63
Hosanna	14	60	0.23
SANCTUS	24	54	0.44
Agnus Dei 1	21	60	0.35
Agnus Dei 3	10	60	0.17
AGNUS DEI	11	60	0.18
MISSA L'H. A.	15	62	0.24





The end…

- personal matters
  - Kassler 'in goverment service' already in 1969
  - Arthur Mendel died in 1979
  - Lewis Lockwood left Princeton in 1980

- technical matters
  - already in the late 1960s, there were migration issues
  - hardware platform became obsolete around 1980
  - most encodings have disappeared
    - punch cards allegedly still used for other purposes in 1990s

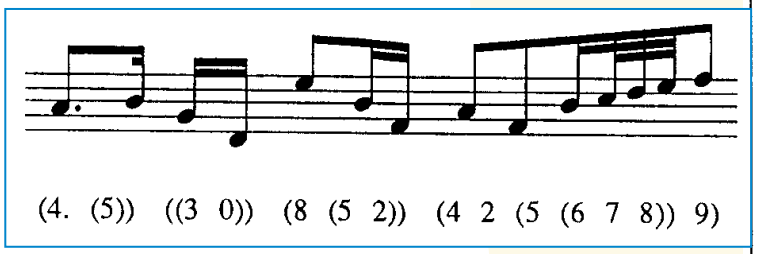
- computer-supported New Josquin Edition never happened

DARMS project (1964-after 1976)

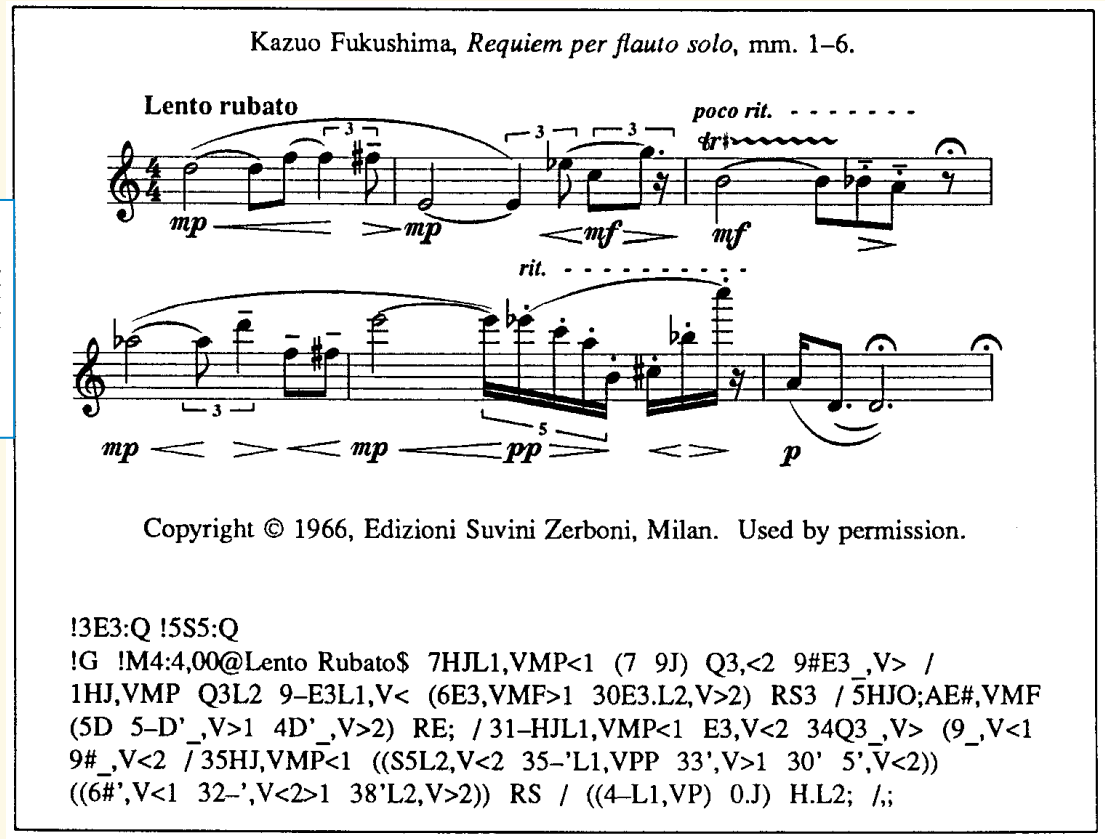
- Digital Alternate Representation of Musical Scores
- encoding system created by
  - Stefan Bauer-Mengelberg: mathematician, conductor
  - Melvin Ferentz: ?computer scientist, CUNY
  - (later) Raymond Erickson: music, CUNY
- ambitions
  - completeness (Erickson 1976)
  - formalisation
  - universality
- applications
  - high-quality music printing
  - music analysis

DARMS code

- designed for musically untrained data typists



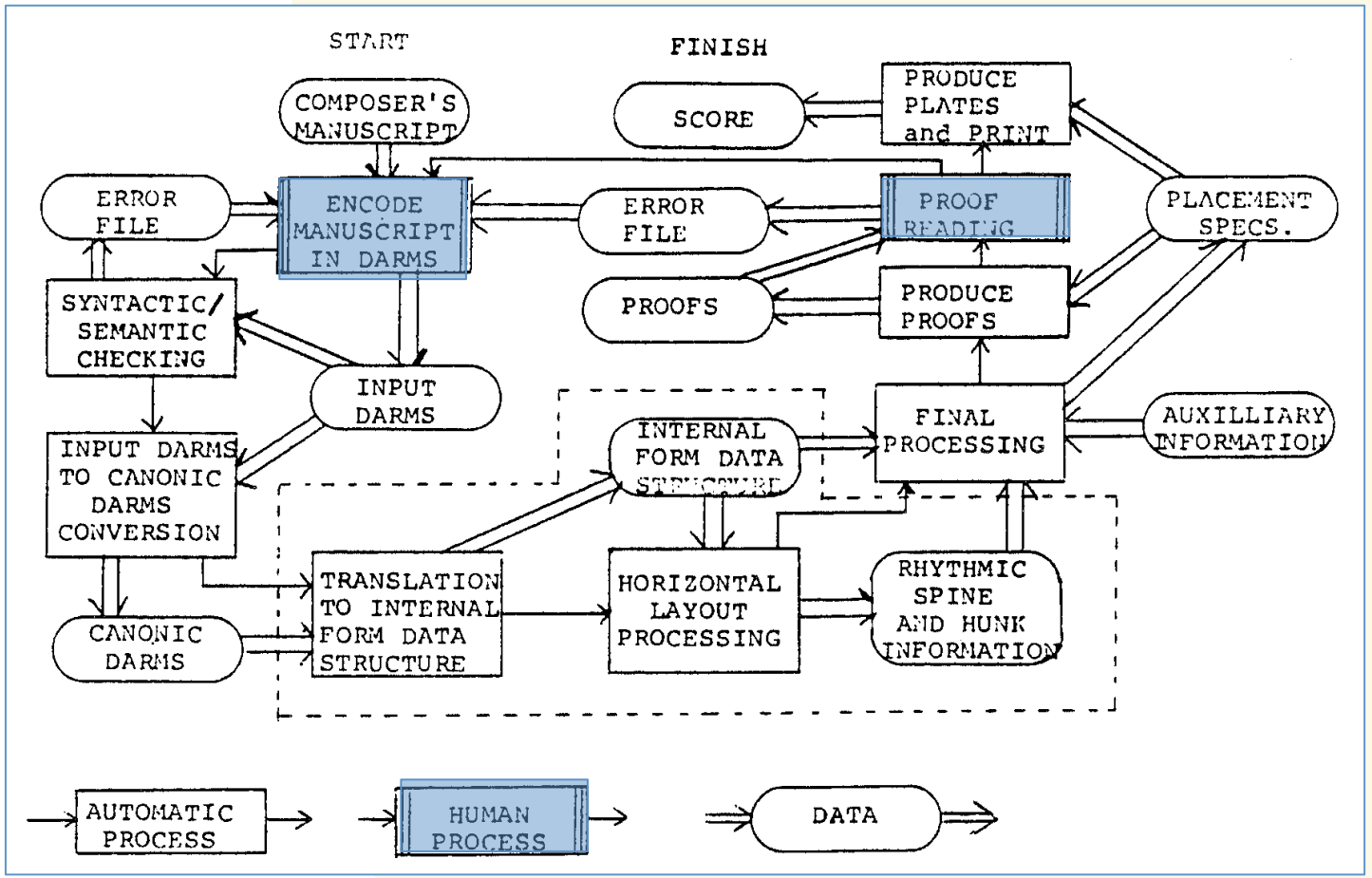
- simple codes are really simple




```
!3E3:Q !5S5:Q
!G !M4:4,00@Lento Rubato$ 7HJL1,VMP<1 (7 9J) Q3,<2 9#E3_,V> /
1HJ,VMP Q3L2 9–E3L1,V< (6E3,VMF>1 30E3.L2,V>2) RS3 / 5HJO;AE#,VMF
(5D 5–D'_,V>1 4D'_,V>2) RE; / 31–HJL1,VMP<1 E3,V<2 34Q3_,V> (9_,V<1
9#_,V<2 / 35HJ,VMP<1 ((S5L2,V<2 35–'L1,VPP 33',V>1 30' 5',V<2))
((6#',V<1 32–',V<2>1 38'L2,V>2)) RS / ((4–L1,VP) 0.J) H.L2; /,;
```

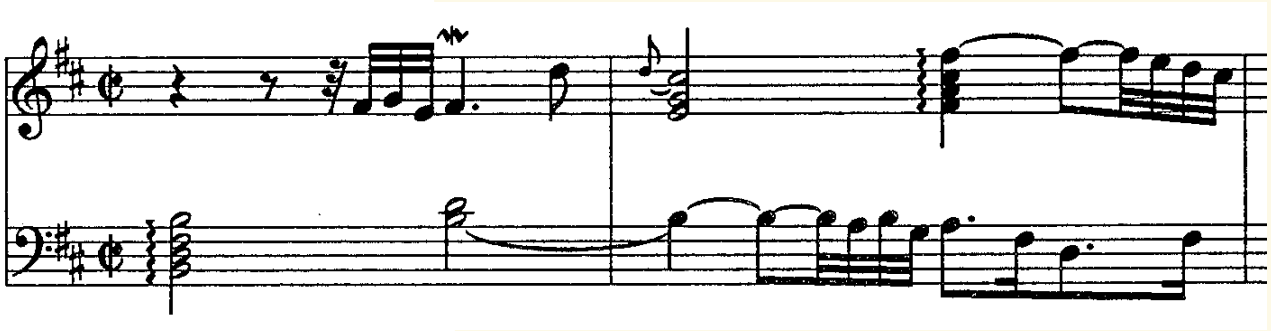
- but codes can become very complex

DARMS: printing system

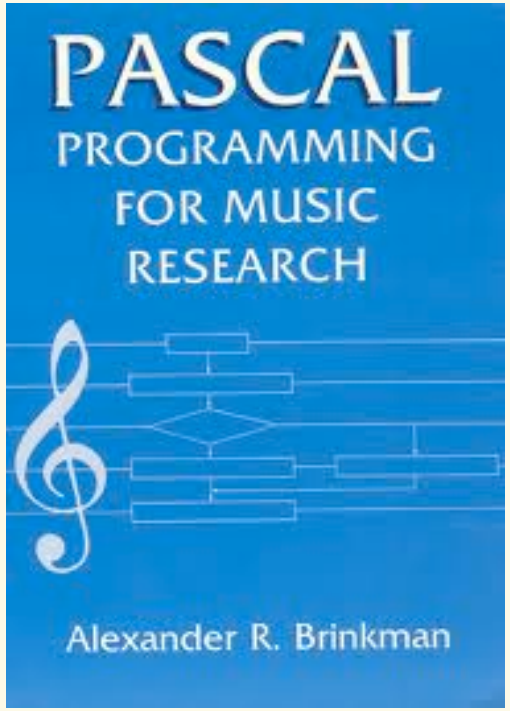


Fadeout

- code never finished
- envisioned complete systems not realized



- music printing based on DARMS dialect
  - The Note Processor (Stephen Dydo, mid-1980s)
- musicological applications
  - indexing 16th c. madrigal and motet prints (Lincoln 1988, 1993)
  - Pascal programs by Brinkman (1990)
    - powerful internal representation
    - still mainframe oriented



The heroic legacy

- many, many projects met a similar fate
- in terms of data and software, nearly everything has disappeared
- what has remained
  - 'algorithmic' ethos of computational musicology
  - numerous encoding systems

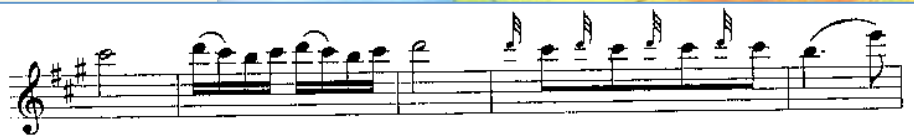
- some lessons from this period
  - vulnerability of technology
  - danger of being over-ambitious
  - human circumstances

But did all technology disappear?

- Plaine and Easie Code
  - created for encoding music using a typewriter (!) in early 1960s (Brook & Gould 1964)
- extremely crappy

- secret: part of a useful and acceptable application scenario, source cataloguing
  - RISM A/II series

- here's a lesson too!



```
112A    1.1.1
112B    pf.
112C    G-2
112D    xFCG
112E    2/4
112F    '''2C/!{y6DCz''B'''C}!f/2D/q3D{8Cq3D8Cq3D8Cq3D8C}/y'
        '4.B'''8Ez/
```

But did all technology disappear?

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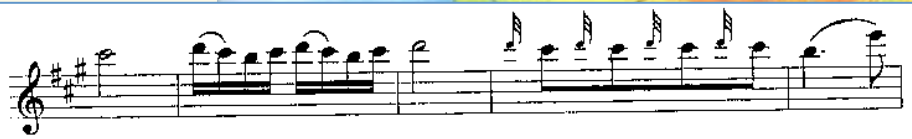
- extremel
- secret: part of a u al an
  acceptable application scenario,
  source cataloguing
  - RISM A/II series
- here's a lesson too!

create stuff that
people want to use



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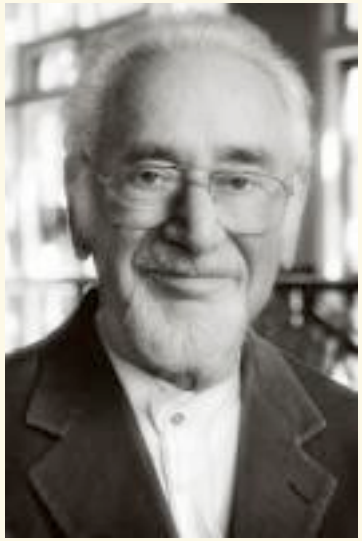
          '4.B'''8Ez/
```

Crisis and recovery (1980-2000)

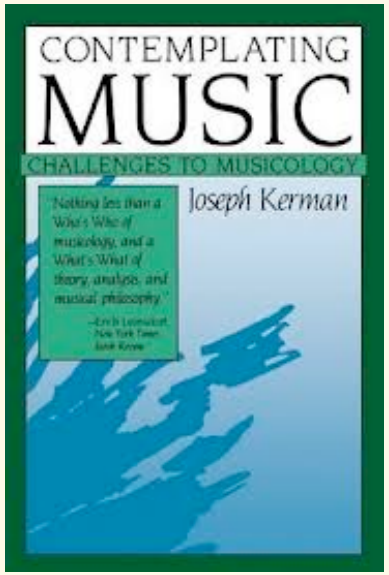
- distinctive dip in early 1980s
- less sure about the decline after 1992

Changes in musicology

- Joseph Kerman, *Contemplating music: Challenges to musicology* (1985)
  - criticises musicological 'positivism'
  - central role for music criticism and aesthetic appreciation
- Kerman about Arthur Mendel



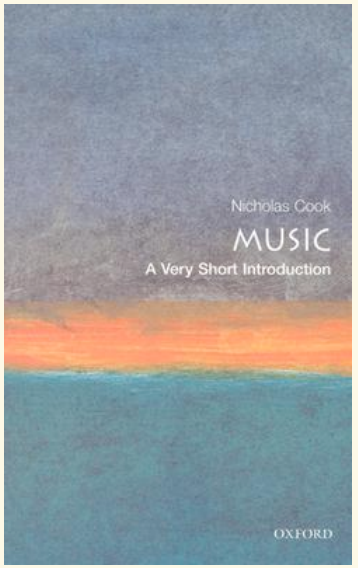
> The unhealthy influence of this doctrine, which puts quasi-scientific methodology first and assumes a methodological continuum in the treatment of all kinds of low- and high-level phenomena, can well be imagined (p. 58)



Musicology after Kerman

- new musicology / critical musicology / cultural musicology

- just a few important aspects
  - musical work not considered as autonomous object
  - criticism of underlying ideologies
  - centrality of musical meaning and subjectivity

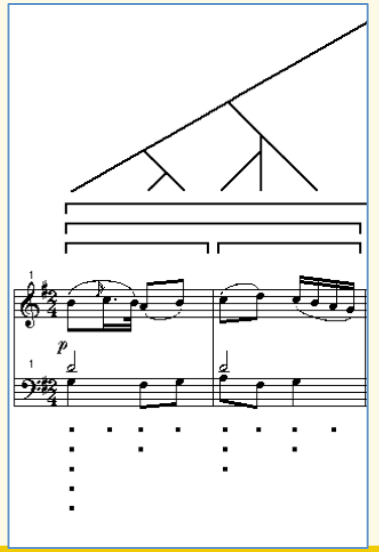


- it all happened for understandable reasons
  - see Nicholas Cook. *Music: A very short introduction* (2000)
- bad news for computational musicology

Analytical innovations in CM

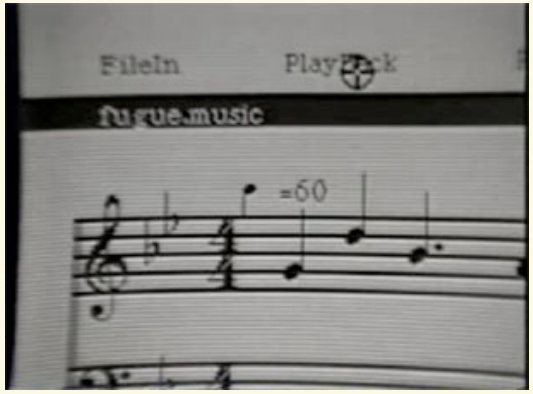
- Humdrum toolkit, created by David Huron
  - first music-analytical toolkit for end-users
  - simple tools, pipelined for complex tasks
  - still widely (?) used

- Study of musical grammars
  - influence from linguistics, Chomsky in particular
  - seminal text: Lerdahl and Jackendoff, *Generative Theory of Tonal Music (1983)*
  - grammars of melody, harmony
  - fundamental reorientation: puts human competence in the centre of attention

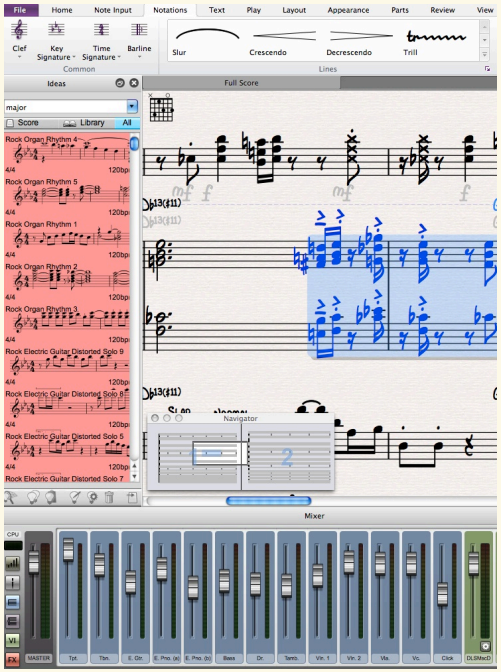


Consumer music software

- first interactive music printing prototype: Mockingbird (Maxwell & Ornstein 1984)
  - https://www.youtube.com/watch?v=_Xu3r5lZds0
- many music printing programs emerged
  - primitive interoperability through MIDI
- little/no attention to musicological needs
  - great tradition of tweaks and workarounds in Finale and Sibelius



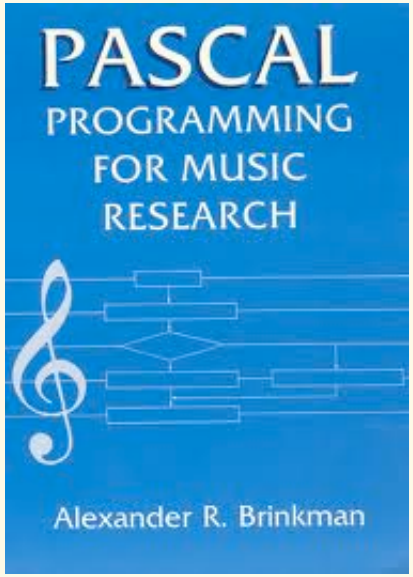
Mockingbird

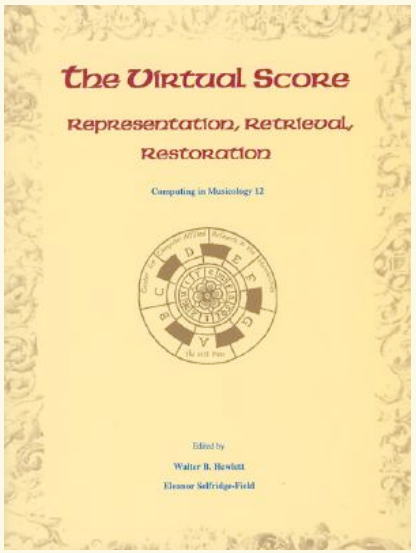


Conclusion: late 1990s

- partly recovered from crisis
  - contours of infrastructure emerging
  - tiny amounts of data and software
- adherence to algorithmic paradigm
  - interactive paradigm in music printing only

- separation from mainstream musicology
- emerging community (important role CCARH)
- anchoring the discipline elsewhere
  - music psychology: cognition and perception (e.g. Huron)
  - Music Information Retrieval



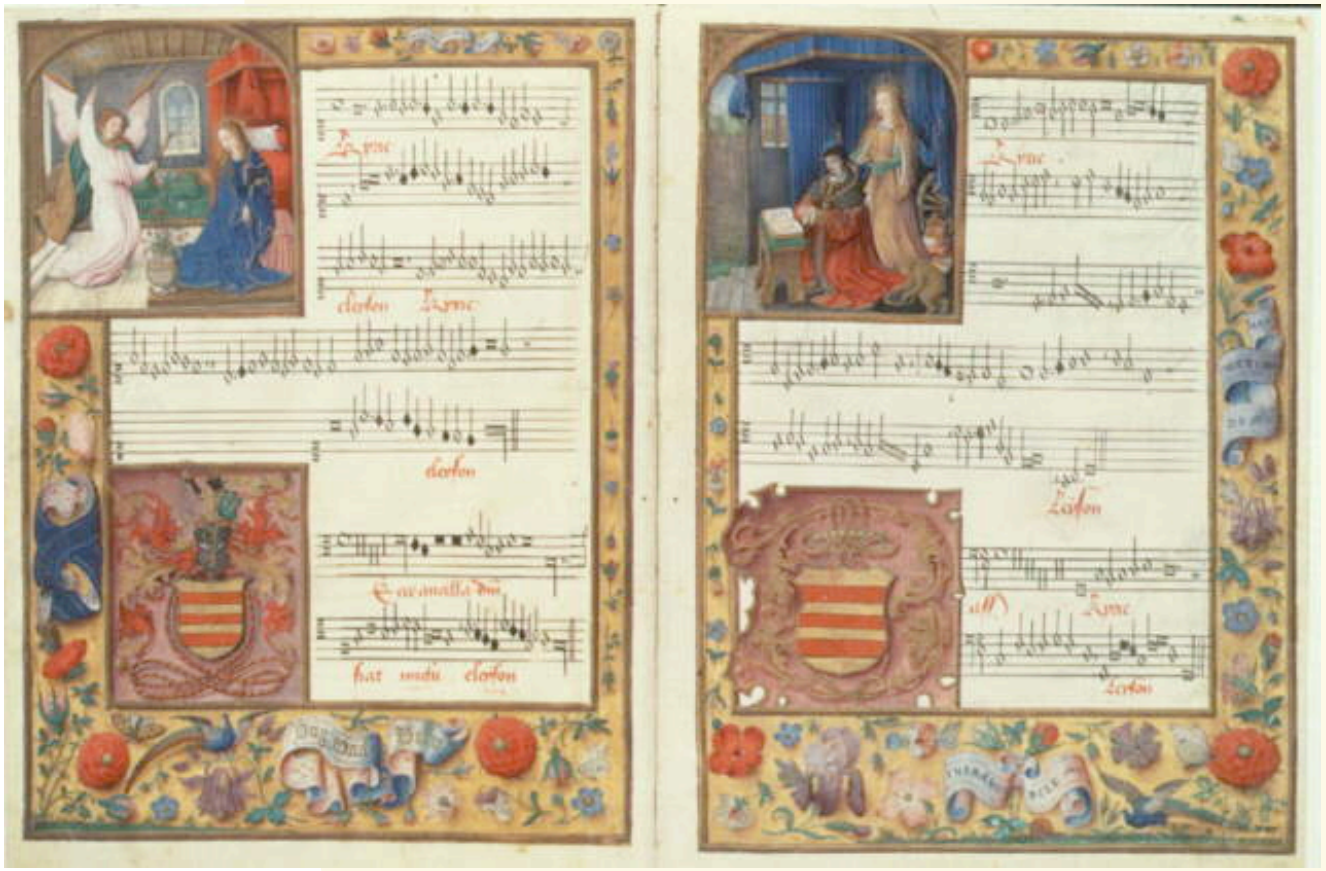


Corpus creation

- closed storage representations of commercial products

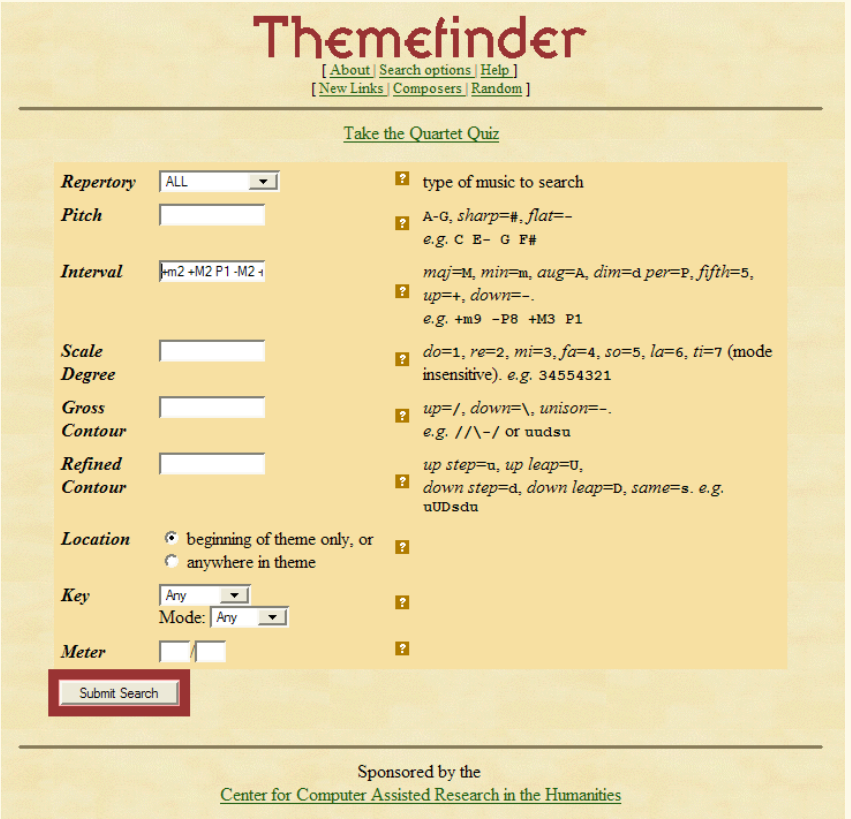
- creation of open research corpora
  - classical
    - MuseData (CCARH) c. 1000 works, high quality (http://www.musedata.org/)
  - folk song
    - ESAC data (Steinbeck, Schaffrath, Dahlig) c. 20.000 songs (http://www.esac-data.org/)
  - special forms of music notation
    - ECOLM (Crawford): lute tablatures (www.ecolm.org)
- often created together with dedicated software for editing, searching and/or analyis

Three WWW landmarks



Rome Reborn. Online exposition at Library of Congress, 1993
http://www.loc.gov/exhibits/vatican/index.html

Three WWW landmarks



MIDI data on the web
http://www.classicalarchives.com/

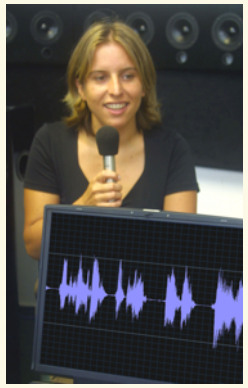
Music search engines
http://themefinder.org/

Internet and MIR (1995-)

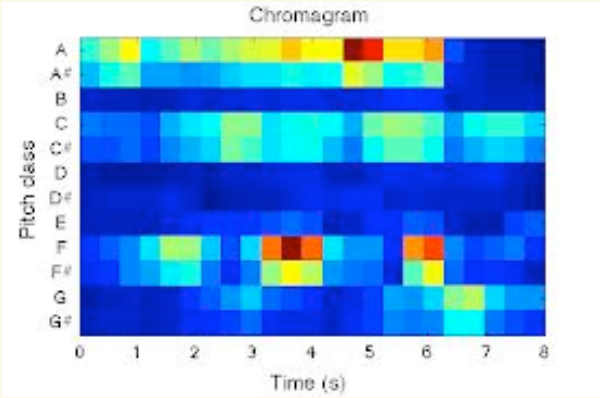
- unprecedented quantities of music(al data) on the Internet
- Music Information Retrieval creates technologies to retrieve, explore, analyse and listen to it

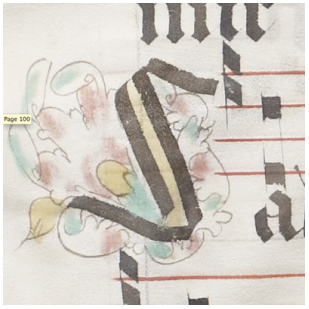
- strong sense of community
  - International Society for Music Information Retrieval (www.ismir.net)
  - second home for computational musicologists like me

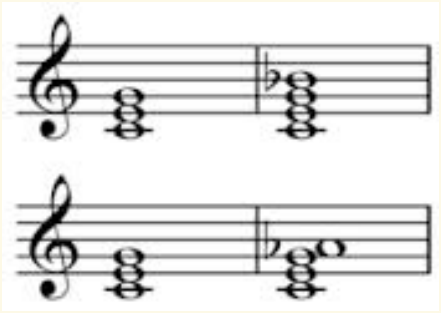
Some MIR highlights



- Query by humming paradigm
- Audio fingerprinting / Shazam
- Chroma Features
- Million Song Dataset
- Music similarity
- MIREX
- Lots of cool stuff from McGill
  - SIMSSA, Billboard, Gamera, Salami…





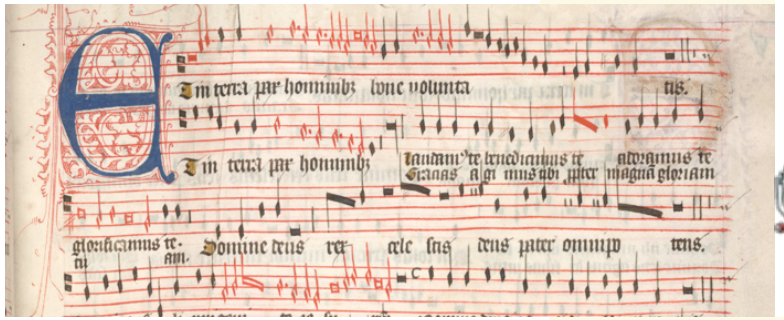


What has MIR done for musicology?

- bad news
  - engineering approach (whatever it takes to get the best results)
    - lowers explanatory value
  - many low-hanging glass ceilings
  - not many successful applications
    - often solution in search of problem

- good news
  - lots of computational methods waiting to be exploited
  - audio-based research now serious possibility
  - ready to deal with data-rich potential of the Internet

Digital Musicology (since 2005)



- massive use of technology by musicologists
  - exploit the Internet
  - creative use of existing technologies
  - not primarily about processing of music notation
- in general, do not seem to care much about technology developed in MIR and CM

Overseeing the past…

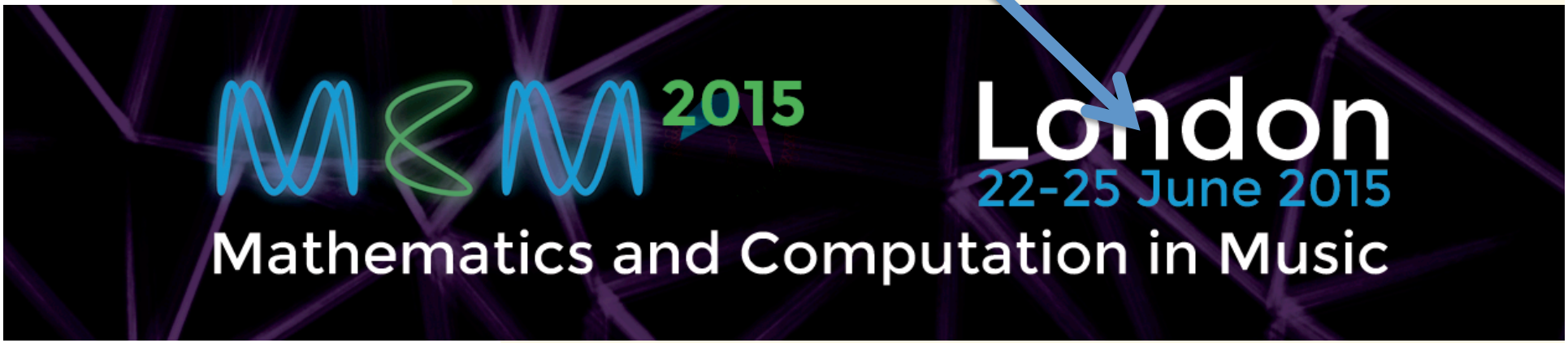
Great progress has been made in computational / digital musicology, BUT

1. **a strong focus on development of new technologies on the one hand and a lack of uptake of these amongst the intended users on the other**
2. **an implicit but fairly insistent message to musicology that science knows how to do things better**
3. **an increasing disciplinary divide, affecting conference and publication infrastructure, social networks, communication and disciplinary values**

IAML IMS

MUSIC RESEARCH IN THE DIGITAL AGE

21–26 JUNE 2015 NYC



Intermezzo

- The next three slides present tangible output from projects that I've participated in

CM contributions from NL

TMI **TmiWeb**

More texts

Search

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What is TmiWeb?

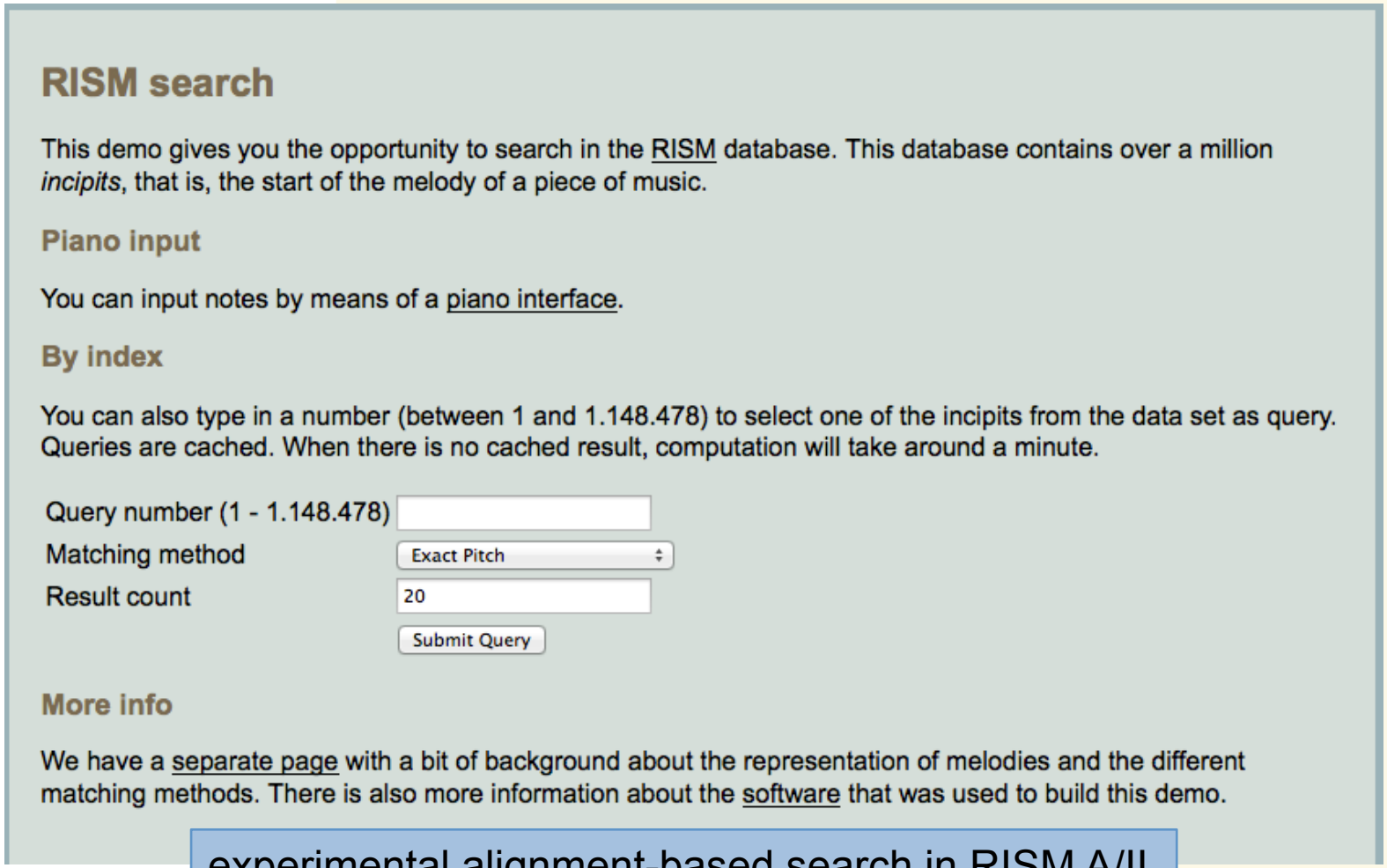
TmiWeb is the online version of Thesaurus musicarum italicarum, an electronic corpus of Italian music treatises from the Renaissance and early Baroque. It contains the works of two of Italy's most important authors on music theory, Pietro Aaron (c. 1480-c.1545) and Gioseffo Zarlino (1517-1590), as well as to a number of writings by their contemporaries.

Nearly 30 works are online on TmiWeb in a full-text, searchable multimedial edition. A list of texts can be found here

All texts are encoded using a slightly-extended variant of the TEI P5 standard. TmiWeb employs the Kiln publication environment developed at King's College, London.

http://tmiweb.science.uu.nl/ (back online after a long interruption)

CM contributions from NL



RISM search

This demo gives you the opportunity to search in the RISM database. This database contains over a million *incipits*, that is, the start of the melody of a piece of music.

Piano input

You can input notes by means of a piano interface.

By index

You can also type in a number (between 1 and 1.148.478) to select one of the incipits from the data set as query. Queries are cached. When there is no cached result, computation will take around a minute.

Query number (1 - 1.148.478)

Matching method: Exact Pitch

Result count: 20

Submit Query

More info

We have a separate page with a bit of background about the representation of melodies and the different matching methods. There is also more information about the software that was used to build this demo.

experimental alignment-based search in RISM A/II

CM contributions from NL

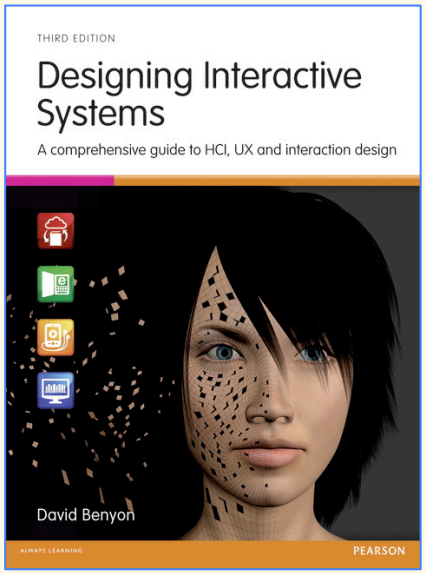
The Meertens Tune Collections

With the Meertens Tune Collections (MTC) the Meertens Institute provides a rich set of collections of musical data for research purposes, such as musicological investigations or music information retrieval tasks. Over the past decades, these data have been collected in the Database of Dutch Songs. The online interface of the Database of Dutch songs provides access at the level of individual records through extensive search and browse functionality. With the MTC, several collections are provided as a whole. MTC currently consist of the following collections:

Name	Description	data types	version
MTC-OGLAUDIO	Collection *Onder de groene linde*: 7178 audio recordings collected by Dutch field workers during the 1950s-1980s.	mp3	1.0
MTC-OGLSCANS	Scans of 3754 transcriptions of recordings from *Onder de groene linde* as made during the 1950s-1980s. The music is hand-written, the lyrics are typed.	jpg	1.0
MTC-FS	4120 digitally encoded vocal folk songs both from *Onder de groene linde* (2503) and from various related written sources (1617).	**kern, midi, lilypond, png, pdf, txt	1.0
MTC-INST	2368 digitally encoded instrumental tunes from 18th-century Dutch manuscripts and printed scores.	**kern, midi, lilypond, png, pdf	1.0
MTC-ANN	Annotated Corpus: 360 melodies used in various publications.	**kern, midi, png, pdf	1.0
MTC-LC	Large Corpus: 4830 melodies used in various publications.	**kern, midi	1.0

http://www.liederenbank.nl/mtc/, see Kranenburg et al. 2014

My teaching at UU includes



- *Design of Interactive Systems*
- … is concerned with developing high quality interactive systems, products and services that fit with people and their ways of living (David Benyon, *Designing Interactive Systems*)

- human-centred design
  - not just 'user-centred'
- aim is to create people-technology systems
  - seamless integration of human and tool
  - support and enhance work practice

Musicology Centred Design

- Human Centred Design for music research
- not many successful people-technology systems around

- core issue: acceptability
  - what makes people want to use technology?
  - what prevents people from using it?

- understanding musicologists
  - what do musicologists do?
  - what do they value?

- how?
  - observation: ethnography
  - participatory design
  - ask questions: survey

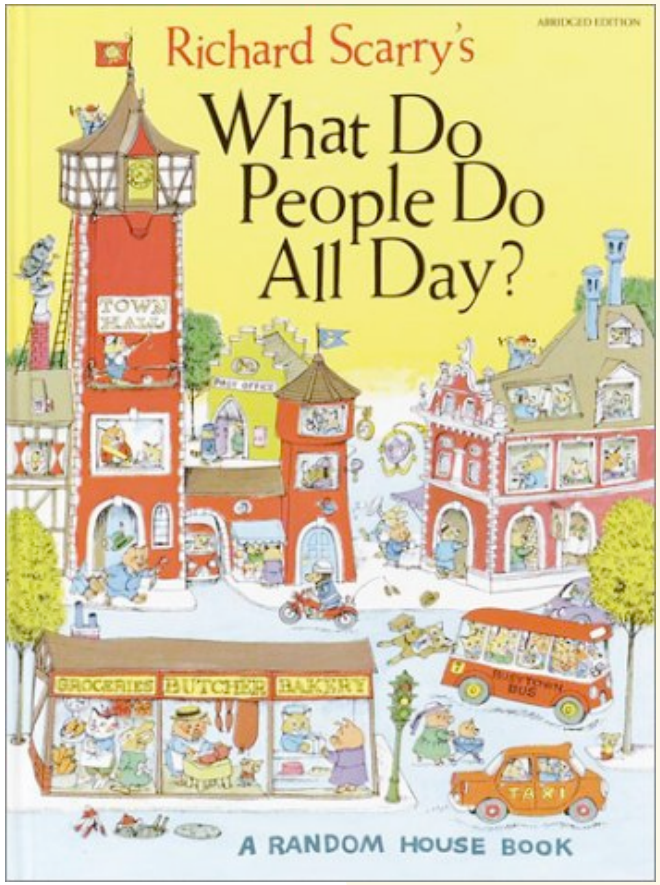
What has been done so far in MCD

- ethnography
  - observations of musicologists at the British Library (Barthet & Dixon, 2011)

- participatory design
  - tune family modelling in WITCHCRAFT (Volk & Kranenburg 2012)
  - Case study on DIAMM in M. Bulger et al. (2011)
  - eCloud project (http://pro.europeana.eu/get-involved/projects/project-list/europeana-cloud)
    - personas and scenarios for Early Music Tools
    - use case early printed music in Europeana
  - Transforming Musicology (http://www.transforming-musicology.org/)
    - mini-projects: collaborative, driven by music research questions

- and no doubt several others

What do musicologists do all day?



Joint work with Charles Inskip,
University College London

Aim of WDMDAD

- investigate use of technology in musicology
  - what do music researchers use technology for
  - how do they feel about the use of technology

- what we wanted to get out of it
  - qualitative information
  - good stories
  - just a tiny bit of demographics

What did we ask?

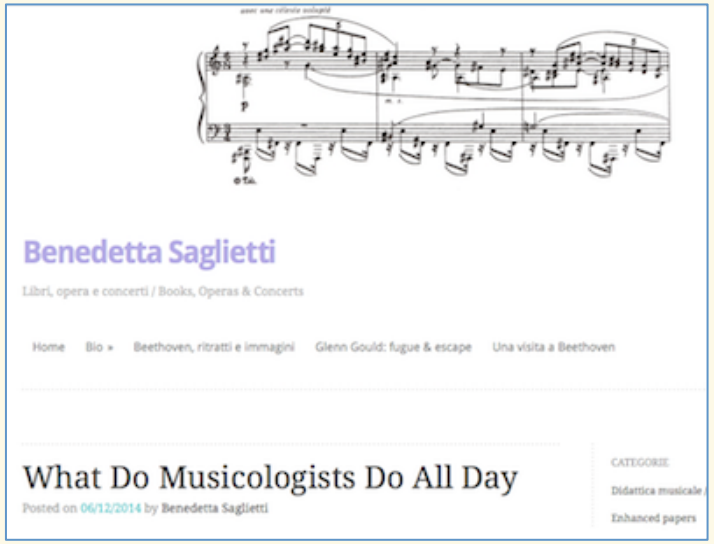
1: What is your gender?	XXXX
2: What is your age?	XXXX
3: Please identify your location from this list	XXXX
4: What is your level of education?	PhD / Doctorate
5: How confident would you say you are using digital systems and materials to find, organise and analyse research materials, and create and disseminate your findings? [1-5]	3
6: Where do you do your musicology research?	Academic institution
7: What is your speciality? (you can choose more than one, if you like)	Historical musicology

What did we ask?

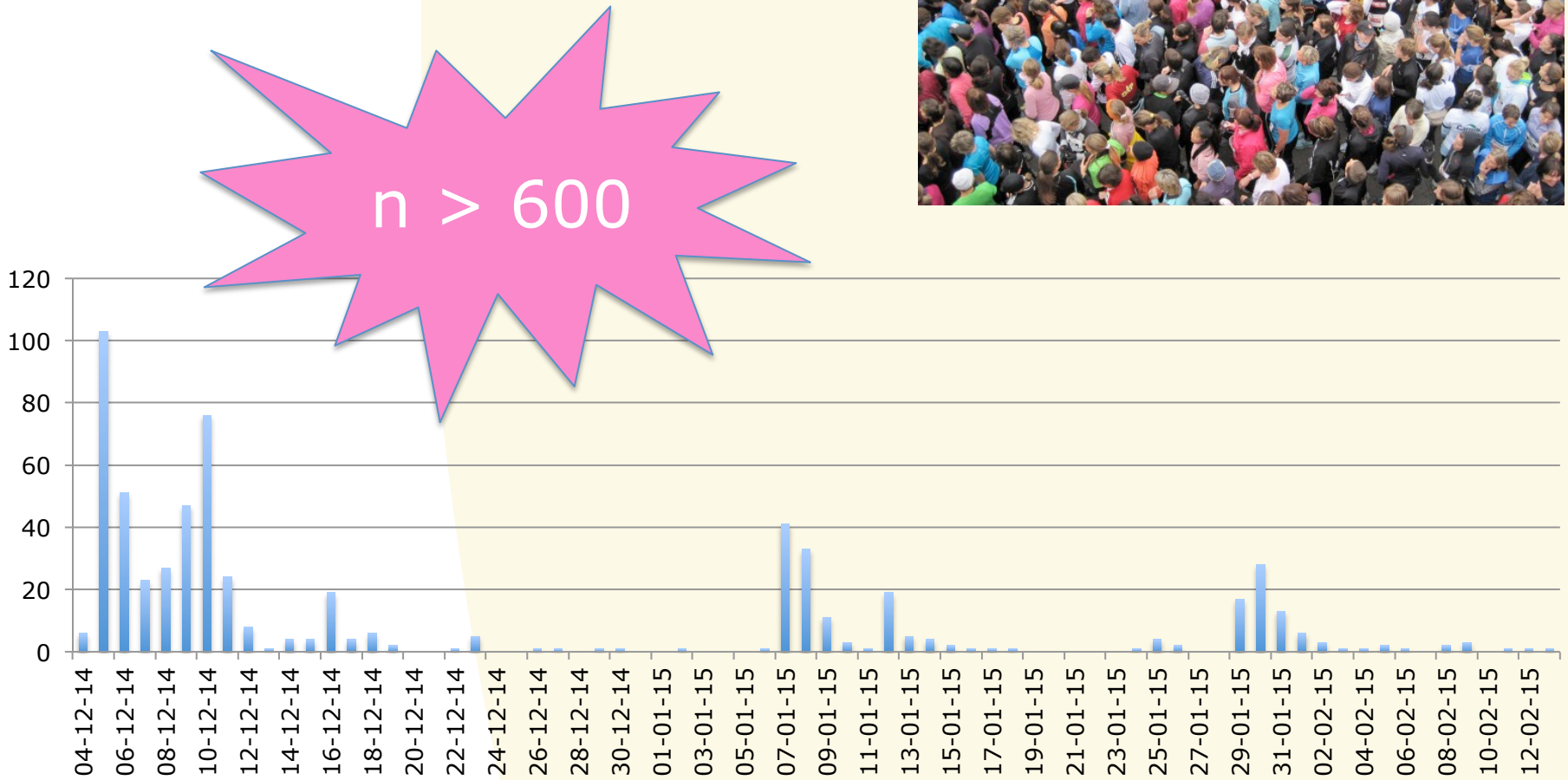
8: What are you currently researching?	Spanish Liturgical Music Manuscripts to 1700 at the University of XXXX
9: Which is the information or music resource you use most in your musicology research and writing?	Digitised archives and manuscript collections
10: Which ${IR1} do you use, and why?	Constantly on the look out for collateral sources to ours. So use materials that are relevant wherever I can find them. However your question is far too narrow, as I also sue many of the other categories in your list. Your response only allowed one choice.
11: If you think you may have a preference for using digital or physical resources in your work, why do you think this is?	Only because I am physically located a world away from the manuscript collections. Similarly, we are in the process of digitising OUR collection to allow international scholars access
12: Tell a story about a rewarding or a frustrating experience (or both, if you like) with technology in your music research.	Frustrating use of FINALE for early music notation. Had to devise my own for publication. No one solution will work for everyone.
13: What do you think are the risks and limitations of the use of technology in musicology research?	Risks and limitations have to do with intellectual property. We have been ambivalent about making our material generally available, as we (and many other scholars that we all know) have not respected intellectual property rights and ethical boundaries.
14: What do you think are the benefits of using technology in musicology research?	If the above could be properly sorted, the gains are enormous. We SHOULD be a community of scholars who collaborate, not who steal.

Publicize

- various mailing lists, including
  - musicology-all
  - computational musicology
  - ams-list
- specifically *not* ISMIR list
- organisations, including
  - International Musicological Society
  - national organisations in AT, AU, D, F, NL
- social media



Response


n > 600
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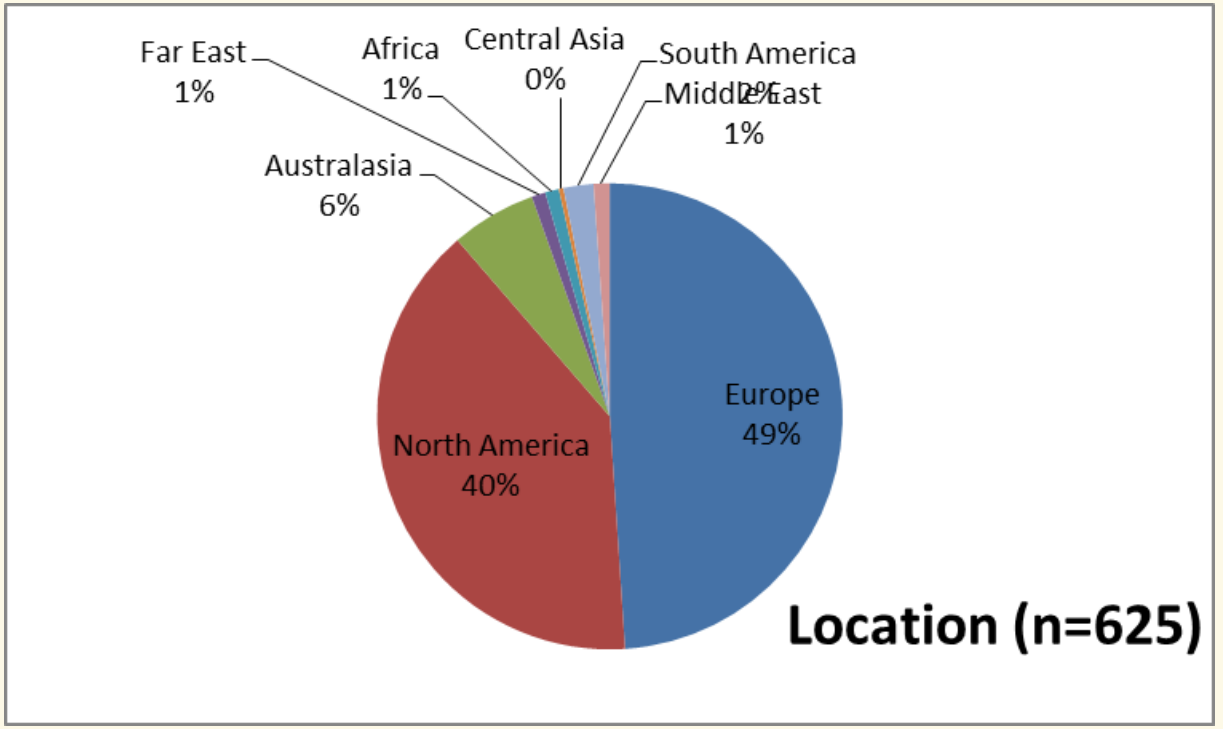
Demographics

Country	Frequency
United States	220
United Kingdom	91
Germany	48
Australia	32
Netherlands	31
Canada	28
Austria	25
Italy	24
France	20
Greece	12

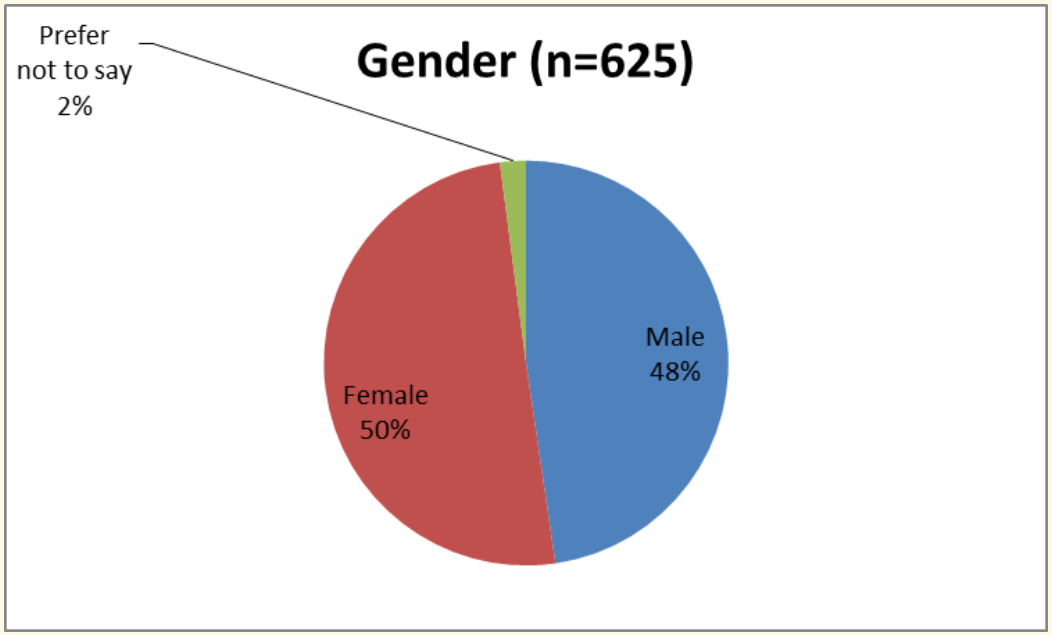


Countries with 1 response:
Chile, China, Croatia, Cyprus, Czech Republic, India, Ivory Coast, Korea South, Lithuania, Malaysia, Mali, Malta, Nigeria, Poland, South Africa, Taiwan, Turkey, Venezuela

Demographics

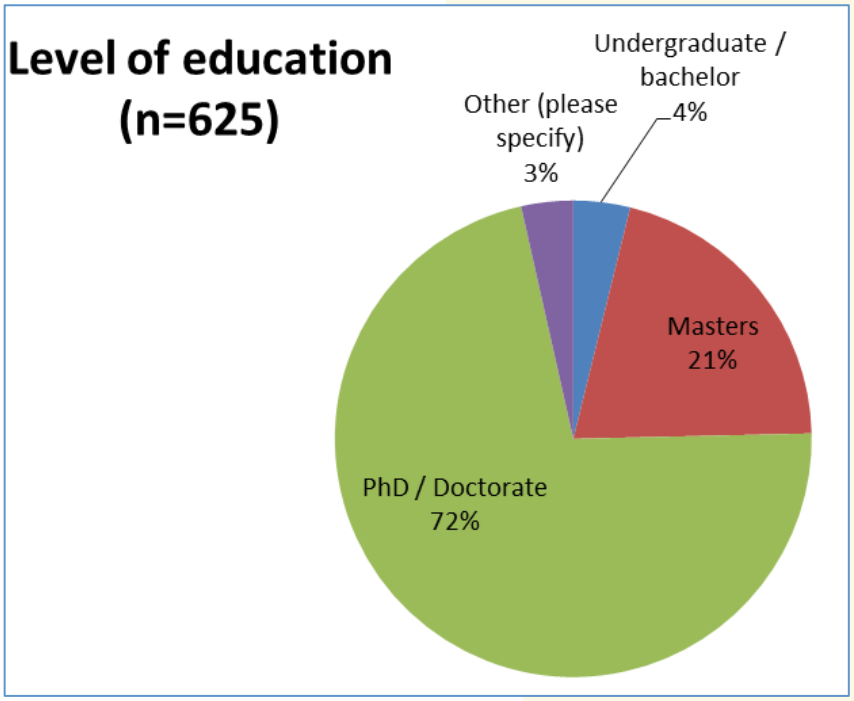
- gender pretty balanced
- more women in North America

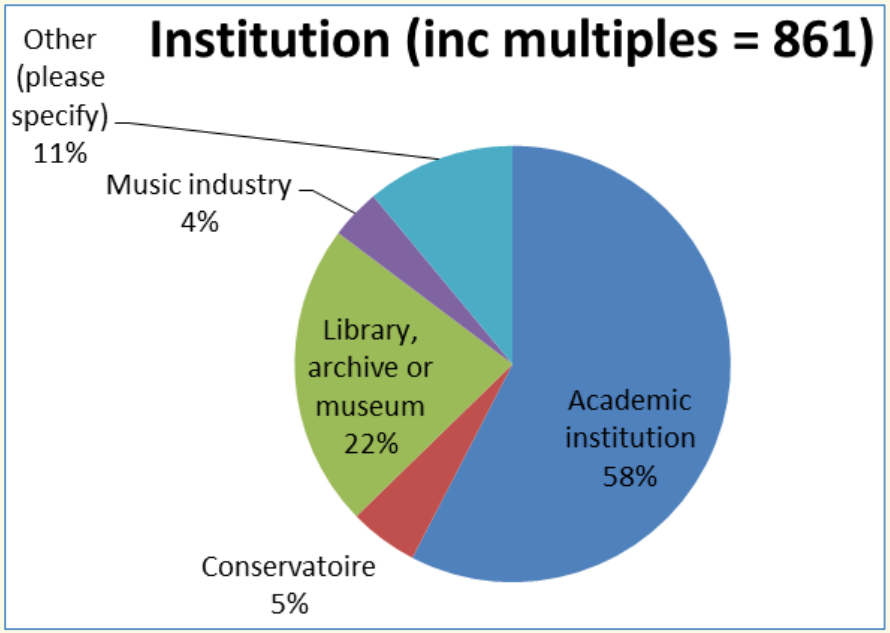
- opportunity: analyse other NA-EU differences



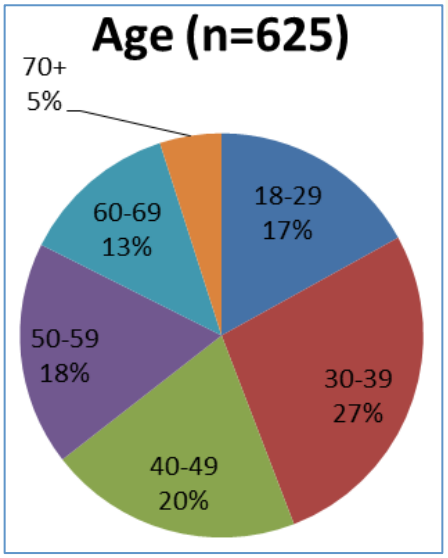
	Female	Male	Prefer not to say	Total
Europe	146	154	6	306
North America	136	105	7	248
Australasia	18	19	0	37
South America	3	10	0	13
Middle East	0	7	0	7
Africa	4	2	0	6
Far East	5	1	0	6
Central Asia	2	1	0	3

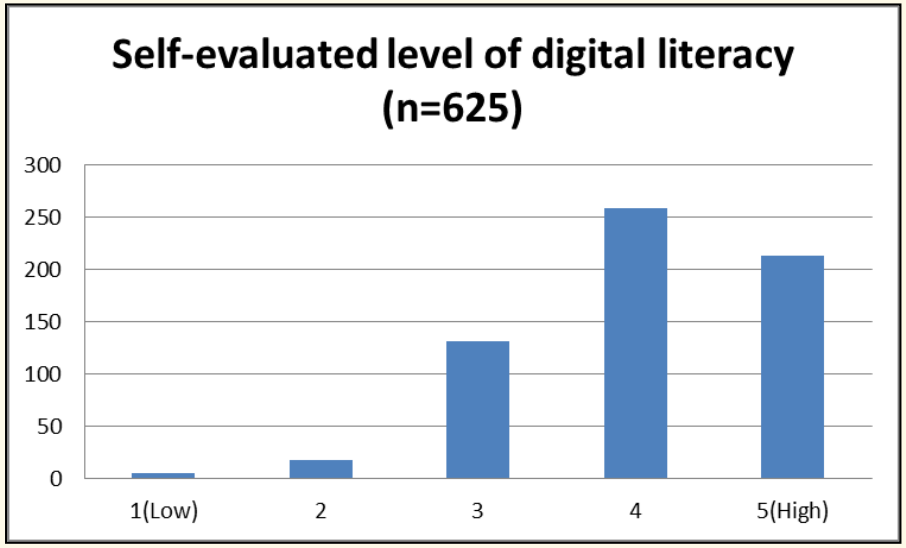
Demographics

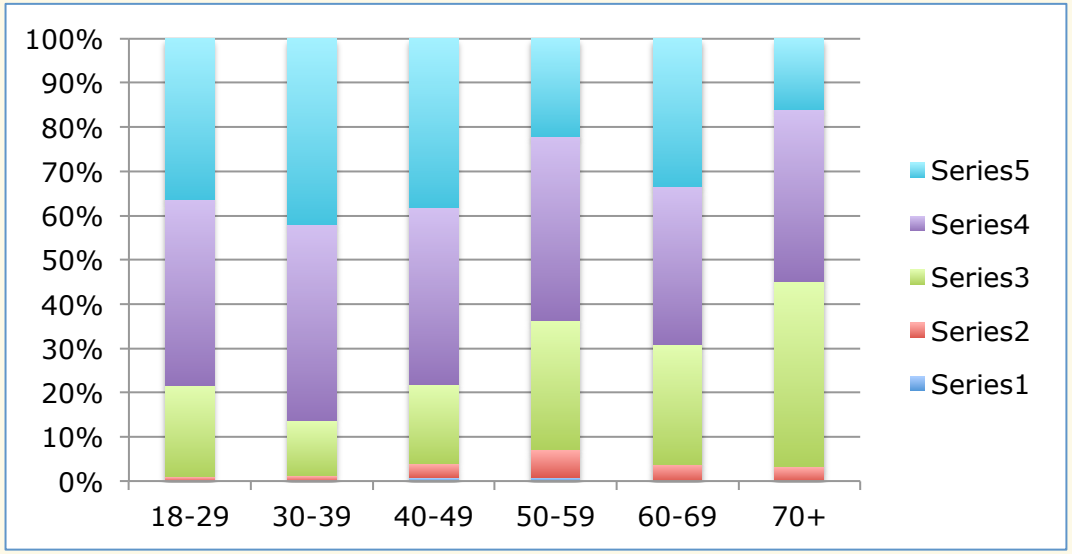




Demographics

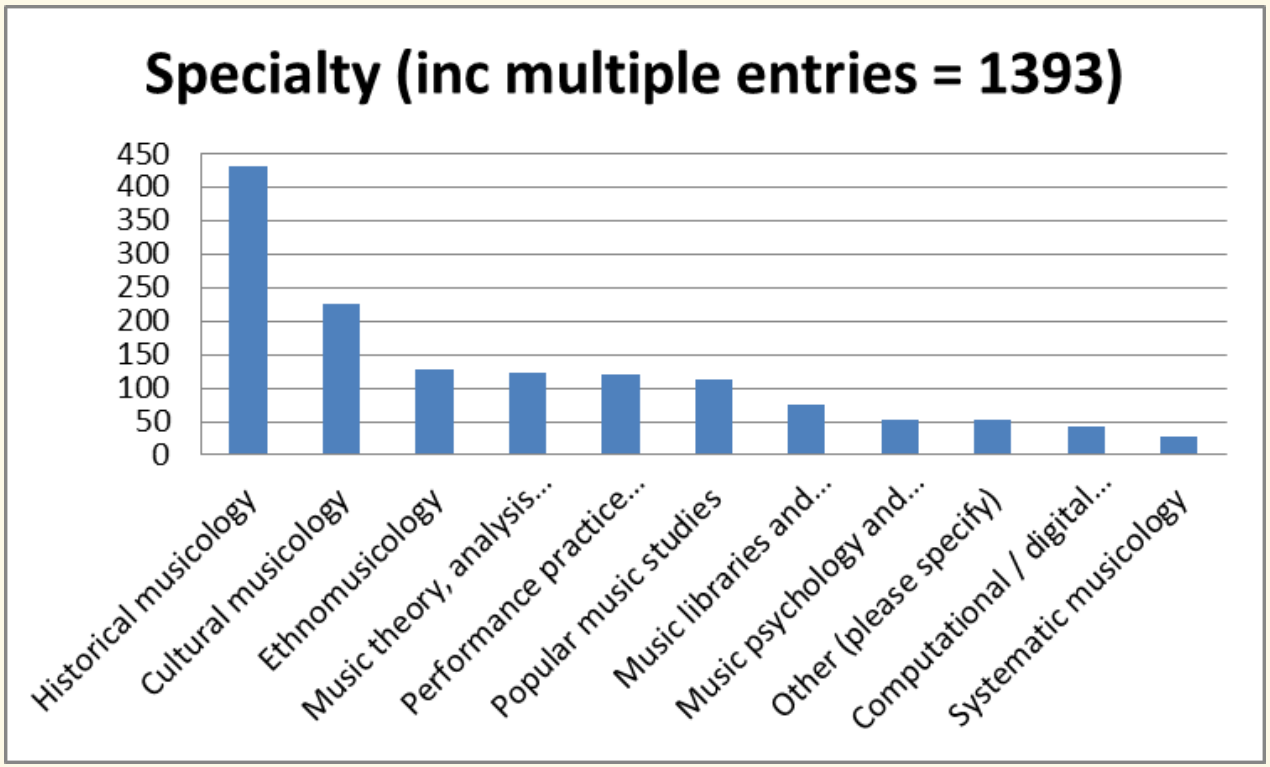




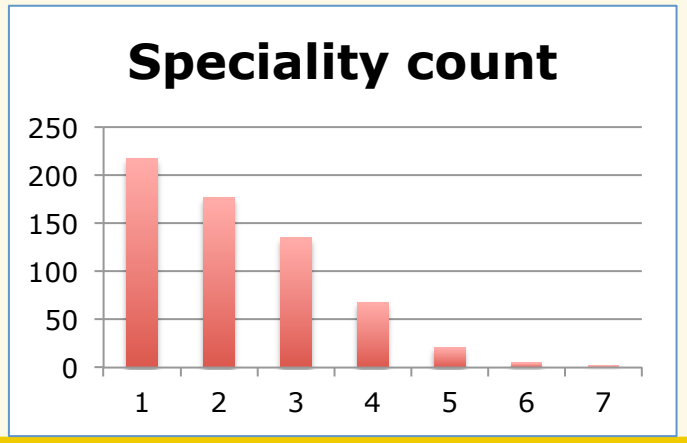


age and skill

Speciality



multiple responses
are very common

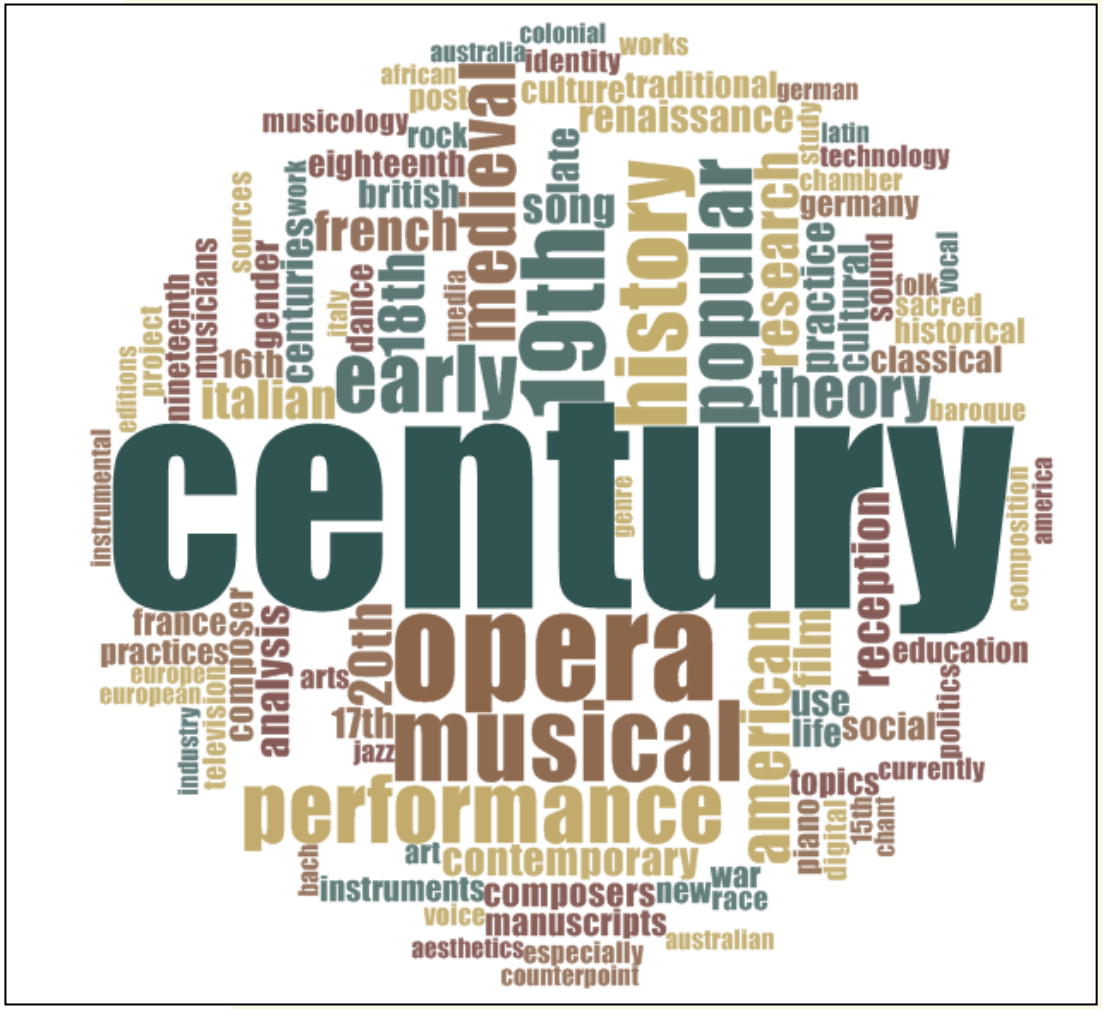


Popular combinations

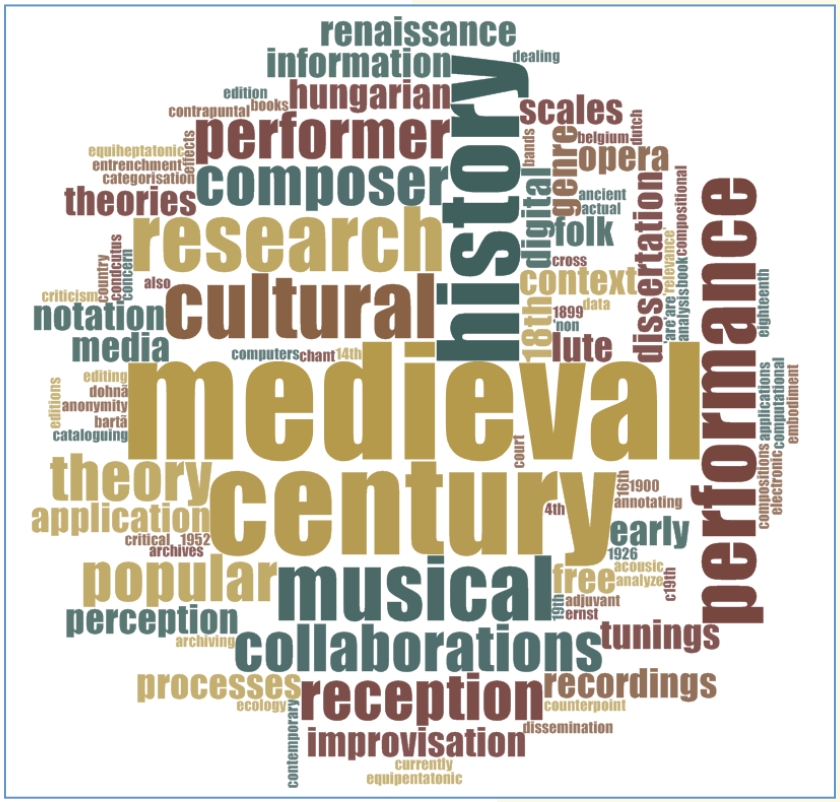
Rank	Frequency	Specialities
1	126	Historical
2	54	Historical + Cultural
3	32	Ethno
4	27	Historical + Performance
5	24	TheoAnaComp
10	11	Performance
13	9	Cultural
29	3	CompDigi

- term ‘cultural musicology’ too vague?

What are you currently researching?



Comparing research topics



digital musicology

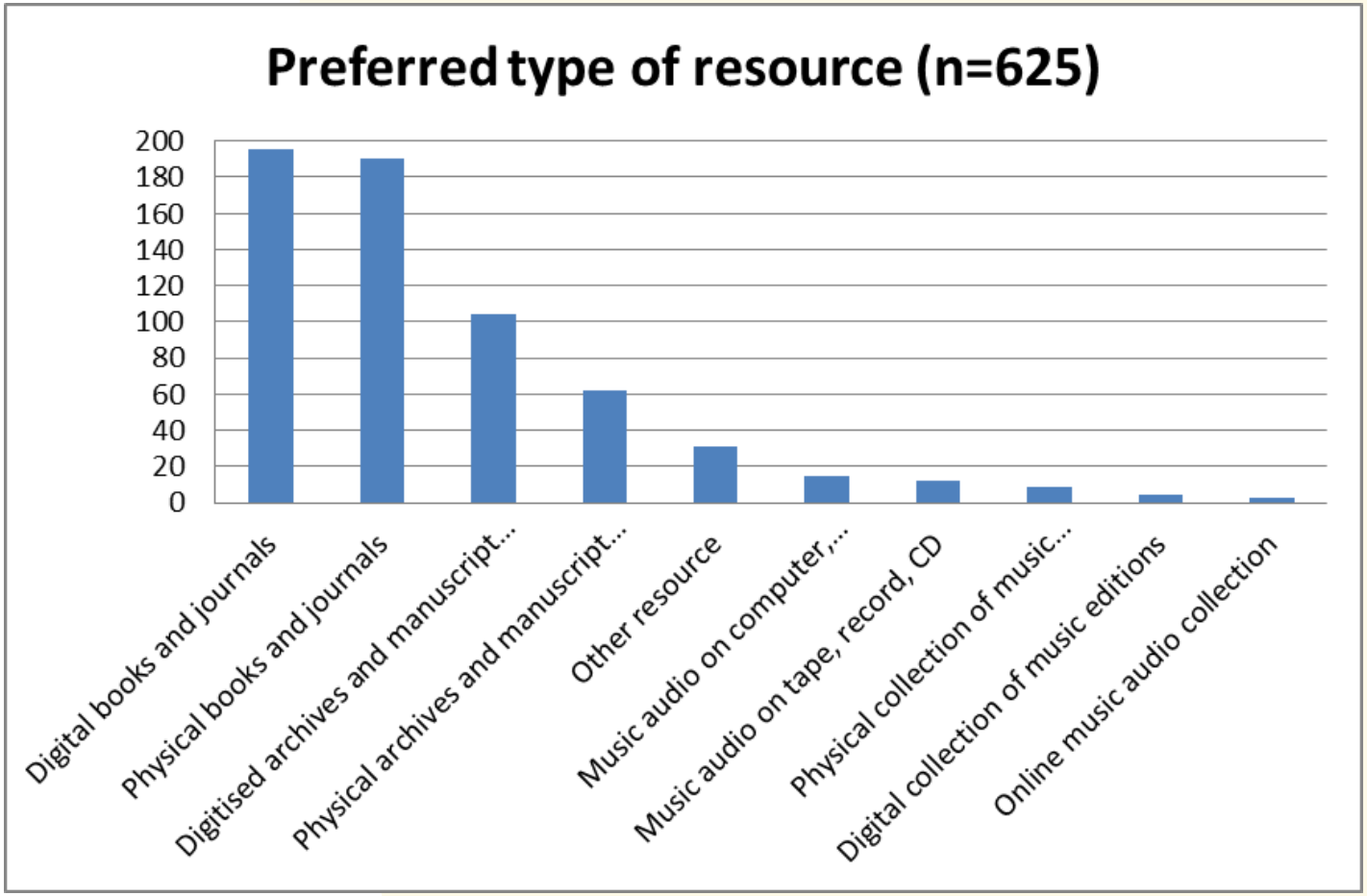
historical musicology

WDCanadianMDAD

- Just the first few topics
  - Eighteenth-century German court music, particularly sacred music
  - WWI Songs, Commemoration, Memory, Silence
  - Fingering in 17th-century French keyboard music
  - the nature of operatic storytelling from an analytic philosophical perspective
  - Texture in rock music
  - modernism and aesthetics
  - Gender and popular music, visual media and popular music
  - ...
  - Scottish Gaelic song in Nova Scotia (genre studies; how song can assist with language revitalization efforts); Cape Breton step dance; Atlantic Canadian disaster songs

- quantitative analysis of topics → better categorization?

Preferred information or music resource



what happened with the music resources?

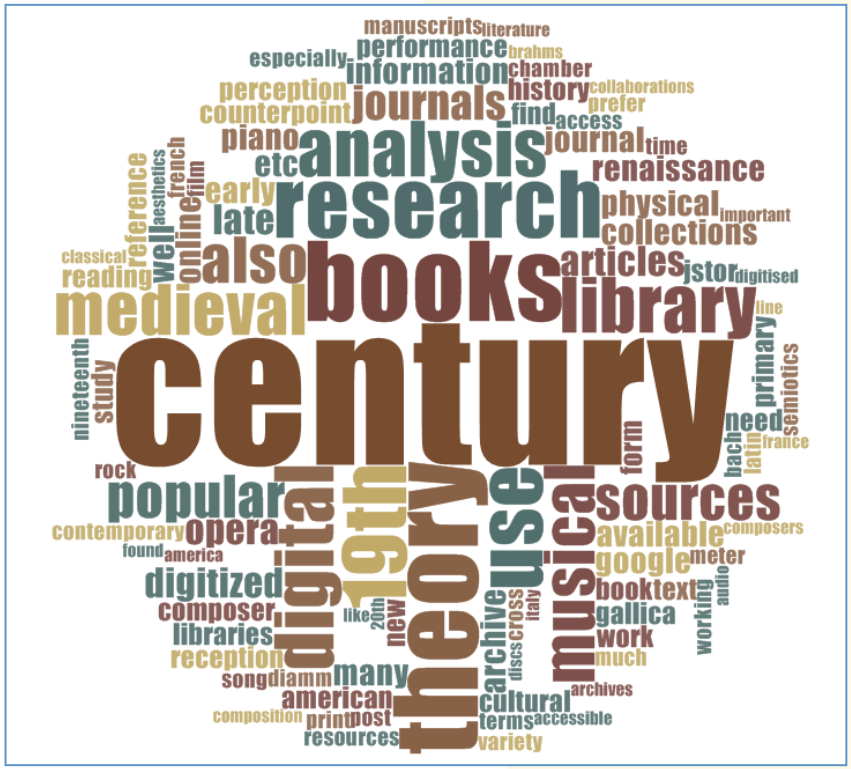
Information resource

- Overall, digital materials are preferred over physical materials (but only slightly)
- there are differences between specialities
  - strongest preferences in digital in *computational/digital musicology* and *music psychology and sociology*
  - highest preference for musical resources in *computational/digital musicology*, but only around 15%

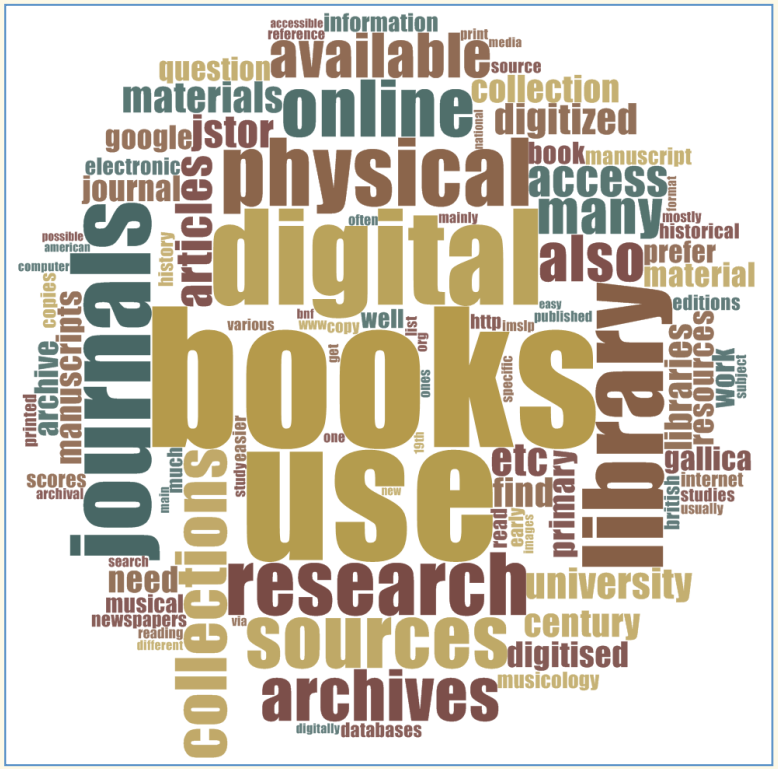
- many respondents indicate that it is difficult to select only one resource

I would have preferred multiple choices to this question. I access information both digitally and physically, depending on ease of access, costs, etc.

Comparing preferences



digital musicology

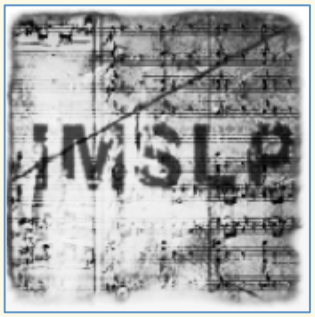


historical musicology

Where is the music?

- Actually, a lot of it is hidden under Archives
- Often-mentioned music resources include

14

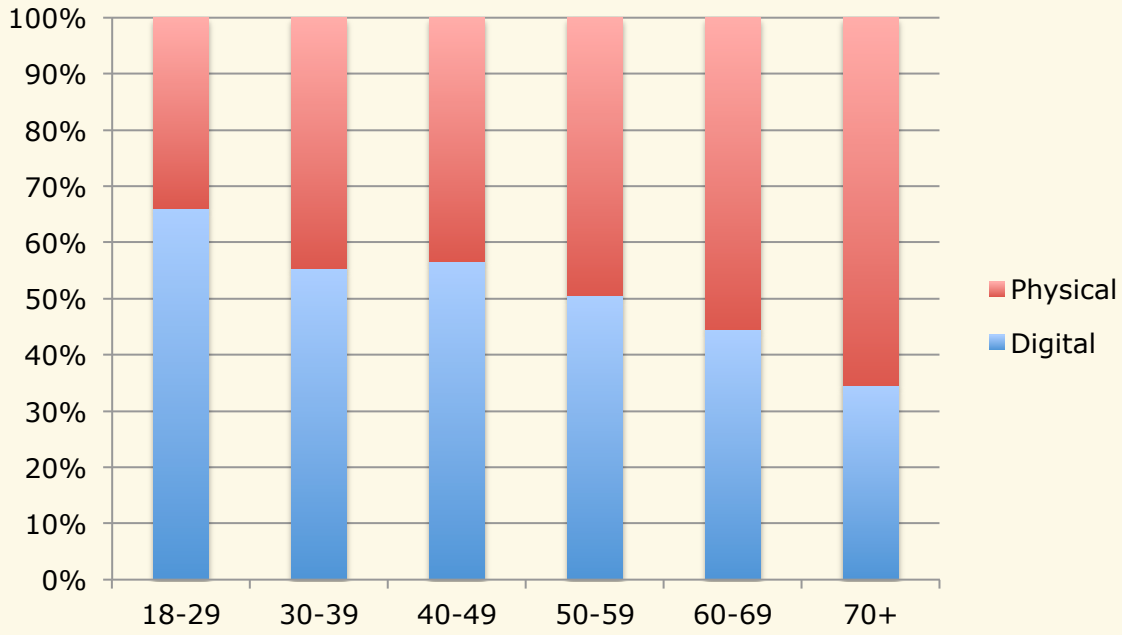


19

32

- First impressions
  - source studies and editing increasingly done using online resources
  - not a lot of music processing beyond (digital) editing

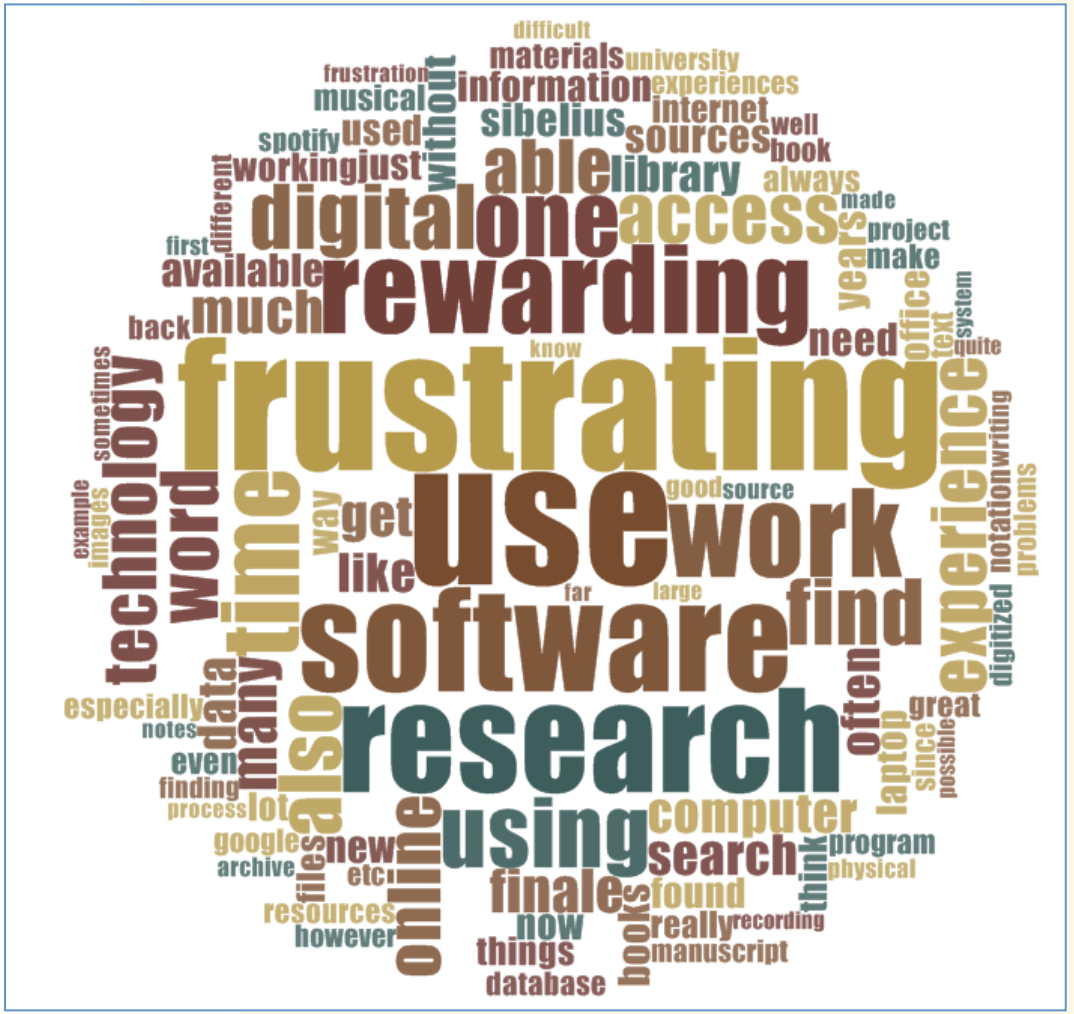
Preference and age



I am 73. Hence the digital resources are a bit unfamiliar!

Because at the age of 84 travel is not so easy for visiting many different physical sites.

Rewarding or frustrating experience



Early music

The iconographical database that I have created of 15th century Spanish musical instruments allowed me to rewrite the early history of the vihuela.

Use of diamm.ac.uk has revolutionised the way I access original music sources. I spent my PhD visiting them all over about 3 years; now I can see them all in one afternoon

I have been able to use music21 to identify small fragments of music as being the same music found in other musical sources. In some cases, these concordances have led to the identification of new voices, making whole an otherwise incomplete piece. Because the process involved comparing each of 1,000 pieces against each other, there is no way that this could have been done without computers.

Music printing

finale®

54

Sibelius® 7.5

The fastest, smartest, easiest way to write music

36

2

I find creating editions using Sibelius very rewarding - particularly with music that has not previously been published. With improved instrument sampling, you can create bearable arrangements and 'hear' works never heard before without amassing an orchestra.

The most rewarding experience with technology is my experience with Finale. What was at first daunting, has now become a pleasure to work with. Liszt's compositions have so many notes, and they look very pretty on the printed page.

Music printing, limitations

For music transcriptions I use Finale… It is a fine technology, but it is not created for medieval music transcriptions… I have a personal collection "Finale-trucs", and sometimes I exchange tricks with other colleagues…

I am often frustrated with creating Schenker graphs in Finale... Very time consuming, and very different from the way I think about a sketch

Had Ligeti grown up using Sibelius I wonder whether pieces with up to 56 staves would ever have been written or even conceived.

Consumer technology

Rewarding: using a digital phone to capture an impromptu moment where a protest group broke into song. Frustrating: a time when the same spontaneous deployment of music during protesting occurred, and said digital phone did not capture the video or audio correctly.

I find Spotify to be both crucial to what I do and to be annoying to the extreme... Spotify has made it so I can find what my patrons need to be hearing, which is a huge relief. Unfortunately Spotify has a clunky search...

Rewarding (or amusing) Field work by Facebook. Making plans to get to a remote Italian village and arranging with a local villager (via Facebook) to pick me up from the nearest bus stop, 20 km down the mountain from the village. All worked out fine. Facebook was absolutely crucial for my initial contact with people in that village.

Risks and limitations of technology

Sustainability

I risk I am well aware of is loosing all of my data.

Biggest risk is that it all disappear.

The long term future [centuries or millennia scale] of digital storage and accessibility. I hope my books are kept as a backup when I have gone!

Methodology

That it reduces the human perspective

A return to naive positivism

One's research agenda is shaped and subtly altered by the materials and methods one has access to, so there is a danger of looking only for the types of things it is easy to do with digital materials...

It is often unclear as to whether or not a source has been peer-reviewed, or if the source is authentic.

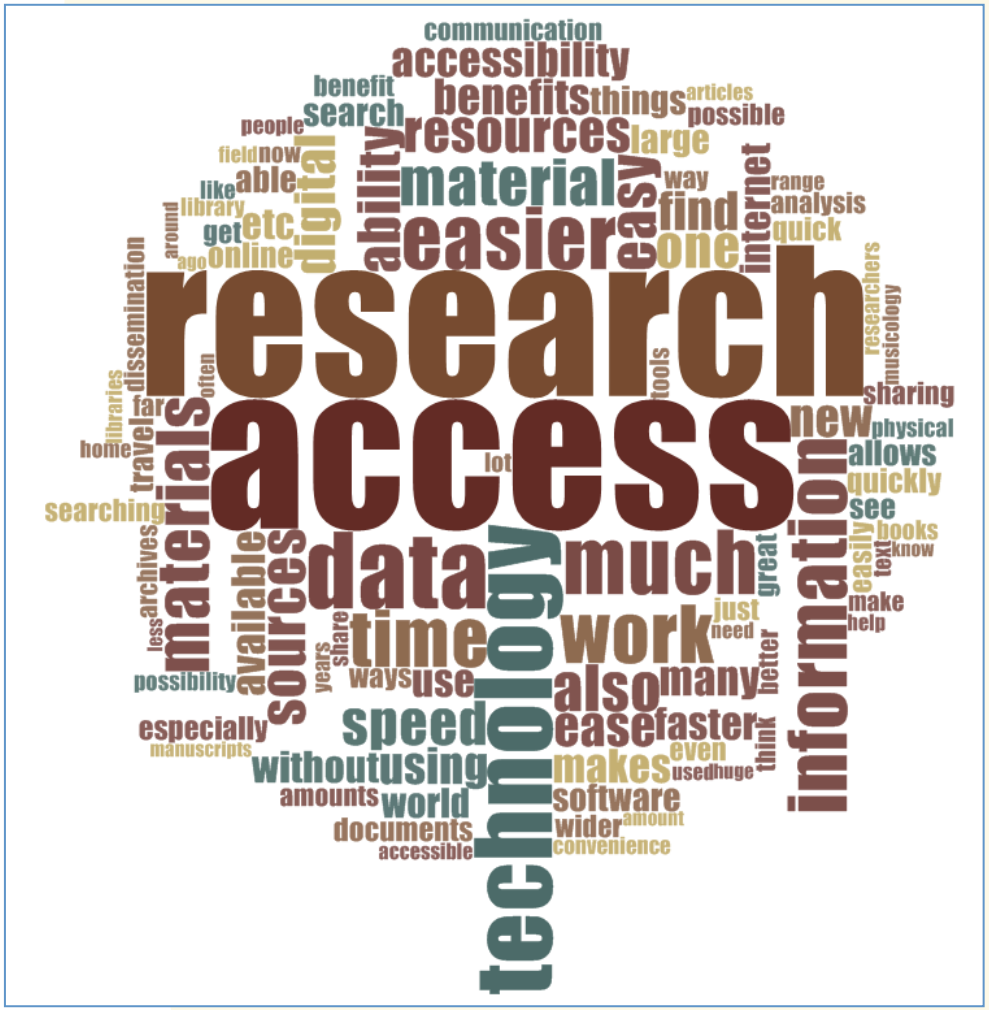
Missed opportunities

The loss of non-searched happy accidents. 'Browsing' in the digital realm is a far less productive activity than browsing in library stacks.

Ethnomusicology has been slowly moving into a new era of 'armchair' research, mostly some kind of youtube laziness that is troublesome.

It does distance musicologists from the physical object. Recently I started work on the digital images of a manuscript that looked enormous when view on my 27 inch computer screen. When I visited the library to conduct a codicological study, I was a little shocked to see it was a tiny book that could have fit easily into someone's pocket. This completely transformed my understanding of the manuscript as something that was indeed more portable, perhaps a personal object…

Benefits of using technology



Benefits of using technology

benefit	occurence
Access to primary and secondary sources	232
Speed, save time	116
Communication, inc collaboration, dissemination, sharing, teaching	109
Searchability, findability, discoverability	59
Large datasets can be analysed	51
Ease of use	34
Economic	32
Word processing, notation software, reference managing	30
New research question	27
Data management	18

Access and discovery

Access to an enormous and ever expanding body of information, recordings, archives, people.

Twenty years ago, if I wanted to listen to Bartok's recordings, I had to go to Hungary; now, I go to the online archive. Truly unbelievable. There is a whole new level of democratization… which I think can only invigorate the field.

One of my greatest "finds" was a previously unknown libretto for a Lully opera performance in 1701, which I stumbled upon in GoogleBooks. It had been digitized by the Bayerische Staatsbibliothek…

Collaboration

Sharing, collaborating, learning...all easier with technology. It widens the field in terms of how you can do things.

…I feel especially blessed with the current ways in which the internet can be used. As an *independent scholar*, these provide me with a crucial link with the musicological world around the globe, especially in a host of groups on Facebook. Scanned documents, articles and knowledge are generously shared, there, in a way that is most encouraging.

The tyranny of music notation

The ability to move away from Western-centric transcriptions of non-Western music, and instead imbed sound files that are more accurate and representative is a huge benefit.

Obviously the presence of millions of sound recordings provides new kinds of analytic material once unimaginable for music studies scholars, but along with that comes new problems and risks as well (excess of information, lack of a methodology for analyzing recorded sound, etc).

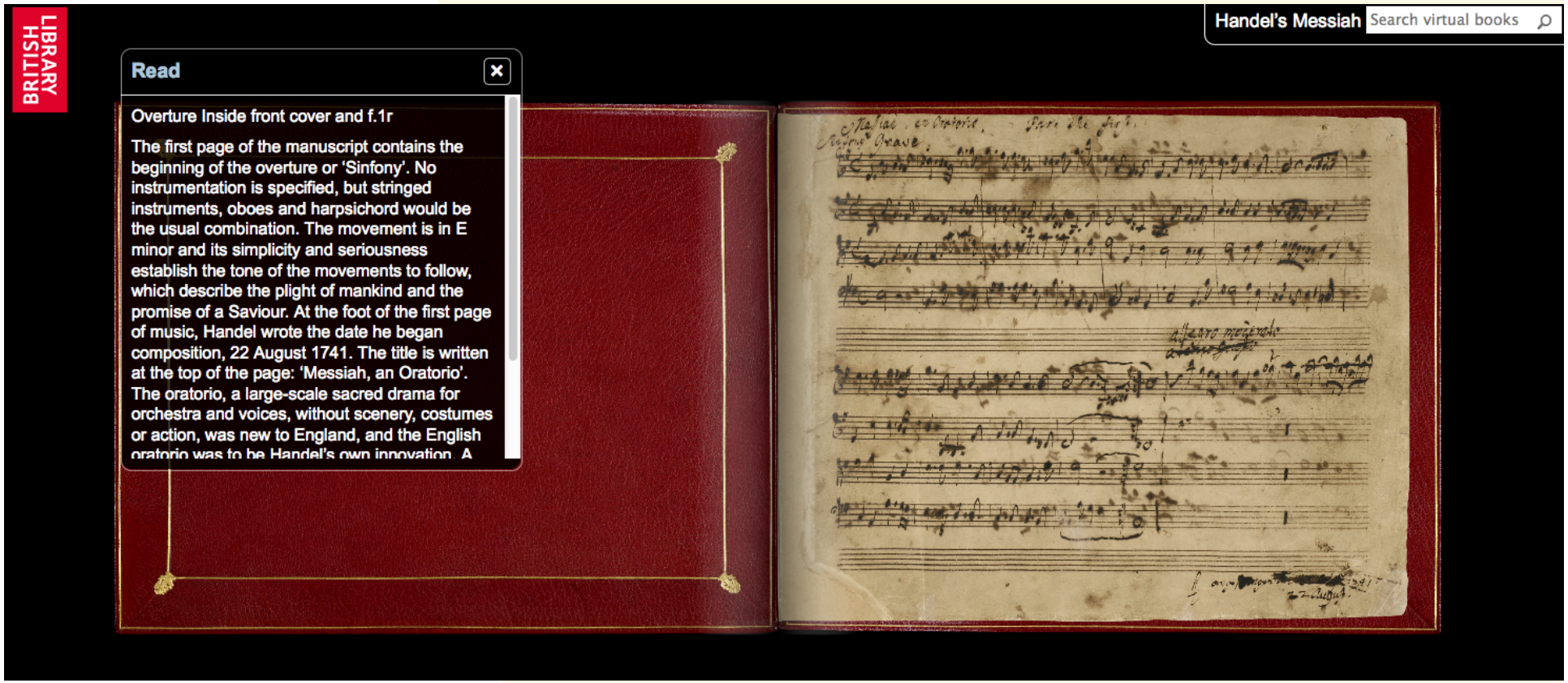
The most dramatic shift has been that recording technology has freed us from the tyranny of music notation as a representational system. That means that performance can be studied on an equal footing with composition. Ironically, digital audio has allowed us to see beyond the discrete steps of the chromatic scale and metric divisions, and to explore pitch and rhythm as continuously variable (i.e. analogue) concepts.

Messiah in Oklahoma

I think they [the benefits] are astronomical. I can read about Handel and his Messiah creation until I am blue in the face and tell students how magnificent the work is...but I truly feel that until I show them the digitized copy from the British Library and page through it with them virtually, the facts and the marvel of it all simply don't sink into their minds…

Technology makes it possible to open up a world of knowledge at their fingertips. Suddenly they aren't in backwater Oklahoma any longer, they're sitting on a magic carpet of technology wisking themselves away to London or Cairo or St. Petersburgh to see history happen with an immediacy that is life changing if they have the sense to see it.

Messiah in British Library



http://www.bl.uk/turning-the-pages/?id=38fd72b2-5b98-4fc2-aaae-98e717e8d512&type=book

Preliminary insights

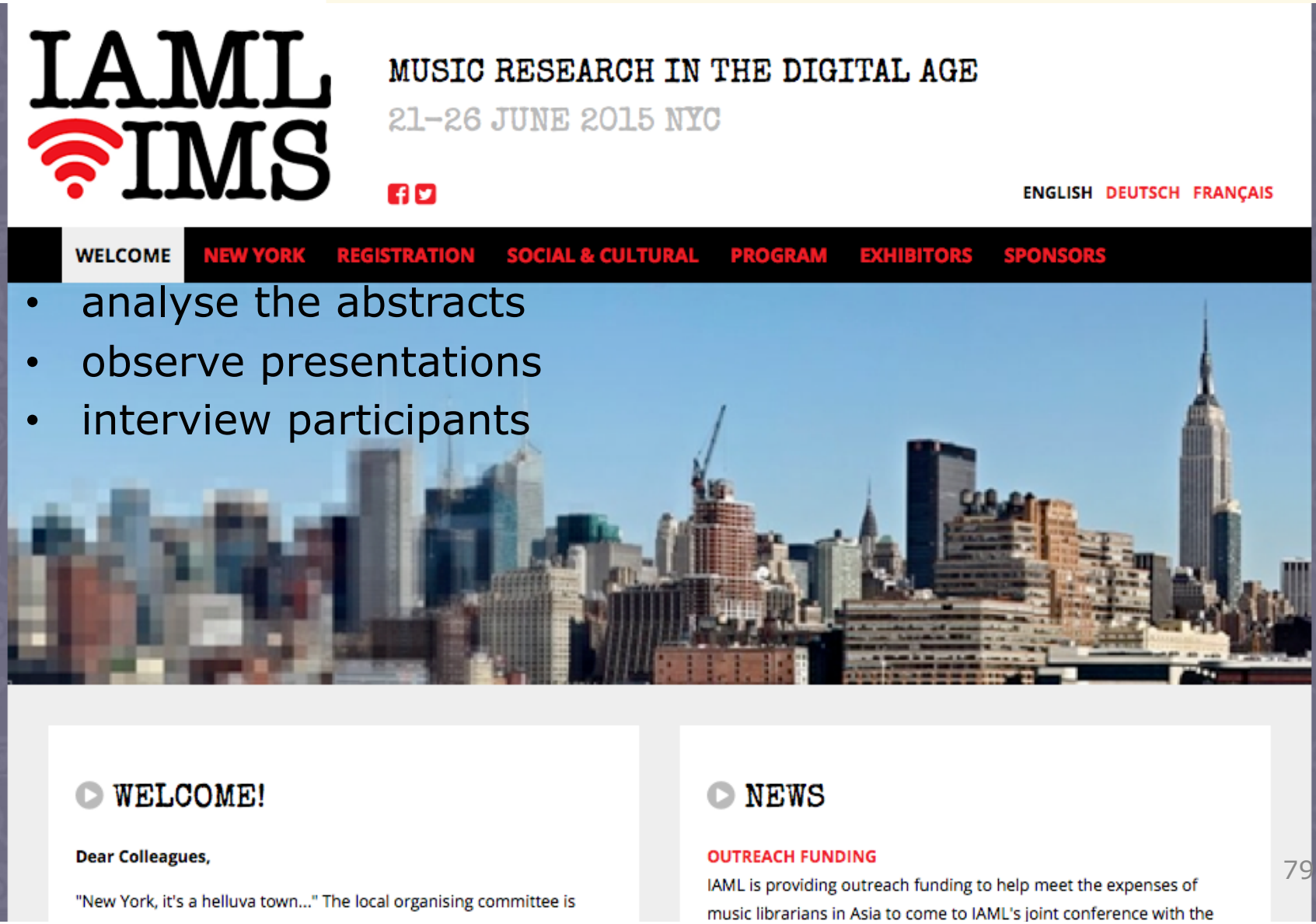
- technology is widely and creatively used
- widely-shared feeling that this has changed musicology
- access and discovery are very important
  - issues around materiality of the sources
- software tools are not always up to the tasks they are used for, music printing programs in particular
  - certain amount of laziness
- worries about sustainability and quality

What we plan to do next

- for the survey
  - reading / labelling responses wit NVivo
  - analysis
  - publication

- other approaches, such as…

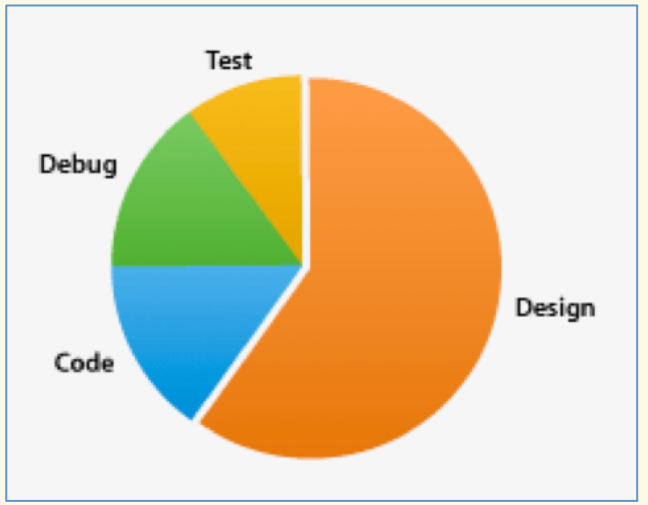
Doing some ethnography !



- analyse the abstracts
- observe presentations
- interview participants

What we hope to attain

- MCD becomes standard practice in technology creation
  - identify stakeholders
  - study work practices
  - identify bottlenecks
  - create solution iteratively, by co-design
  - evaluate EVERY design step



for comparison:
iOS software development

Things we can do to get there

- large-scale research into technology use
  - time-consuming, in-depth analysis of work practices
- apply Human Centred Design techniques to promising topics
  - e.g. persona/scenario based design
  - lots of lo-fi prototyping
  - one such area is definitely music printing/editing
    - medieval, Schenker…
- two-way instruction (after Andre Holzapfel)
  - hands-on experience of music research for developers

Take home messages

- music researchers use technology all the time
- they are very critical toward is and not too happy generally
- don’t create technology *for* musicologists, but with *musicologists*
- apply musicology centred design

Acknowledgements

our respondents!

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Revisiting the Collaborative Process between Music Researchers and Computer Programmers

Opening remarks

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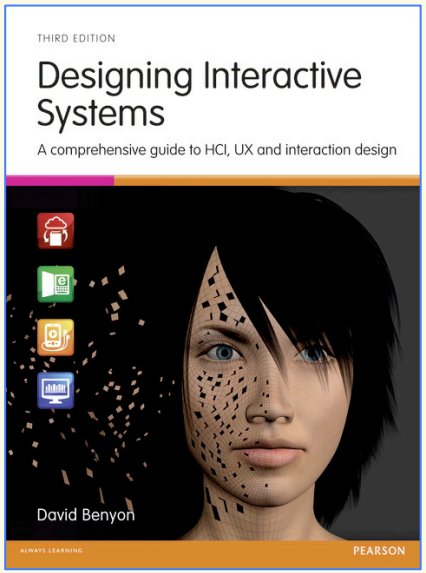
My teaching at UU includes

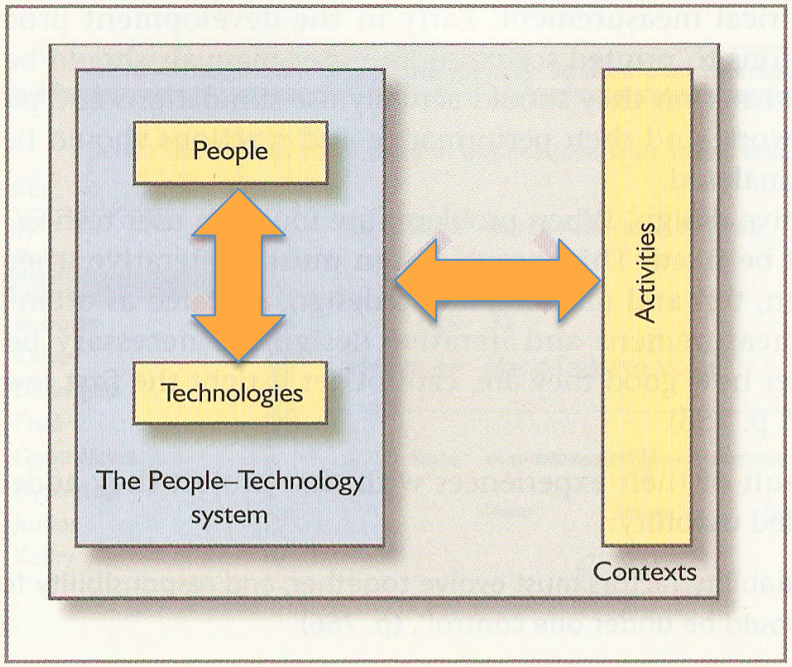


- *Design of Interactive Systems*
- … is concerned with developing high quality interactive systems, products and services that fit with people and their ways of living (David Benyon)

- human-centred design
  - not just 'user-centred'
- aim is to create people-technology systems
  - seamless integration of human and tool
  - support and enhance work practice

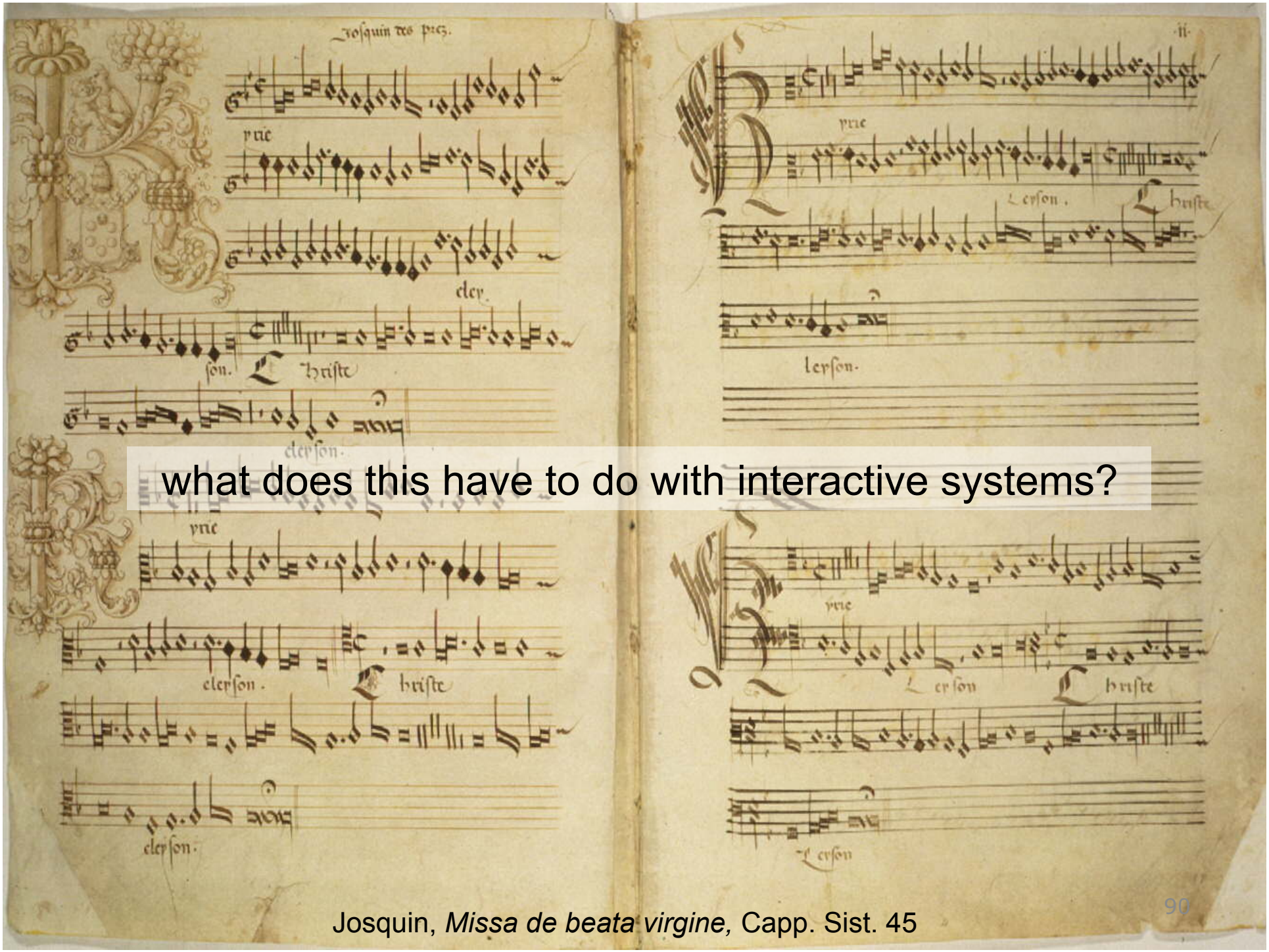
PACT

- interactive systems
  - process information
  - respond dynamically to human actions



- **P**eople
- **A**ctivities
- **C**ontexts
- **T**echnologies

tempting to regard *anything* as an interactive system



what does this have to do with interactive systems?

Josquin, *Missa de beata virgine,* Capp. Sist. 45

PACT for Renaissance polyphony

- non-digital interactive technology
- domain: liturgical performance
  - **P**eople: everyone involved in preparation and performance
  - **A**ctivity: e.g. singing music to liturgical text
  - **C**ontext: mass, feast, location
  - **T**echnology: manuscript with mensural notation

- *manuscript is surviving half of a people-technology system*

- interactive systems design
  - usable: *optimised* for work practice
  - users develop strong *mental models* of activities
  - relies on *routine* and *expertise*
  - displays common design principles such as:
    - *minimalist design, flexibility*

Contextual Design

- Contextual Design is a structured, well-defined user-centered design process that provides methods to collect data about users in the field, interpret and consolidate that data in a structured way, use the data to create and prototype product and service concepts, and iteratively test and refine those concepts with users

- redesigning work processes
- user is expert

Holtzblatt, Karen and Beyer, Hugh R. (2011). Contextual Design. In: Soegaard, Mads and Dam, Rikke Friis (eds.), *Encyclopedia of Human-Computer Interaction*. Aarhus, Denmark: The Interaction-Design.org Foundation. Available online at http://www.interaction-design.org/encyclopedia/contextual_design.html.

Role models for the analyst

archeologist

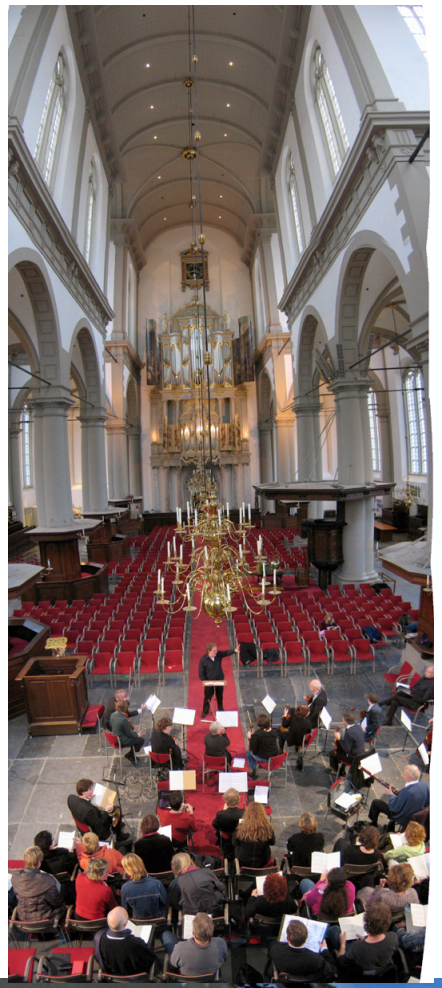
detective

psychologist

antropologist

disciple

Work modelling

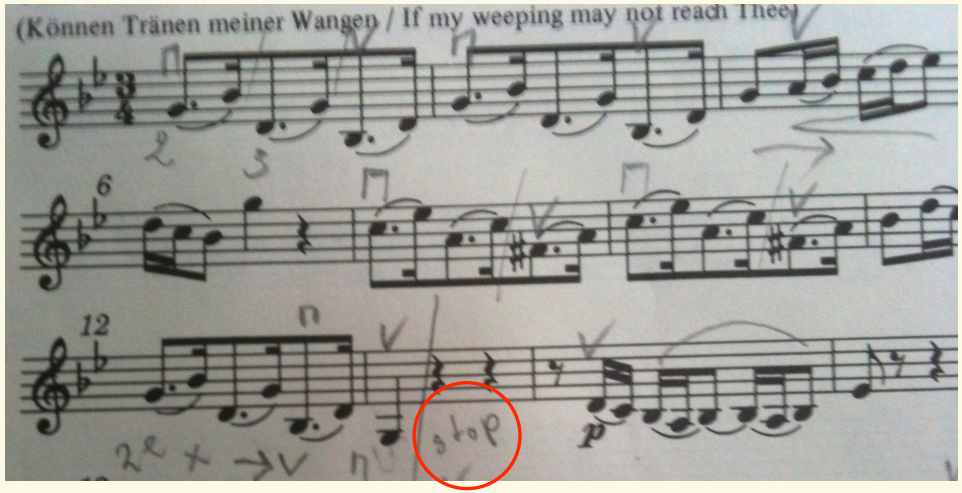


- annotated graphical models
  - flow (communication)
  - sequence (actions)
  - artefact (objects)
  - cultural (values)
  - physical (location)
- indicate *breakdowns*

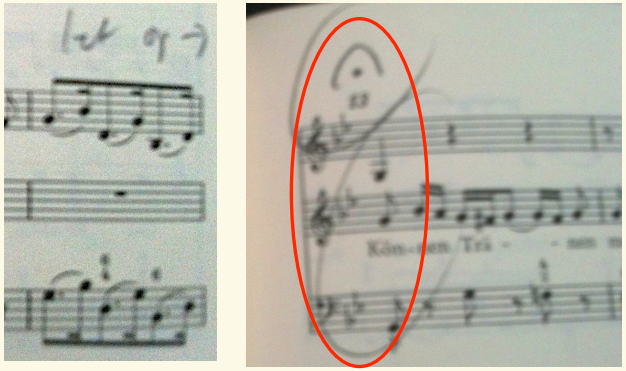
- toy example
  - digital score for performance
  - Westerkerkkoor, Amsterdam (2012)

Artefact modelling

continuous note taking

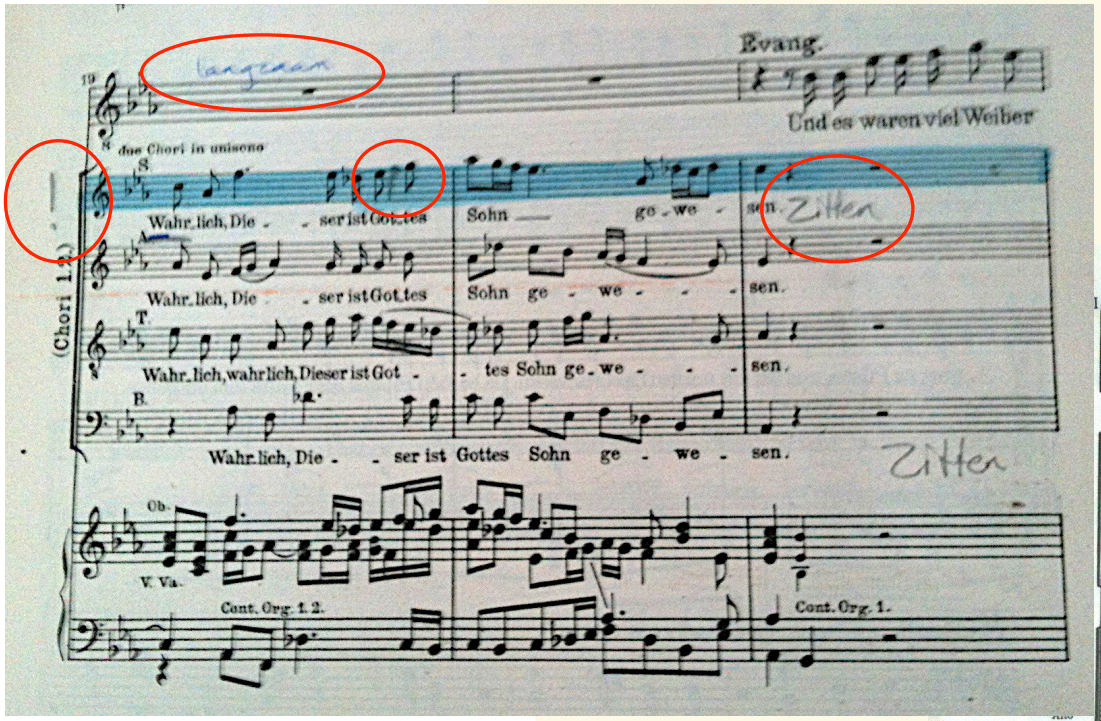


violin part

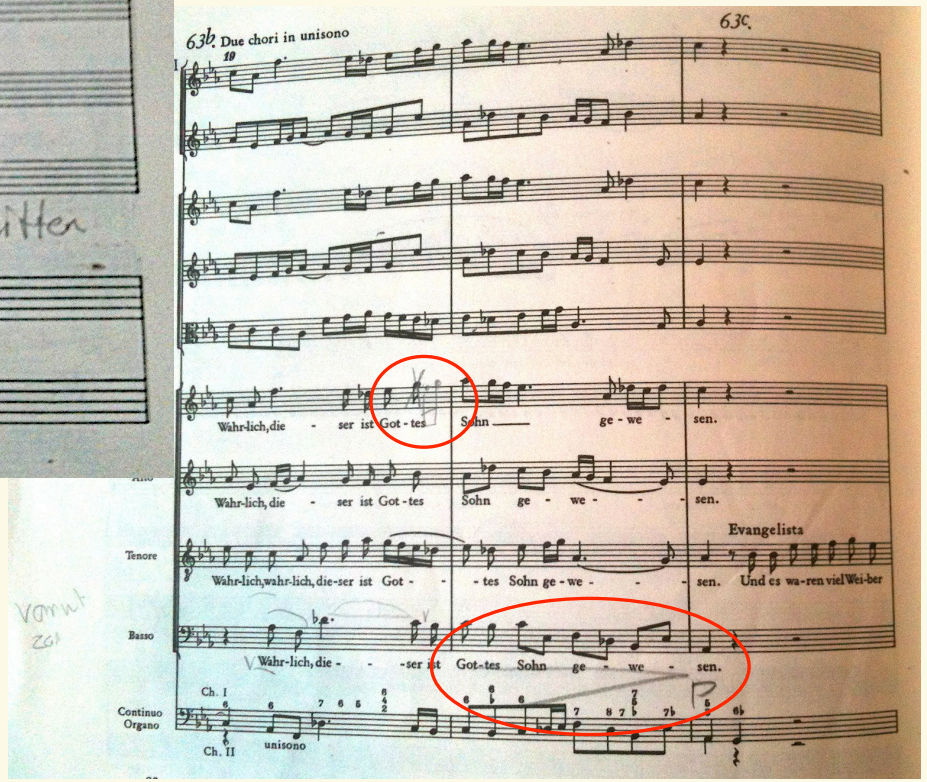


conductor's score

Scores used by singers



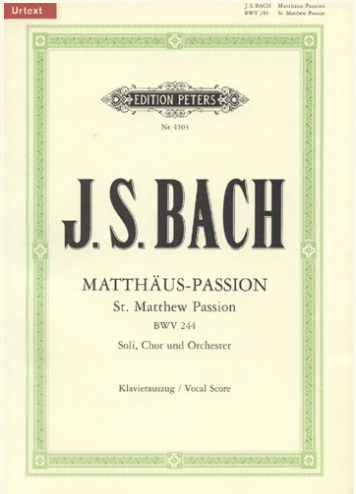
annotations
- changes
- interpretation decisions
- warnings/problems



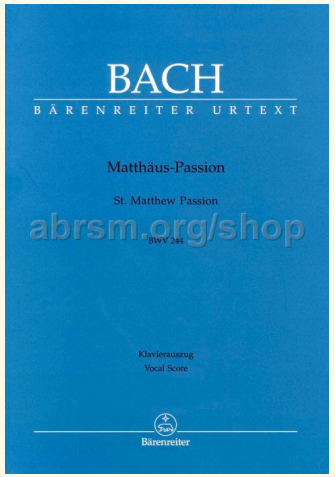
breakdowns:
- inconsistencies between singers
- previous performances
- different editions

Sample breakdown

MATTHÄUSPASSION	Westerkerkkoor		2013		
Nummering					
Bärenreiter	Peters	**SVP in je eigen bladmuziek aantekenen!!**			
		NB Staan / zitten is hier en daar anders dan bij eerdere uitvoeringen. SVP controleren!			
		Koor I	Koor II		
1	1	X *(x=zingt)*	X *(x=zingt)*	Kommt, ihr Töchter…	
2	2			Da Jesus diese…	
3	3	X	X	Herzliebster	
4.a	4			Da versammleten…..	
4.b	5	X	X (hierna zitten)	Ja nicht auf das Fest	
4.c	6			Da nun Jesus	
4.d	7	X		Wozu dienet…	
4.e	8	(hierna zitten)		Da das Jesus merkete..	
5	9			Du lieber Heiland	
6	10			Buß und Reu	
7	11			Da ging hin der Zwölfen einer	
8	12	(hierna staan)		Blute nur…	
9.a	13			Aber am ersten Tage	
9.b	14	X		Wo, wo willst du…	



12.80 €



16,95 €

- directions for renumbering from email attachment
  - identified through participatory observation

Today's focus

- identify PACT elements
- the role of the analyst
- artifacts and breakdowns