

“Ain schone kunstliche underweisung”: Modelling German lute tablature in MEI

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Joint MEC and TEI Conference *Encoding cultures*
Paderborn, Germany, 4-8 September 2023



Hans Judenkönig, *Ain schone kunstliche underweisung* (Vienna, 1523), title page; f. a i

Overview |

- Preliminaries: context
 - The E-LAUTE project
 - A very brief introduction to Renaissance lute tablature
- Modelling German lute tablature (GLT) in MEI: a walkthrough of issues faced and solutions proposed
 - Focus on three selected issues
 - Work in progress – opportunity to get feedback from the community (you!)



Preliminaries

E-LAUTE | The project

- The E-LAUTE project (mod. 1, 2023-25) is concerned with lute tablatures from German-speaking areas, 1450-1550
 - 29 mss + 16 prints, for a total of 550 folios + 1115 pages
- Corpus has never been investigated as a whole
 - **Inaccessibility**. Sources scattered throughout central Europe; not all of them publicly available in digital form
 - **Methodological infancy**. Consistent research methods for corpora in specialist notations (e.g., tablatures) do not exist yet
 - **Illegibility**. The corpus almost exclusively contains music in German lute tablature, which is notoriously hard to read

E-LAUTE | Aim

- The project aspires to investigate the corpus as a whole
- Main aim is to create a novel form of digital music edition: an *open knowledge platform*
 - A comprehensive, interactive, digital scholarly edition in which scholarship and music practice interweave, and which includes the user in the dialogue
 - A transformation of the classic edition into a space of interdisciplinary and discipline-specific work

E-LAUTE | Edition

- Formed by complementary individual components (facsimile, encodings, transcriptions, recordings)
 - **Digital**, i.e., accessible online; **interlinked** using LD techniques
 - **Enriched** with music-historical and performance-practical data
 - Created by **combining** modern music IR methods with traditional musicology, performance practice, and German studies methods
- **Electronic Linked Annotated Unified Tablature Edition**
- Interactive/dynamic: users can co-edit using custom tools
- Hosted online by the ÖNB; integrated into RISM Online

E-LAUTE | Funding

- Weave [1]: a cross-European Science Europe [2] initiative to fund and support “excellent collaborative research projects across borders”
- Researchers from three different countries can apply. Participating national funding organisations for E-LAUTE
 - Fonds zur Förderung der wissenschaftlichen Forschung (**FWF**), AT
 - Deutsche Forschungsgemeinschaft (**DFG**), DE
 - Schweizerischer Nationalfonds (**SNF**), CH

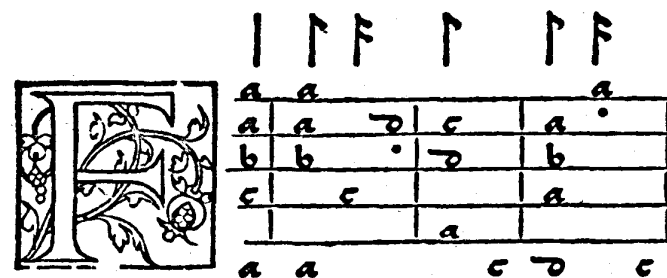
[1] <https://weave-research.net/>; [2] <https://www.scienceeurope.org/>

E-LAUTE | Website



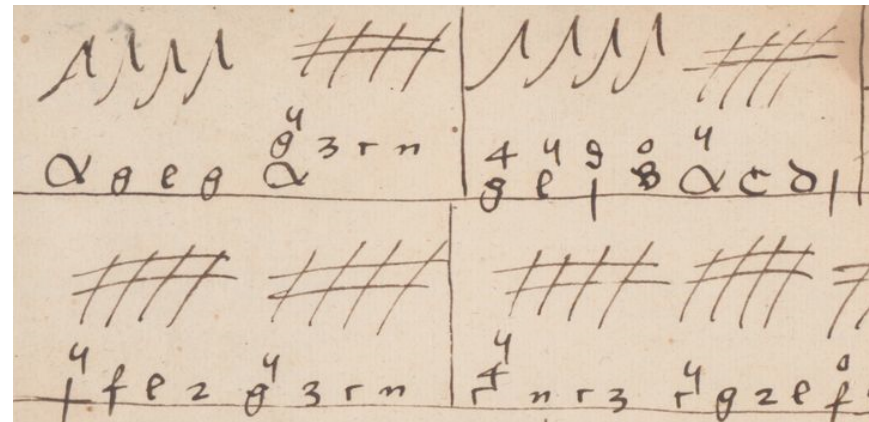
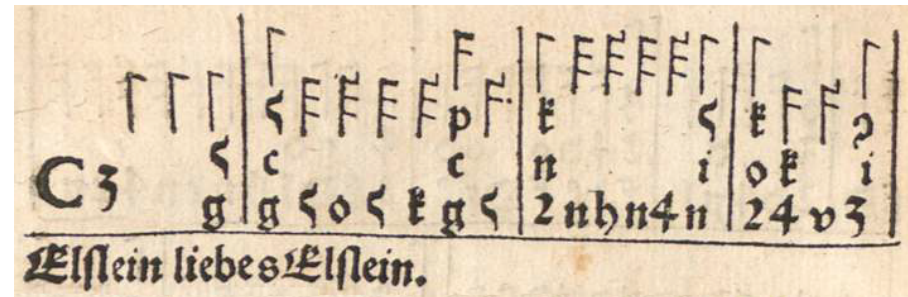
Lute tablature | Staff-based

- 'Staff'-based lute tablature systems (FLT/ILT/SLT)
 - Uses a small set of letters or numbers (denoting frets) placed on horizontal lines (denoting courses)
 - Visual and intuitive
 - (System is still in use today as modern guitar tablature!)
 - MEI model exists (incomplete)

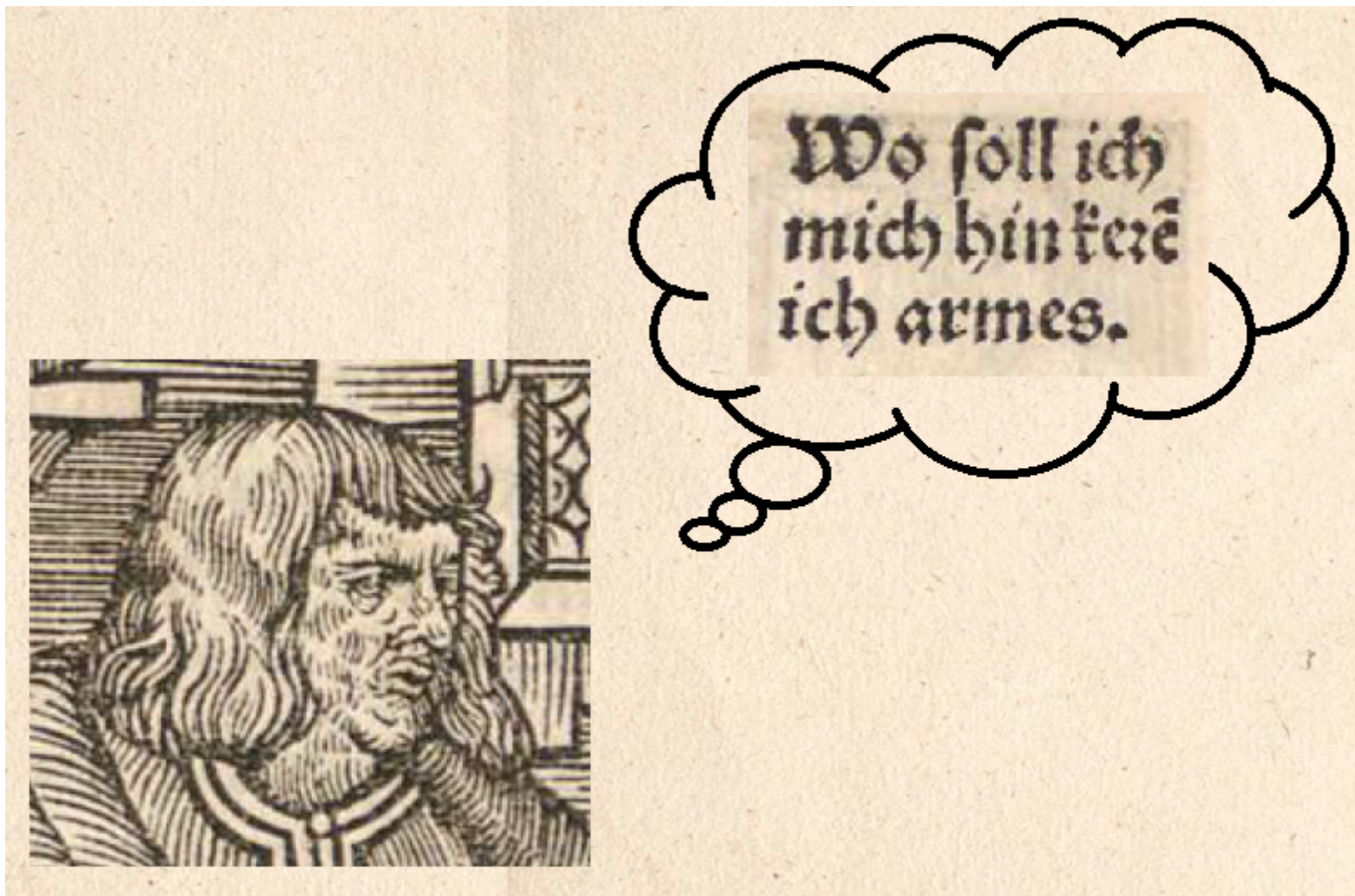


Lute tablature | German

- German lute tablature system
 - Uses different larger sets of unique symbols (letters, numbers, and other) for all individual fret-course combinations; no staff
 - Has similarities/overlap with keyboard tablature
 - Abstract and unintuitive
 - MEI model does not exist



Lute tablature | German





Modelling

Premises |

- **Continuation/consistency.** We extend the existing MEI tablature model (covering FLT/ILT/SLT) to include GLT
 - The staff-based and German tablature systems look different, but encode the same information. We can – and should – therefore build on the existing MEI model
- **Reuse.** We do not want to reinvent the wheel, and use existing general MEI mechanisms where possible
 - ... but are mindful that we do not change their semantics
- **Simplicity.** We look for simple and elegant solutions

Existing model | Basic structure

- The general structure of an MEI file encoding tablature is the same as that of one encoding CMN
- But there are a few important differences
 - The tablature type must be specified on `<staffDef>` – necessary to link frets to symbols
 - The tuning must be specified in `<staffDef>` – necessary to link symbols to pitches
 - The `<tabGrp>` is the main building block, and contains a `<tabDurSym>`, indicating the presence of a rhythm flag (opt.), and one or more `<note>`s with the same onset time

Existing model | FLT example

The diagram illustrates the transformation of a historical lute tablature into a modern notation. The top part shows a historical tablature with a decorative initial 'F' and a five-line staff with letters 'a', 'b', 'c', 'd', 'r'. The bottom part shows a simplified version of the same tablature with a four-line staff and the same letters. Two blue arrows point from the top to the bottom, indicating the transformation process.

```

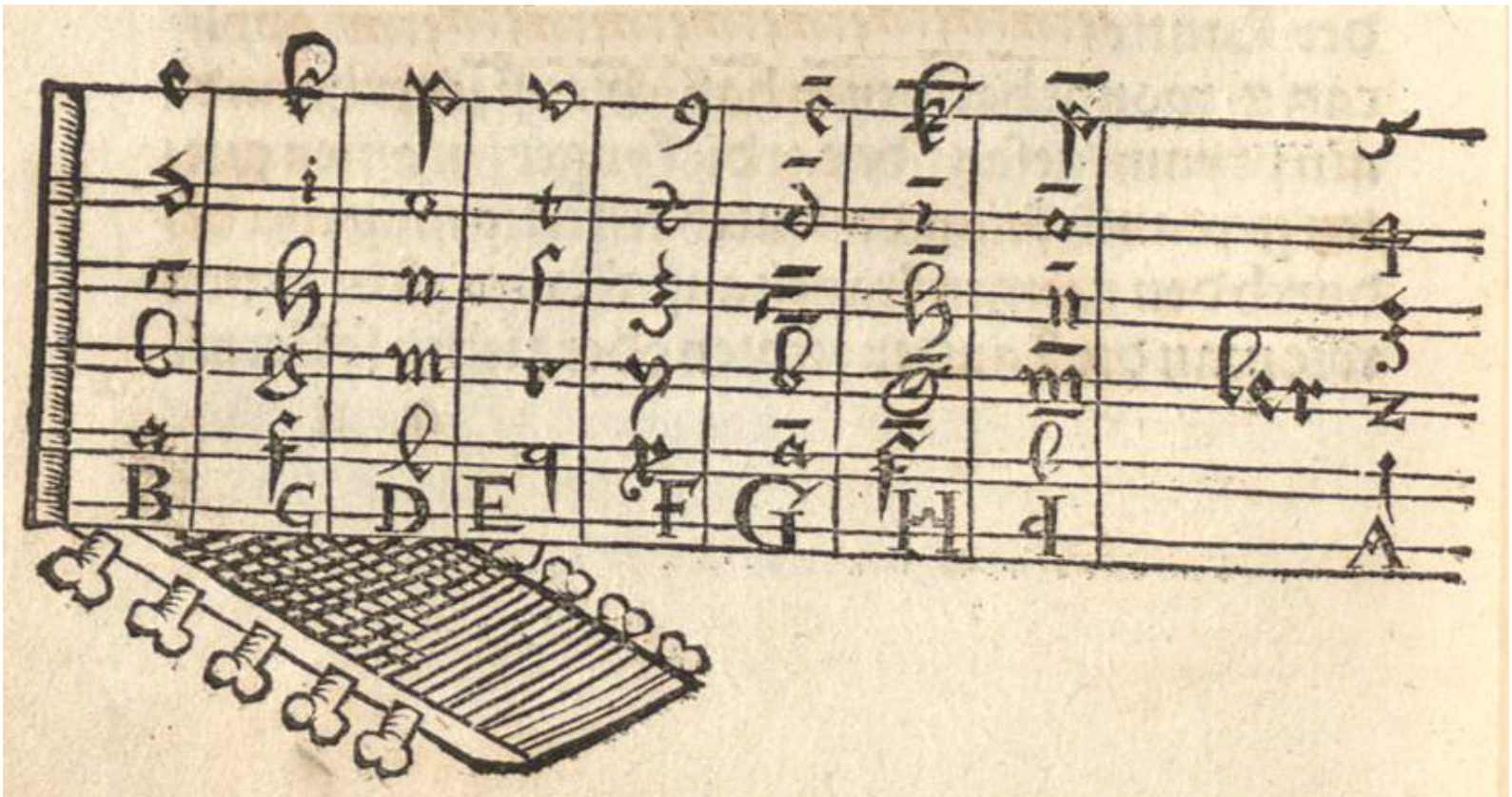
1 <staffDef n='1' lines='5'
2     notationtype='tab.lute.french'>
3     <tuning tuning.standard=
4         'lute.renaissance.6' />
5 </staffDef>
6
7 [...]
8
9 <tabGrp dur='4'>
10     <tabDurSym />
11     <note tab.course='1' tab.fret='0' />
12     <note tab.course='2' tab.fret='0' />
13     <note tab.course='3' tab.fret='1' />
14     <note tab.course='6' tab.fret='0' />
15 </tabGrp>
16 <tabGrp dur='8'>
17     <tabDurSym />
18     <note tab.course='4' tab.fret='2' />
19 </tabGrp>
20 <tabGrp dur='8'>
21     <note tab.course='2' tab.fret='3' />
22 </tabGrp>

```


Model extension | Issues faced

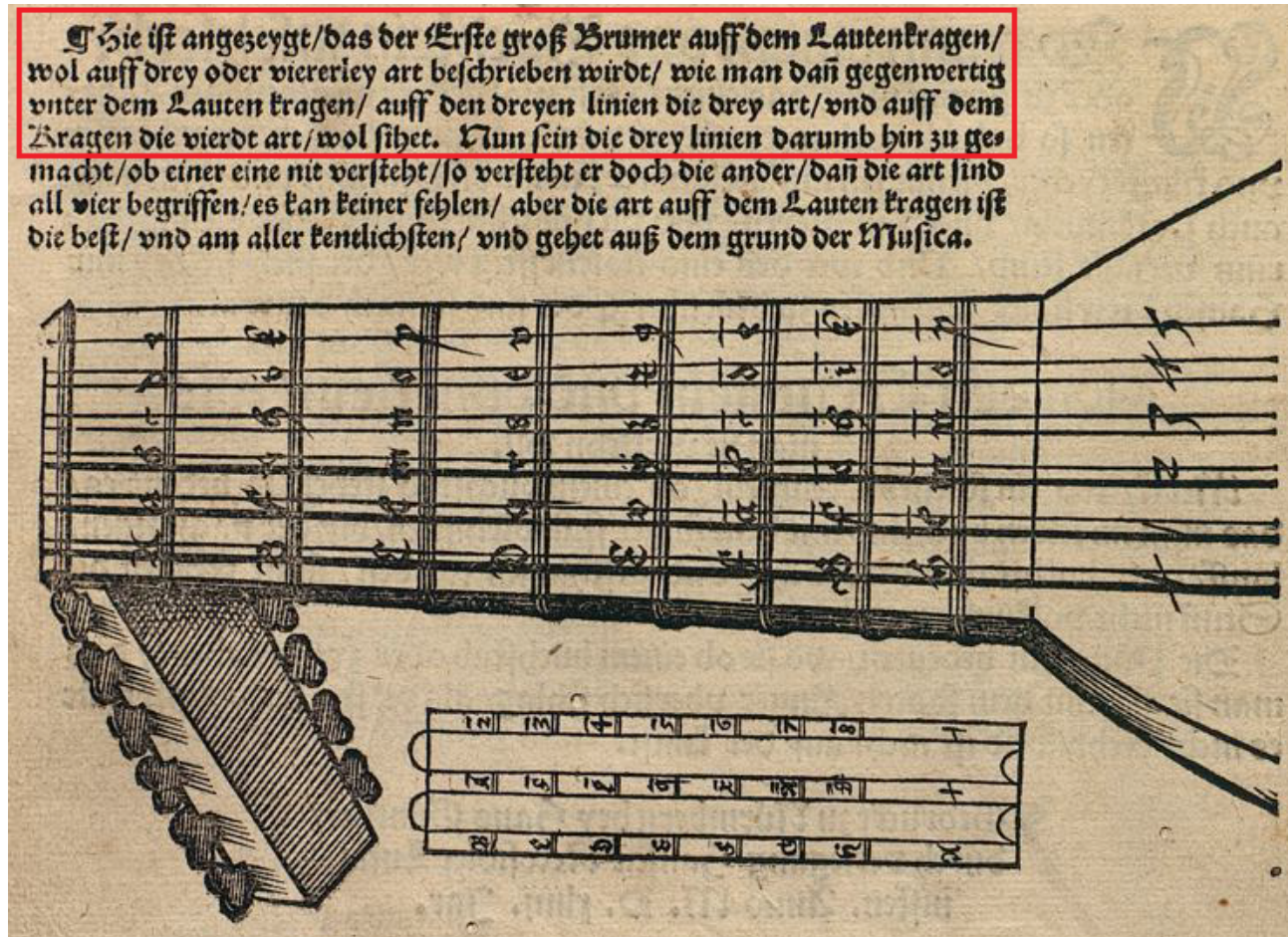
- Different sets of symbols are used across the sources
 - The sources generally agree on the symbols used for courses 1-5, but vary considerably w.r.t. those used for course 6
- Absence of a staff
 - GLT needs no staff. How can a model that is almost entirely staff-based accommodate this?
- Inconsistent vertical placement of symbols
 - The placement of the symbols is not always systematic, and may have a meaning. It should be possible to encode placement of symbols (fret symbols and others) exactly as in the source

Symbols | Variants



Hans Judenkünig, *Ain schone kunstliche underweisung* (Vienna, 1523), f. a ii^v

Symbols | Variants



Hans Newsidler, *Das Erst Buch* (Nuremberg, 1544), f. H iv^v

Symbols | Default set

- First, we define a default set of symbols, consisting of
 - The set of symbols that are the same across the sources + the remaining symbols used most frequently (represents clear usage)
 - This conforms with the Newsidler variant ('+AB')
- The default set ensures that tablature notes are always interpreted consistently
- The default set appears as a table in the MEI guidelines
- When no additional information (see below) is given in the encoding, the default set is assumed

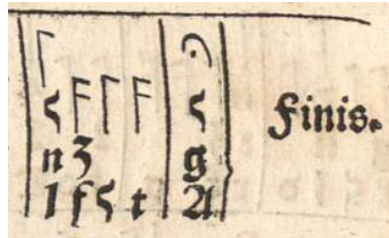
Symbols | Non-default symbols

- Then, with the default set in place, non-default symbols can be handled in three different manners. In increasing level of granularity, these are
 - **Case by case**, using attributes from the `att.extSym` class on `<note>` to define the non-default symbol (local approach)
 - In **'local default sets'**, using `<symbolTable>` in `<scoreDef>` (local-global approach)
 - In predefined **'variant sets'**, using `@notationsubtype` on `<staffDef>` (global approach)

Symbols | Case by case

- Attributes from the `att.extSym` class on `<note>` define the symbol
 - `@glyph.auth`. A controlled vocabulary the symbol is taken from
 - `@glyph.num`. The symbol's numerical (hexadecimal) reference
 - `@glyph.name` (optional). The symbol's name

Symbols | Case by case



```
1 <staffDef n='1' [...]
2     notationtype='tab.lute.german'>
3     <tuning tuning.standard=
4         'lute.renaissance.6' />
5 </staffDef>
6
7 [...]
8
9 <tabGrp dur='2' dots='1' fermata='above'>
10    <note tab.course='1' tab.fret='0' />
11    <note tab.course='4' tab.fret='2' />
12    <note tab.course='6' tab.fret='0'
13         glyph.auth='smufl'
14         glyph.num='U+EC17'
15         glyph.name='luteGermanAUpper' />
16 </tabGrp>
```

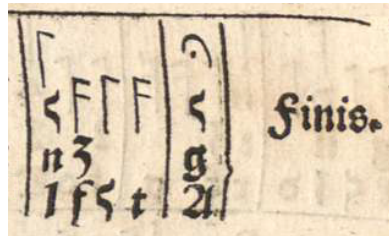
Symbols | Case by case

- Use case: only a handful of non-default symbols are used
- Pros: simple
- Cons: opaque and verbose
 - Complete set of non-default symbols used is not immediately clear
 - Additional attributes needed on every `<note>` with a non-default symbol

Symbols | Local default sets

- The complete set of non-default symbols (a local default set) is defined in a `<symbolTable>` in `<scoreDef>`
 - The `<symbolTable>` defines the local default as a set of `<symbolDef>`s w/ a unique `@xml:id` and containing a `<symbol>`
 - `@altsym` is used on `<note>` to refer to an element of the table

Symbols | Local default sets



```
1 <scoreDef>
2   <staffGrp>
3     <staffDef n='1' [...]
4       notationtype='tab.lute.german'>
5         <tuning tuning.standard=
6           'lute.renaissance.6' />
7       </staffDef>
8     </staffGrp>
9     <symbolTable>
10      <symbolDef xml:id='alt6-0'>
11        <symbol glyph.auth='smufl'
12          glyph.num='U+EC17'
13          glyph.name='luteGermanAUpper' />
14      </symbolDef>
15    </symbolTable>
16  </scoreDef>
17
18  [...]
19
20 <tabGrp dur='2' dots='1' fermata='above'>
21   <note tab.course='1' tab.fret='0' />
22   <note tab.course='4' tab.fret='2' />
23   <note tab.course='6' tab.fret='0'
24     altsym='#alt6-0' />
25 </tabGrp>
```

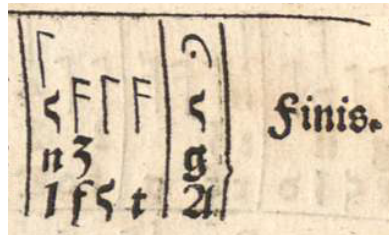
Symbols | Local default sets

- Use case: a fixed set of variant symbols is used within a single piece (but not beyond it)
- Pros: transparent
 - Complete set of non-default symbols used is immediately clear
- Cons: verbose
 - `<symbolTable>` needed; one additional attribute needed on every `<note>` with a non-default symbol

Symbols | Predefined variant sets

- If a complete set of non-default symbols (a variant set) is used in more than one source, it is defined globally on `<staffDef>` as a value of `@notationsubtype`
 - The default set is still defined on `<staffDef>` as a value of `@notationtype`
- The variant set appears as a table in the MEI guidelines

Symbols | Predefined variant sets



```
1 <staffDef n='1' [...]
2     notationtype='tab.lute.german'
3     notationsubtype='judenkuenig_1523'>
4     <tuning tuning.standard=
5         'lute.renaissance.6' />
6 </staffDef>
7
8 [...]
9
10 <tabGrp dur='2' dots='1' fermata='above'>
11     <note tab.course='1' tab.fret='0' />
12     <note tab.course='4' tab.fret='2' />
13     <note tab.course='6' tab.fret='0' />
14 </tabGrp>
```

Symbols | Predefined variant sets

- Use case: a set of non-default symbols is used in multiple sources (i.e., is no longer a local default). Example: the different sets of symbols for the sixth course
- Pros: transparent and non-verbose
 - Complete set of non-default symbols used is predefined and ready-to-use
 - Only one additional attribute needed
- Cons: none!

Staff and verticality |

- GLT uses no staff – but the symbols are placed on an invisible structure that has staff-like properties
 - It contains barlines, repeat signs, mensuration signs
 - Symbols are placed at different vertical positions ('rows')
- We see three practices for vertical placement
 - **Top-aligned** (w/ rhythm flags above the top row)
 - **Bottom-aligned** (w/ rhythm flags above the top row)
 - **Other**. Symbols and rhythm flags can be in any row, possibly following some underlying logic

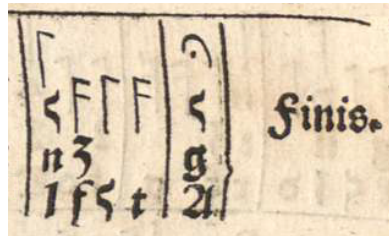
Staff and verticality | Lines/rows

- An invisible staff is defined by using, on `<staffDef>`, `@lines` and `@lines.visible` set to `'false'`. The n invisible lines assume the function of the n rows
 - *In* which the tablature notes are placed
 - *Above* or *in* which the rhythm flags are placed
 - *In, between, and above/below* which any other symbols are placed
- Furthermore, `@valign`, taking only values `'top'` (default) and `'bottom'`, auto-aligns symbols towards top or bottom

Staff and verticality | Position

- `@loc` on `<note>` overrides the vertical position of a symbol as dictated by `@valign`; `@loc` on `<tabDurSym>` overrides the default position of a flag above the staff
 - `@loc` indicates the position on the staff by means of an integer, where `'0'` represents the lowest staff line, `'1'` the space between the lowest and second-lowest staff lines, etc.
 - `@loc` is not constrained to the staff, and can also be used to place symbols above or below the staff
 - The numbering is slightly unintuitive, but provides the precision needed to place all symbols (including fingerings, ornaments, ...) anywhere on, above, or below the staff

Staff and verticality |



```
1 <staffDef n='1' lines='3' lines.visible=  
2           'false' valign='bottom'  
3           notationtype='tab.lute.german'  
4           notationsubtype='judenkuenig_1523'  
5     <tuning tuning.standard=  
6           'lute.renaissance.6' />  
7 </staffDef>  
8  
9 [...]   
10  
11 <tabGrp dur='4'>  
12   <tabDurSym />  
13   <note tab.course='1' tab.fret='0' />  
14   <note tab.course='3' tab.fret='3' />  
15   <note tab.course='5' tab.fret='0' />  
16 </tabGrp>  
17 <tabGrp dur='8'>  
18   <tabDurSym loc='4' />  
19   <note tab.course='3' tab.fret='0' />  
20   <note tab.course='5' tab.fret='2' />  
21 </tabGrp>  
22 <tabGrp dur='4'>  
23   <tabDurSym loc='4' />  
24   <note tab.course='1' tab.fret='0' />  
25 </tabGrp>  
26 <tabGrp dur='8'>  
27   <tabDurSym loc='4' />  
28   <note tab.course='2' tab.fret='4' />  
29 </tabGrp>
```

Full example |

Handwritten musical score for the piece "Ellein liebes Ellein." The score is written in a medieval style with square neumes on a four-line staff. The lyrics are written in Gothic script below the neumes. The piece begins with a C-clef and a 3/4 time signature. The score is divided into measures by vertical bar lines. The lyrics are: "Ellein liebes Ellein." The piece ends with the word "Finis." The score is written on aged, yellowed paper.

Ellein liebes Ellein.

Finis.

Full example |

Elslein liebes Elslein.

C

5 g | 5 c g | 5 o 5 e g 5 | e n | n h n 4 n | e o | e v | 9 j |

9 3 2 g 3 h 2 | p c g | 5 n | o 4 j f | 2 f | 3 2 3 c | e | p g | 9 n | p c g |

5 n | 5 e | p | e n | 5 g | o 3 f | 4 c f | 5 n | 3 f t | 5 g | 2 f | 3 2 3 c | e | p g |

9 n | r | 2 p c g | 5 g | f | 5 g | o 3 f | 4 c f | 5 n | 3 f 5 t | 5 g |

Thank you! |

- Contact
 - <https://e-laute.info/>
- Links
 - Tab IG repo. <https://github.com/music-encoding/tablature-ig/>
 - *An MEI model for GLT.* <https://tinyurl.com/MEI-german/>

