HNS2CF
A MAPPING TOOL FROM HAMNOSYS TO SL CATFORM

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OBJECTIVE

Many different ways of representing sign forms – e.g., Stokoe Notation [1], SignWriting [2] – have been designed over the past 60+ years, each developed with certain goals and uses in mind. To promote annotation flexibility while avoiding data isolation, we argue there should be a robust effort to translate between systems. Here, we take a first step in this direction by mapping from the Hamburg Notation System (HamNoSys; [3]) to the new SL CatForm coding schema [4].

Our contributions:

- The HNS2CF mapping tool, the formal mapping rules, and implementation
- The Python code used to build the tool
- An empirical evaluation on German Sign Language (DGS) data

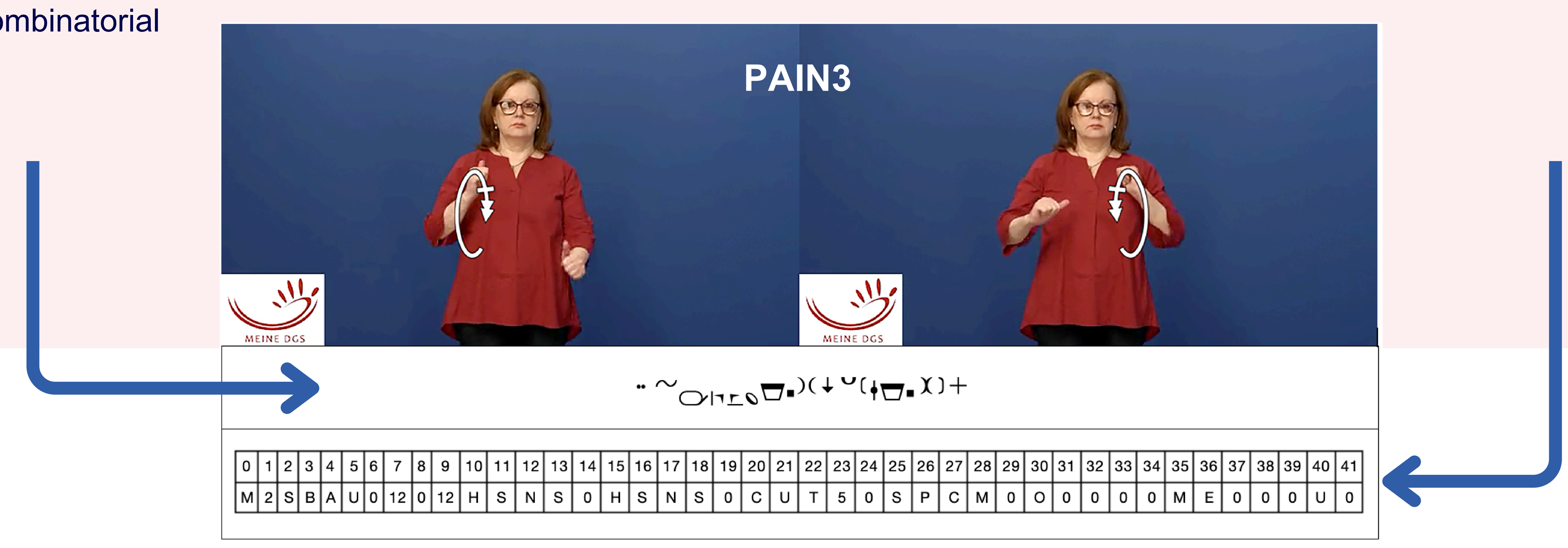
THE TWO NOTATION SYSTEMS

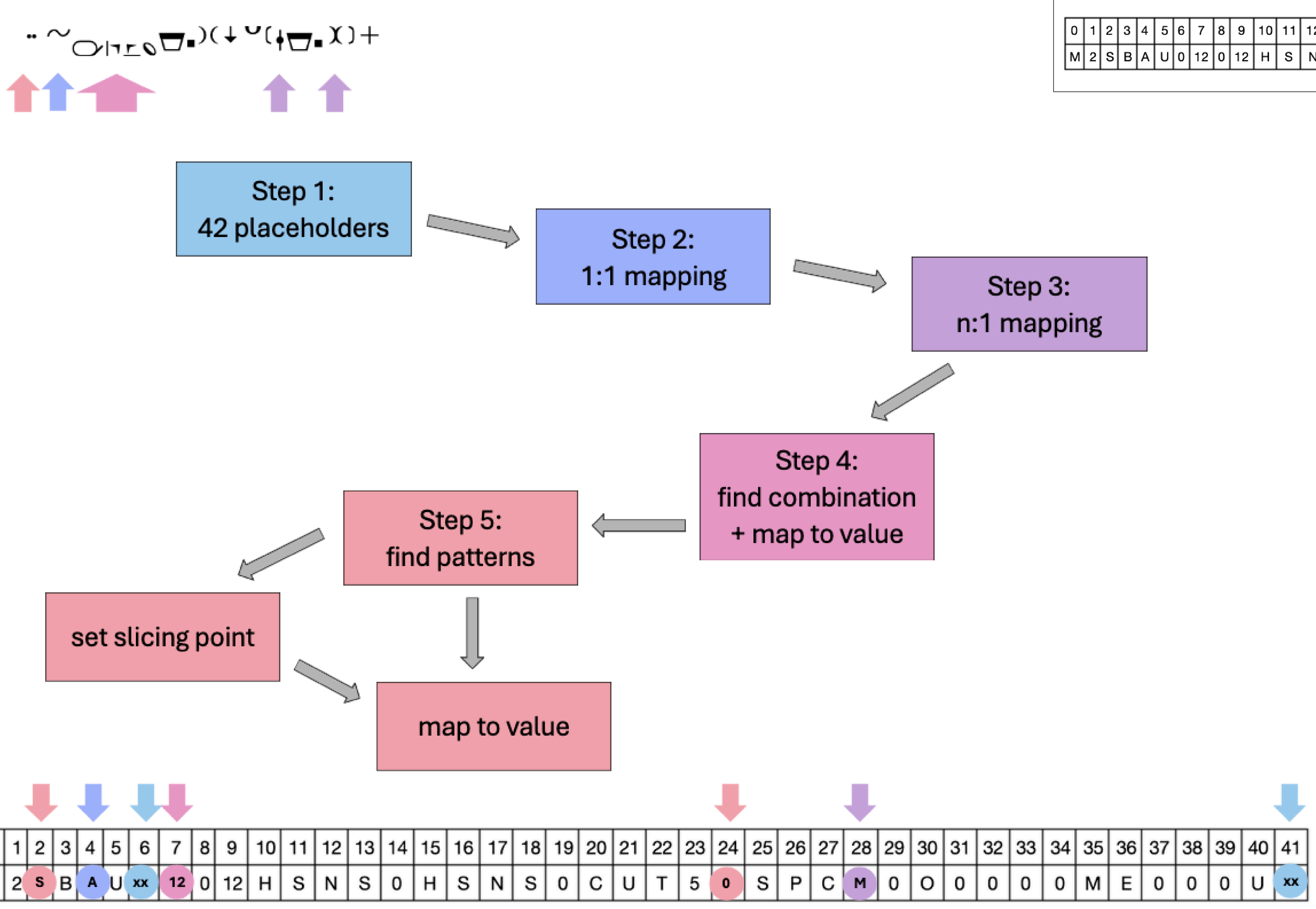
Hamburg Notation System (HamNoSys)

- Originally developed in the 1980s [5], but has undergone several improvements and extensions; we use HamNoSys version 3 [3]
- Encodes signs as linear strings of iconic symbols, representing the manual part of a sign and (optionally) non-manual features
- Encompasses roughly 200–210 characters (see example below [6])
- Follows a specific syntax and is inherently combinatorial

SL Cat Form Coding Schema

- A more recent phonological coding schema, designed to represent minimal units of categorical form in sign languages [4]
- Builds on the descriptive analysis of Kenyan Sign Language (KSL)
- Contains 42 variables, each consisting of a single or double alphanumeric character/s (see example below)
- Variables are fixed and independent => the system does not employ sequential ordering





MAPPING PROCESS

One to one mapping (1:1)

- Most straightforward mapping: direct matches from one HamNoSys character to one value in SL CatForm
- 18/40 variables that were mapped

Many to one mapping (n:1)

- Multiple characters in the HamNoSys string map to a single value within a variable in the SL CatForm string
- The most common mapping relation: 25/40 variables that were mapped

Combination

- Matching value for a variable is extracted from a fixed combination of multiple HamNoSys characters
- 11/40 variables that were mapped

Pattern

- Certain combinations of any character from a set of HamNoSys characters
- Once found, this triggers: a) set value for variable, **or** b) set slicing point, split the HamNoSys, and look only in specific part for matches
- 17/40 variables that were mapped

EVALUATION

Results

- Of 4,116 compared values (98 types * 42 variables) 76.7% (3,155 values; green) were matches, 16.9% (699 values; red) were mismatches, 0.6% (24 values; orange) the mapping tool could not find a suitable match, and 1,1% (42 values; yellow) were empty manual annotations
- Least accurate performance for **orientation** (52.1% mismatches); most accurate performance for **articulator** (only 3.9% mismatches)

Discussion

- First version of HNS2CF already performs well in the evaluation study, with 76.7% matches in 98 random DGS signs
- Many mismatches are not caused by HNS2CF itself, but other sources, e.g., the manual coder not feeling confident or mismatches for finger orientation that were later shown to be mapped correctly from HamNoSys (annotator disagreement)
- Potential improvements: 1) adding language-specific values to SL CatForm; 2) refining mapping logic for path axis 2; and 3) building reversed system from SL Cat-Form to HamNoSys to serve as validation tool and offer insights into the kind and amount of information lost during mapping

	matches	mismatches	no match found	no manual coding	not possible
articulator	561 (81.8%)	27 (3.9%)	0 (0%)	0 (0%)	98 (14.3%)
handshape	987 (77.5%)	265 (20.8%)	22 (1.7%)	0 (0%)	0 (0%)
orientation	102 (52.1%)	91 (46.4%)	0 (0%)	3 (1.5%)	0 (0%)
location	306 (78.1%)	80 (20.4%)	0 (0%)	6 (1.5%)	0 (0%)
core movement	684 (77.6%)	177 (20.1%)	2 (0.2%)	19 (2.2%)	0 (0%)
manner of movement	515 (75.1%)	59 (8.6%)	0 (0%)	14 (2.1%)	98 (14.3%)
total	3155 (76.7%)	699 (16.9%)	24 (0.6%)	42 (1.1%)	196 (4.8%)

For more information, please visit https://semasign.eu

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