

A sign by any other name

Prepared for the
SignWriting Symposium 2017

revision 02

by Stephen E Slevinski Jr

in association with the Center for Sutton Movement Writing



Sign

A sign is something that is meaningful to someone.

Signs exist in our minds, in our senses, and in the world.

A sign of a sign language can be written many ways on paper and many different ways on computer.

Some of these ways of writing a sign can be considered the writing of words, others ways are the writing of data.

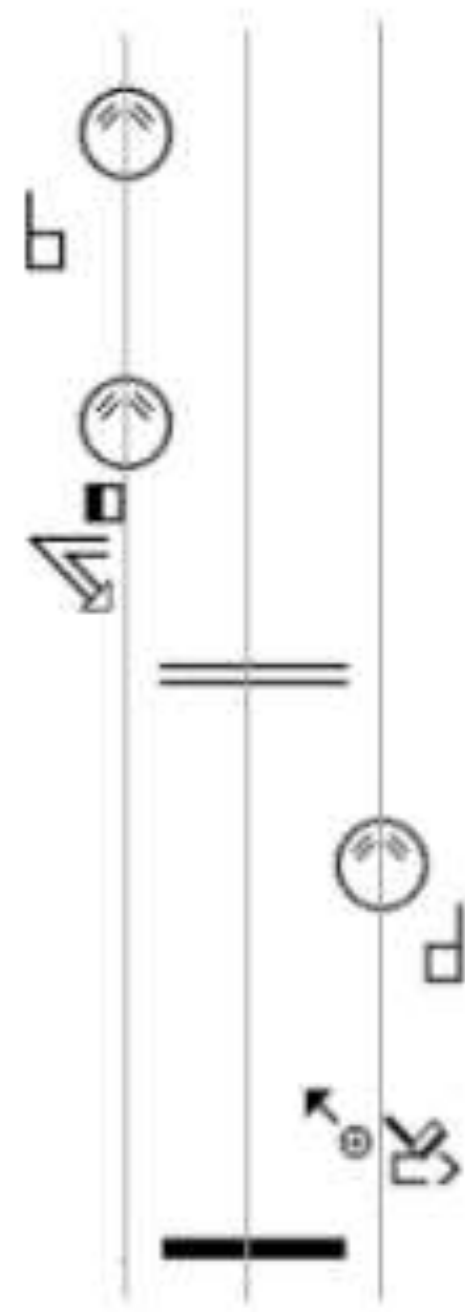
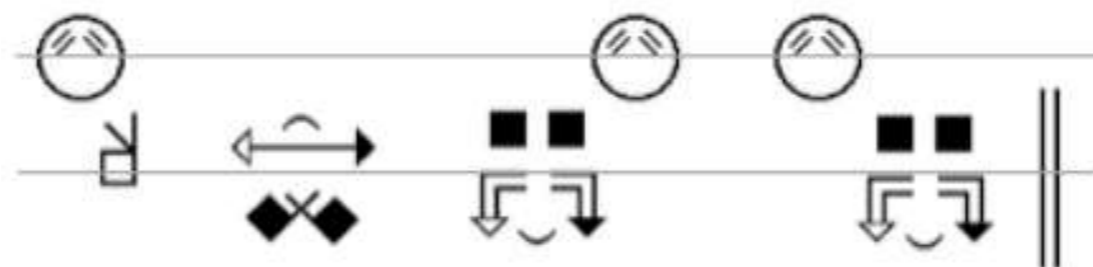
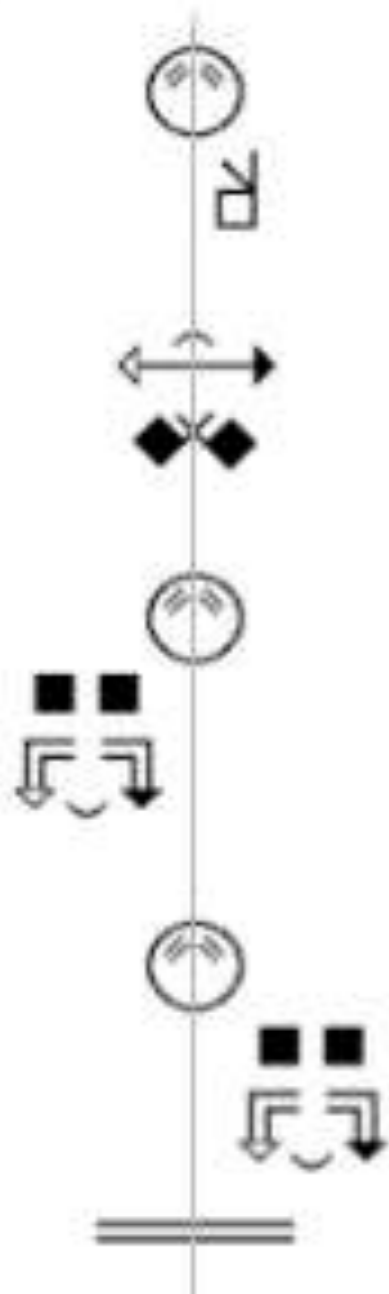
Sutton SignWriting

A script for sign languages.
ISO 15924 Script Code sgnw

Each sign is written as a word.

The words are 2-dimensional
clusters of symbols.

The words are combined
with punctuation to form text.



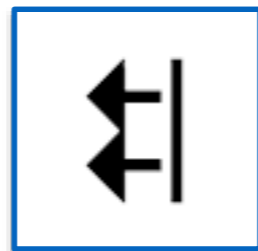
Formal SignWriting

A two-part word of time and space.

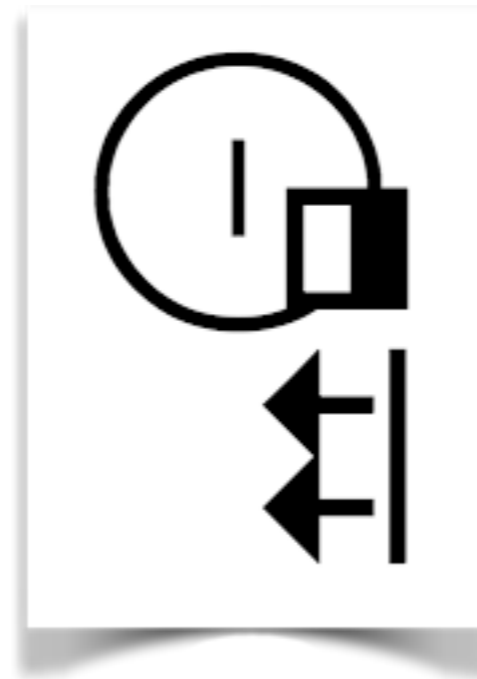
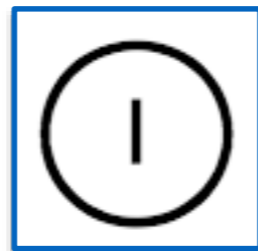
First syllable
Starting hand shapes



Second syllable
Movements and Dynamics



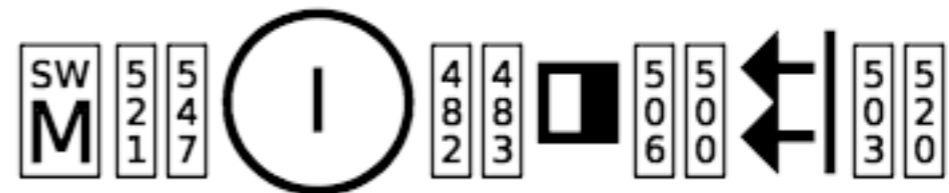
Third syllable
Faces and Locations



Layered writing in
2-Dimensions

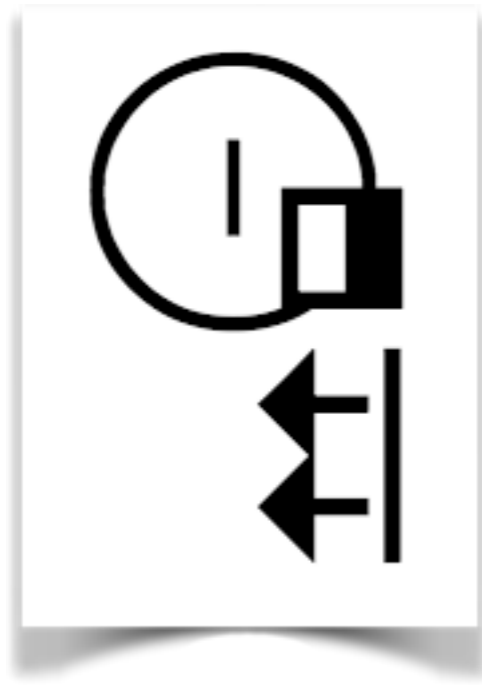


Temporal Prefix

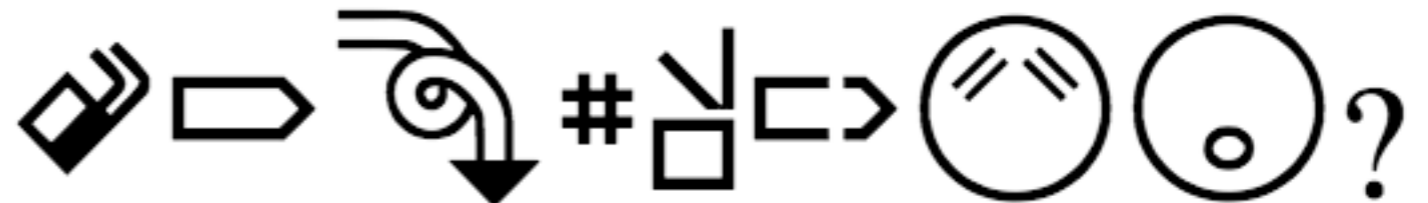
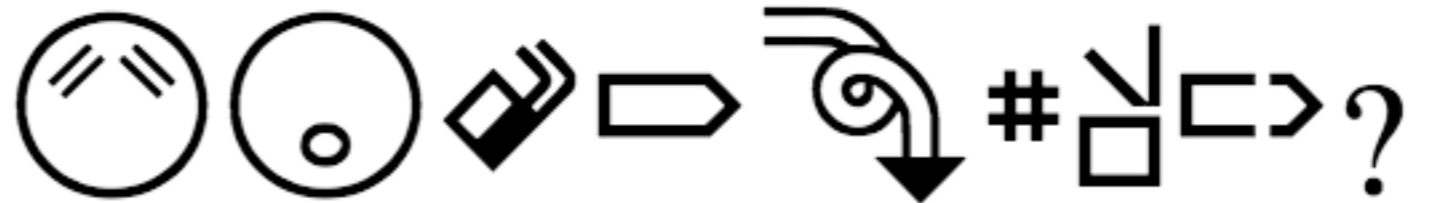
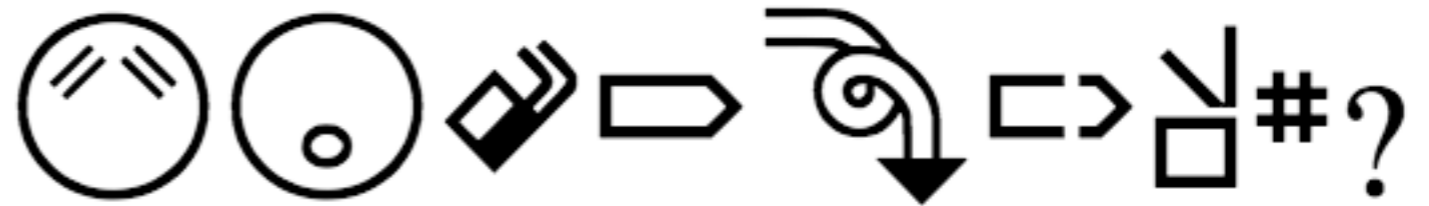
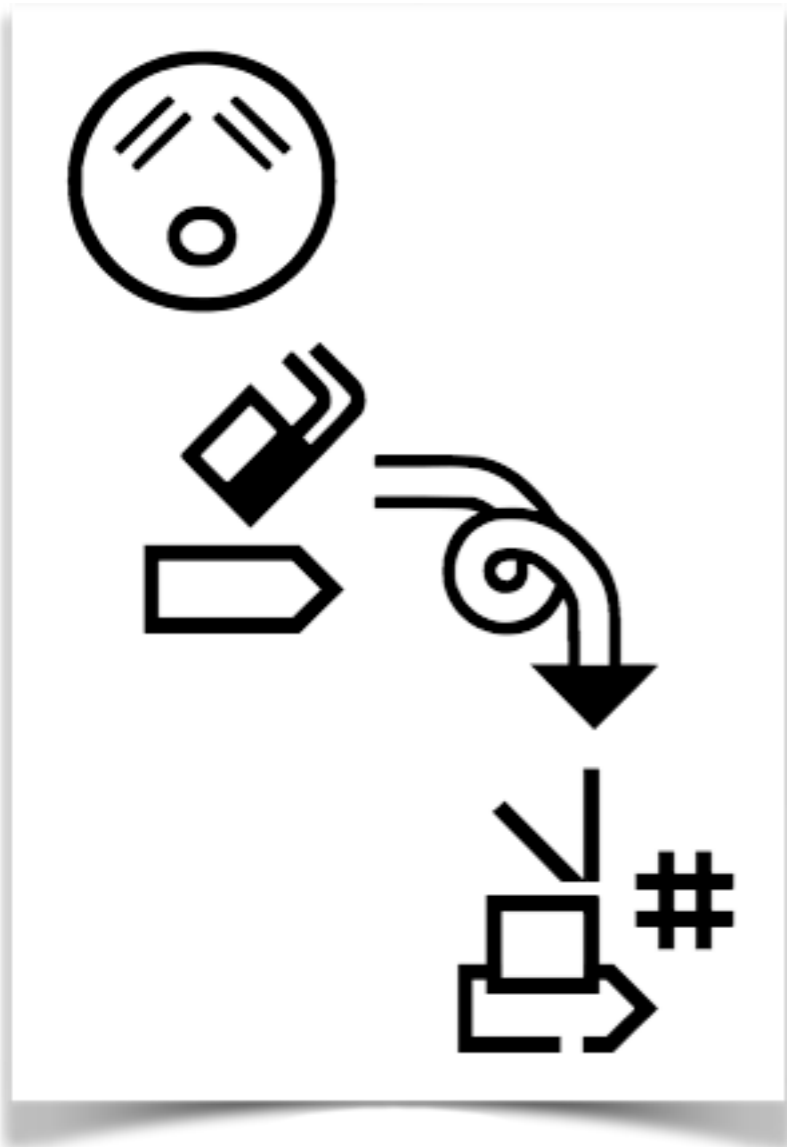


Spatial Signbox

How do you spell a sign?



What about something more complex?



The SignSpelling Sequence



First syllable starts with beginning hand positions.

Second syllable contains the movements and dynamics.

Additional syllables alternate between hand positions and movements.

The Last syllable contains faces and locations.

Used for sorting and rendered in dictionary

Syllable Types

Hand Positions

Movements Between

Faces & Locations

		Syllable 1 Hands Beginning Position
		Syllable 2 Movement Between Syllable 1 & 3
Syllable Types Hand Positions Movements Between Faces & Locations		Syllable 3 Hands Ending Position
		Syllable 4 Location & Facial Expressions

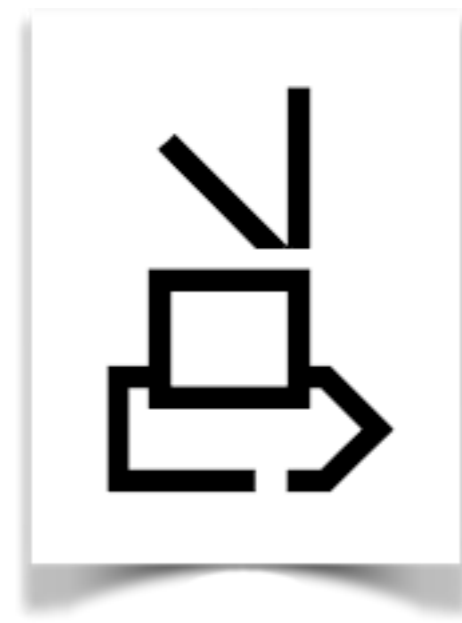
Two perspectives for Syllables

Front Perspective



a straight on view
of the signer

Top Perspective



a top-down view
of the signer

The Importance of palm facings

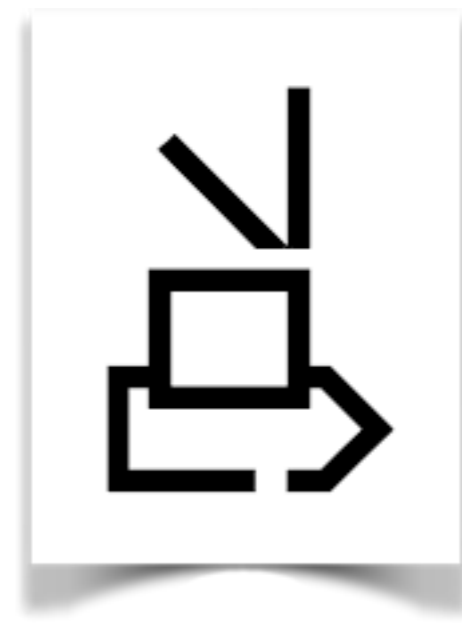
Front Perspective



White palm faces the signer.

Half palm faces to the side.

Top Perspective



Line breaks for
top perspective.

White palm faces up.

Arrow heads and tails

Black arrow head for right hand

Front Perspective



Double line tail

Movement
up then down

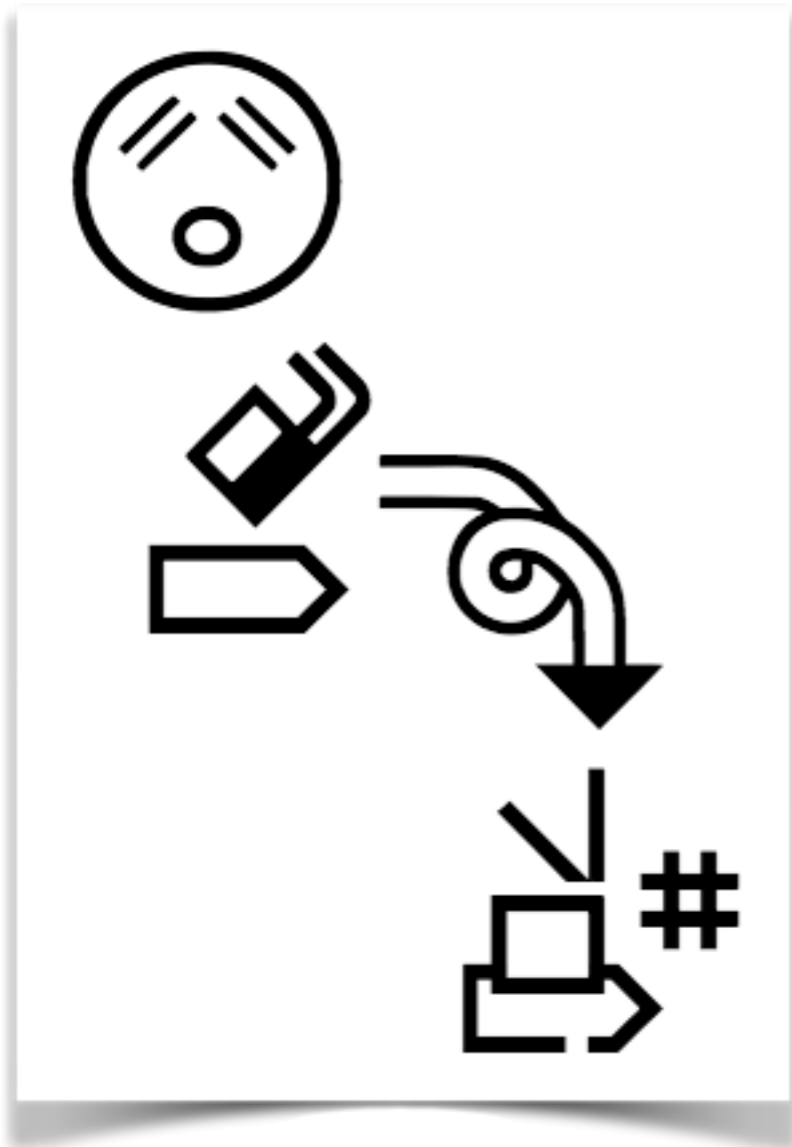
Top Perspective



Single line tail

Movement
away then back

Reading the sign



Starting position
Front perspective
Left palm facing signer
Right palm facing to side



Movement between
Front perspective
Right hand moves to the right, loops and down.
Hash mark for strike!

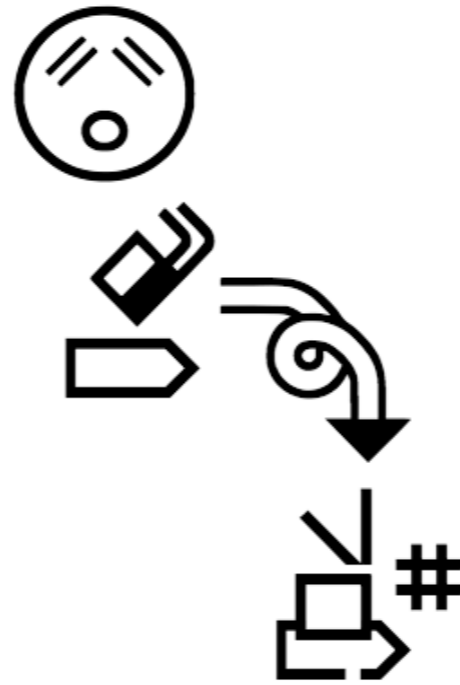









Ending position
Top perspective
Both palms facing up

How does

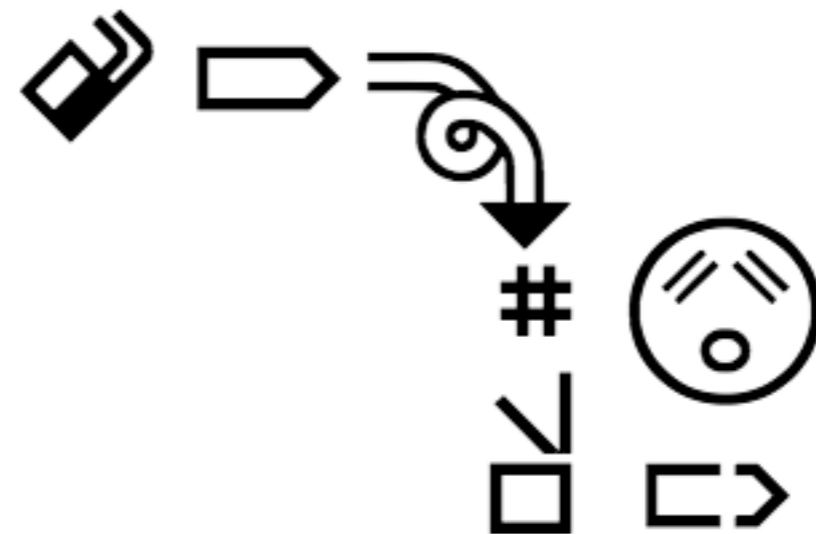
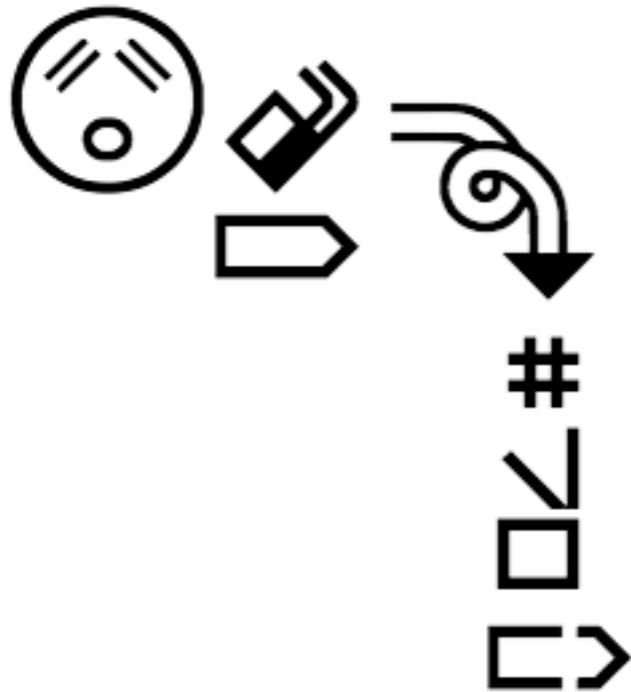


become



Why isn't    #    

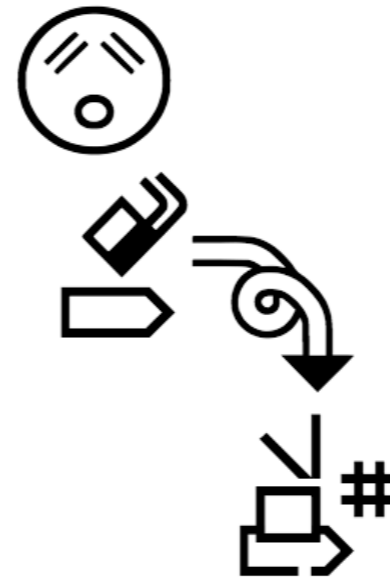
equal to something else?



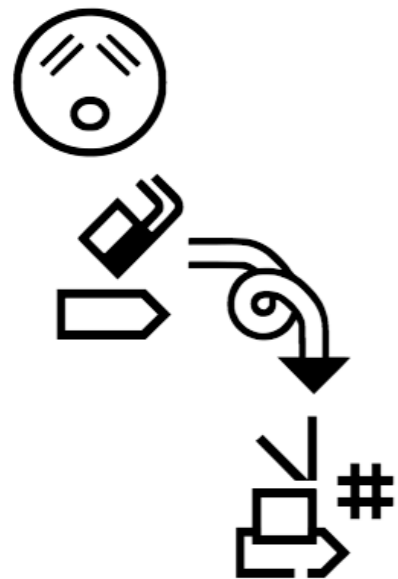


is fundamentally

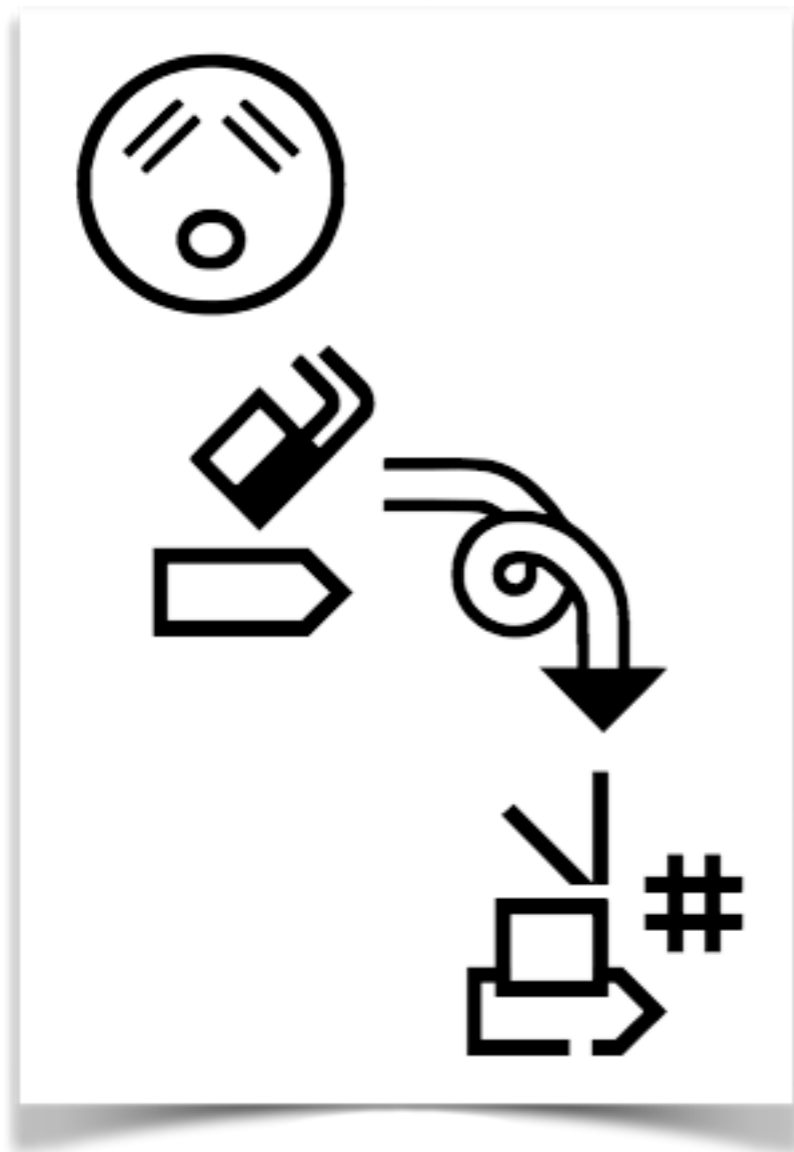
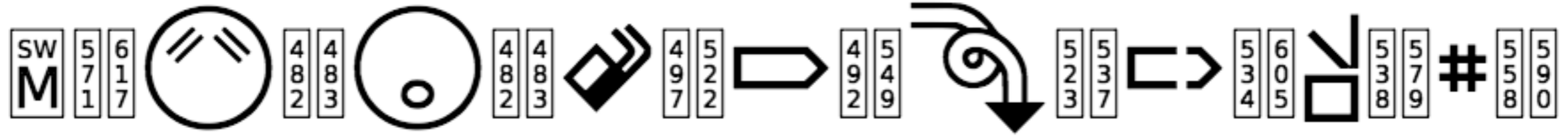
different than



!

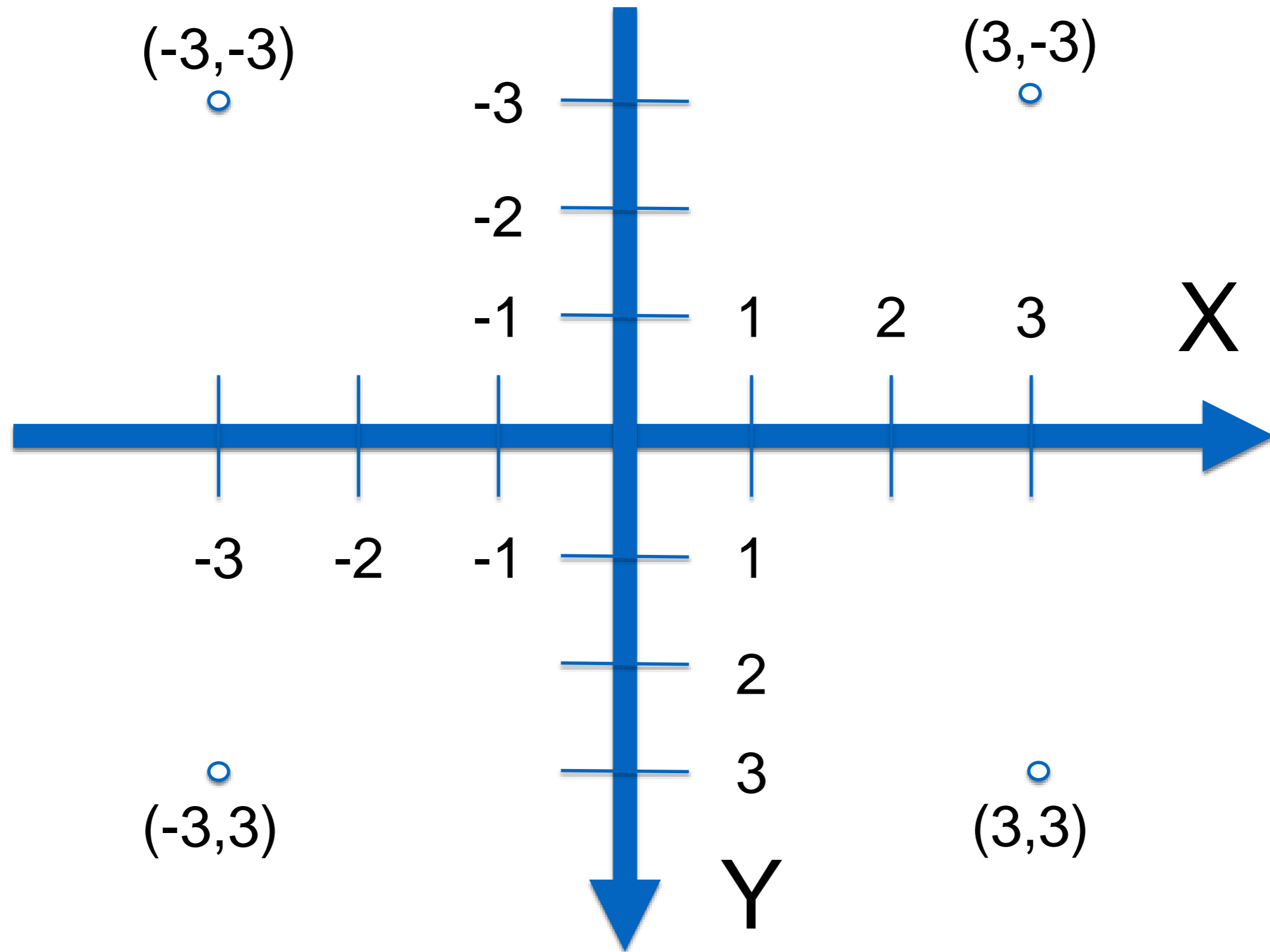


is equal to something else.



Layered writing in
2-Dimensions with
Cartesian Coordinates

Two-Dimensional Space with (X,Y) values



Writing in Two-Dimensional Space

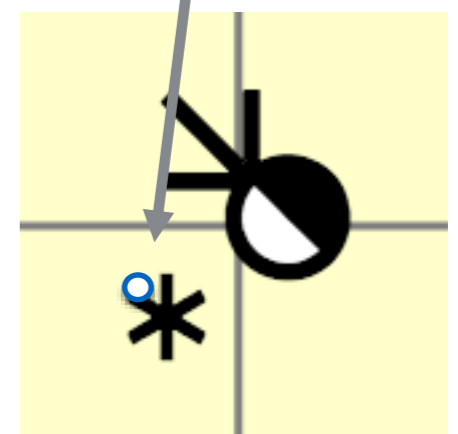
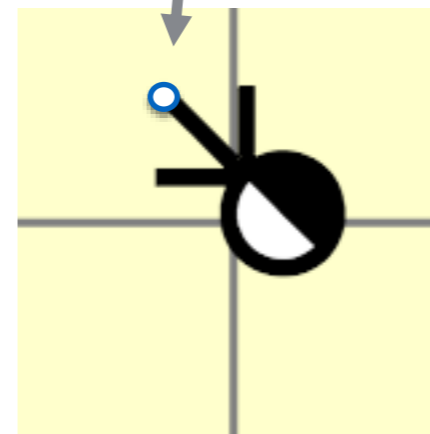
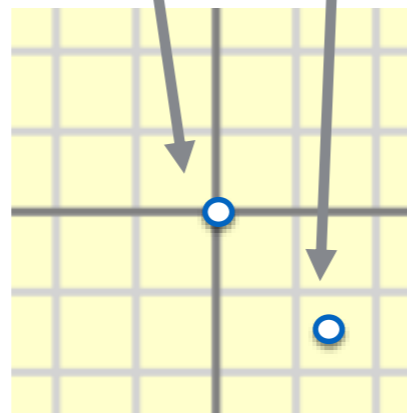
$$\begin{array}{|c|c|c|} \hline \text{SW} & 5 & 5 \\ \hline \text{M} & 1 & 1 \\ \hline & 4 & 7 \\ \hline \end{array} \begin{array}{|c|} \hline \text{♿} \\ \hline \end{array} \begin{array}{|c|c|} \hline 4 & 4 \\ \hline 9 & 8 \\ \hline 0 & 3 \\ \hline \end{array} * \begin{array}{|c|c|} \hline 4 & 5 \\ \hline 8 & 0 \\ \hline 6 & 6 \\ \hline \end{array} = \begin{array}{|c|c|} \hline \text{SW} & \\ \hline \text{M} & (514,517) \\ \hline \end{array} \begin{array}{|c|c|} \hline \text{♿} & (490,483) \\ \hline \end{array} * \begin{array}{|c|c|} \hline * & (486,506) \\ \hline \end{array}$$

Middle Lane Signbox Max Coord

Spatial Symbol

Spatial Symbol

Signbox Space



Both X and Y range from 250 to 749.

Center is (500,500)

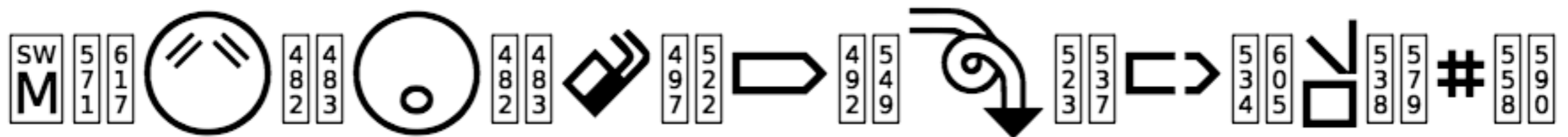
Formal SignWriting

A two-part word of time and space.

Temporal Prefix



Spatial Signbox



Formal SignWriting

Temporal Prefix



Sequential list of symbols

Written by an author

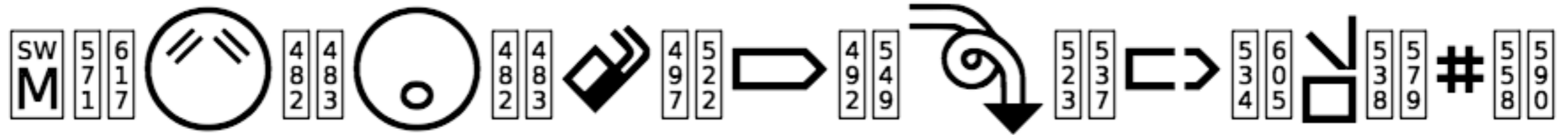
Ordered by a particular theory

Neither formatting nor style

Meaning not found in the Spatial Signbox

Formal SignWriting

Spatial Signbox



2-dimensional cluster of symbols

Written by an author

Symbols are positioned with Cartesian Coordinates

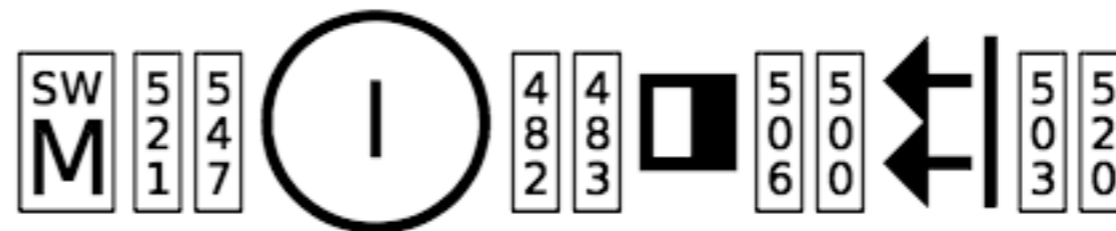
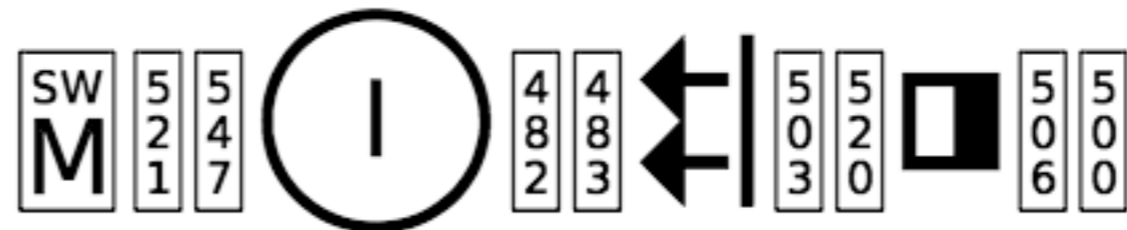
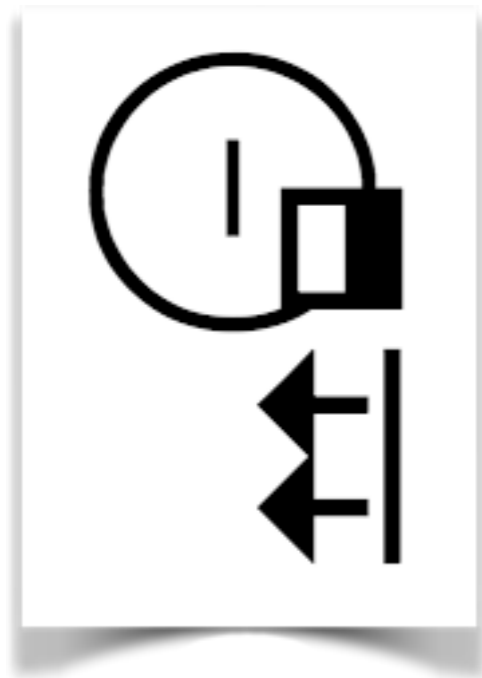
Neither formatting nor style

Meaning beyond the Temporal Prefix

Formal SignWriting

Spatial Signbox Equivalents

The order of spatial symbols only matters for overlap.

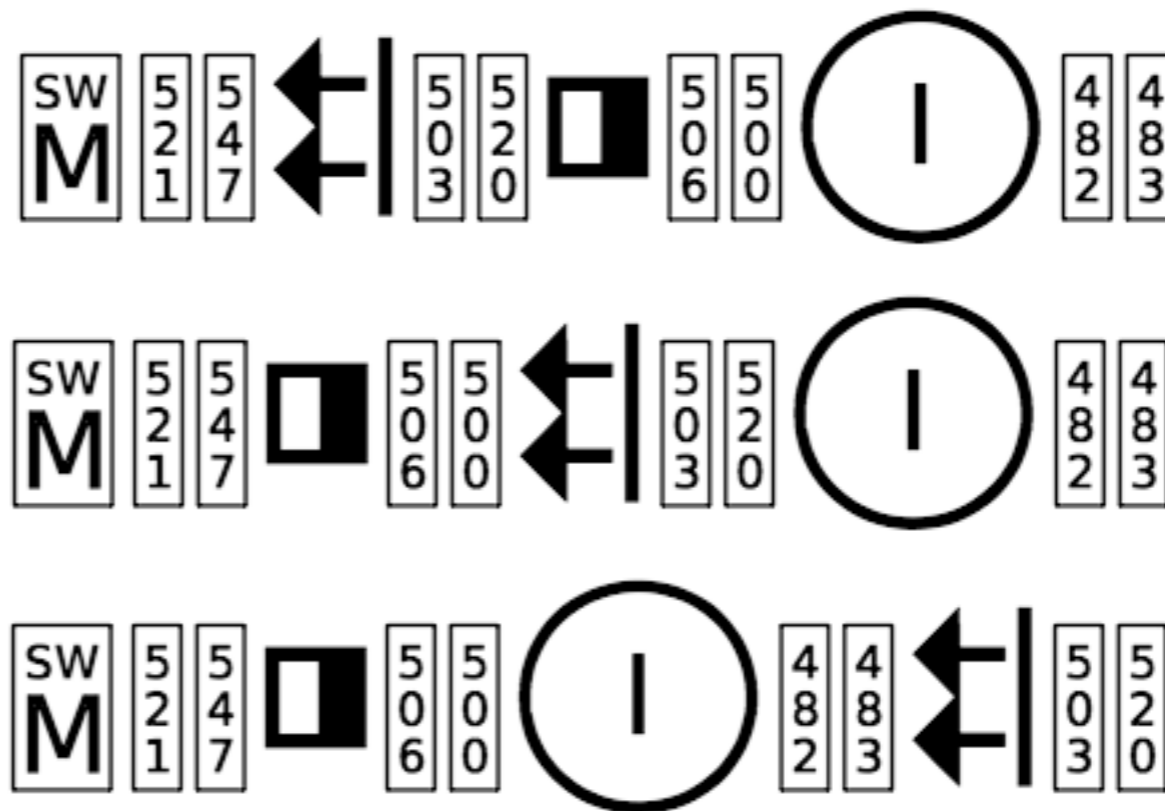


A correct order must write the hand after the head.

Formal SignWriting

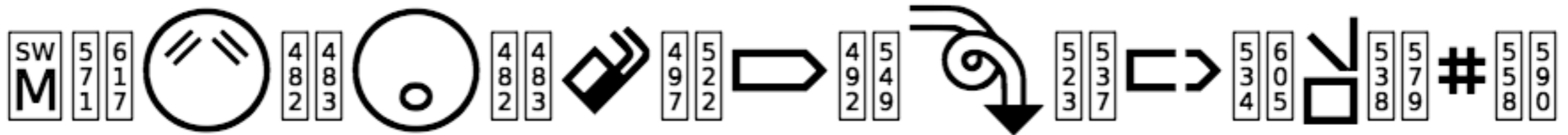
Spatial Signbox Dissimilars

Some sequences of spatial symbols will overlap incorrectly.

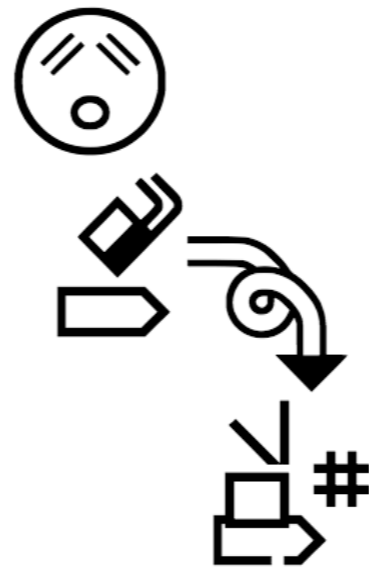


An incorrect order will write the hand before the head.

How does

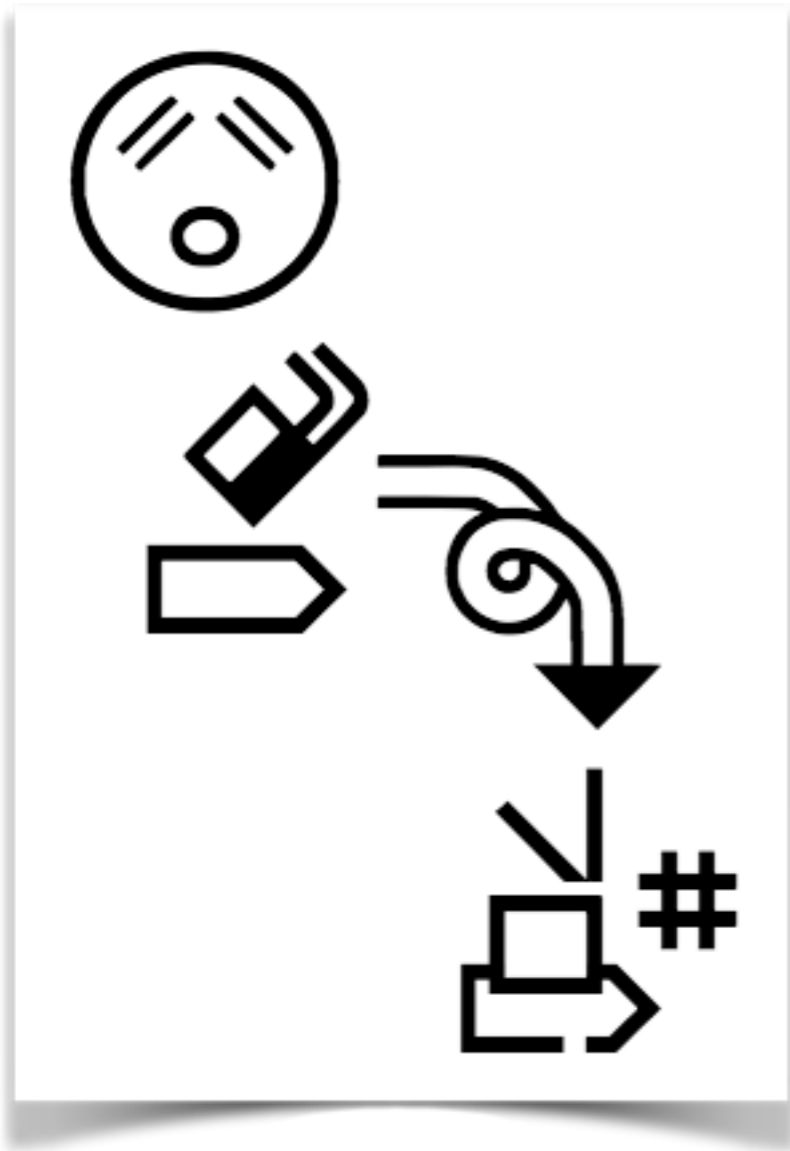


become



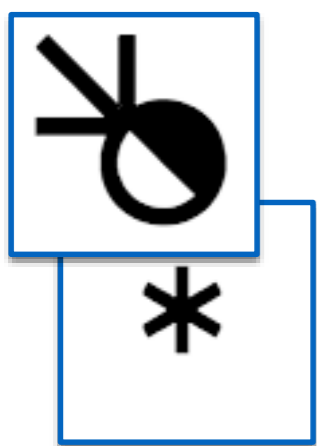
SignWriting Today

Scan and process



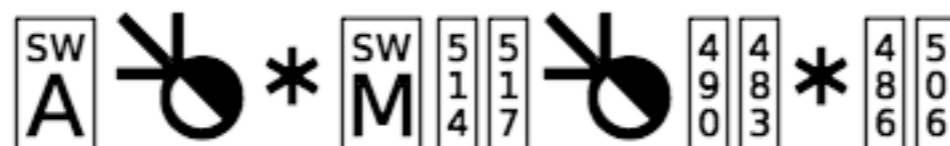
Regular Expressions are used to identify signs written in SignWriting.

Signs are rewritten with fonts inside of SVG, retaining the source string as text which can be copied.



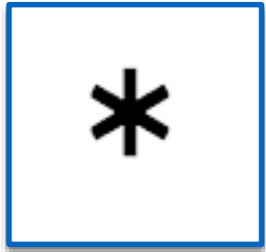
SignWriting as Image

SVG

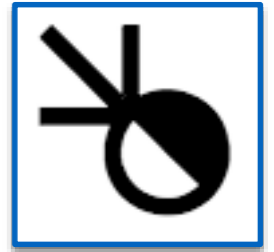


```
<svg version="1.1" xmlns="http://www.w3.org/2000/svg" width="28" height="34" viewBox="486 483 28 34">
  <text style="font-size:0%; ">A•M•H•H</text>
  <g transform="translate(490,483)" >
    <text class="sym-fill" style="font-family:'SuttonSignWritingFill';font-size:30px;fill:white;">H</text>
    <text class="sym-line" style="font-family:'SuttonSignWritingLine';font-size:30px;fill:black;">H</text>
  </g>
  <g transform="translate(486,506)" >
    <text class="sym-fill" style="font-family:'SuttonSignWritingFill';font-size:30px;fill:white;">H</text>
    <text class="sym-line" style="font-family:'SuttonSignWritingLine';font-size:30px;fill:black;">H</text>
  </g>
</svg>
```

Using the Symbol Fonts, a simple text process can create an SVG document from a string.



SignWriting as Image



Symbol Fonts

font-family: “SuttonSignWritingLine”

Every symbol has a line glyph as the positive space of the symbol image.

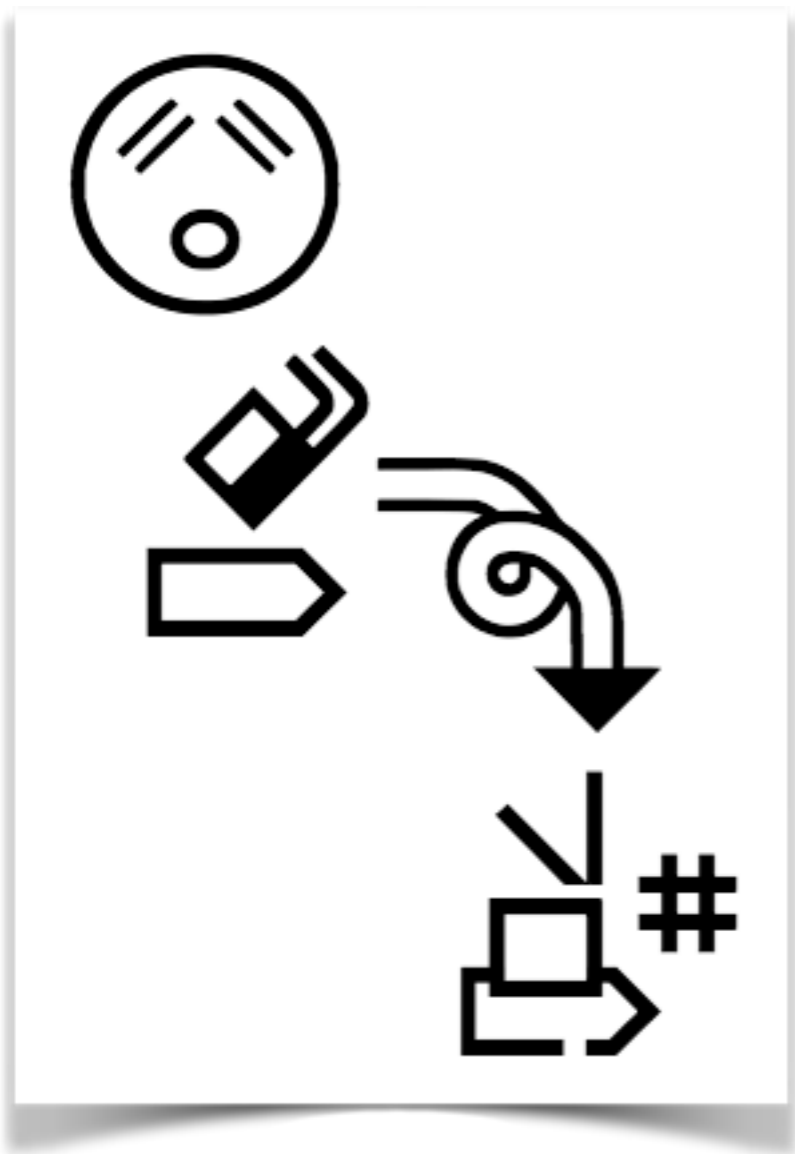
Private Use Area Unicode Plane 15

font-family: “SuttonSignWritingFill”;

Some symbols have an additional fill glyph as the negative space used when one symbol covers another.

Private Use Area Unicode Plane 16

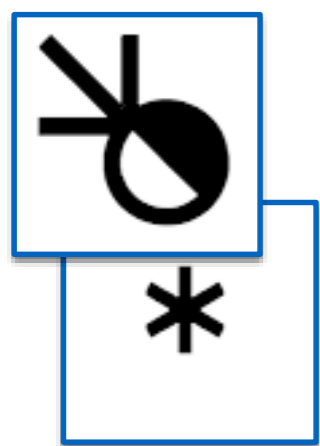
SignWriting Tomorrow



The Universal Shaping Engine (USE) is a widely supported rendering system for complex scripts.

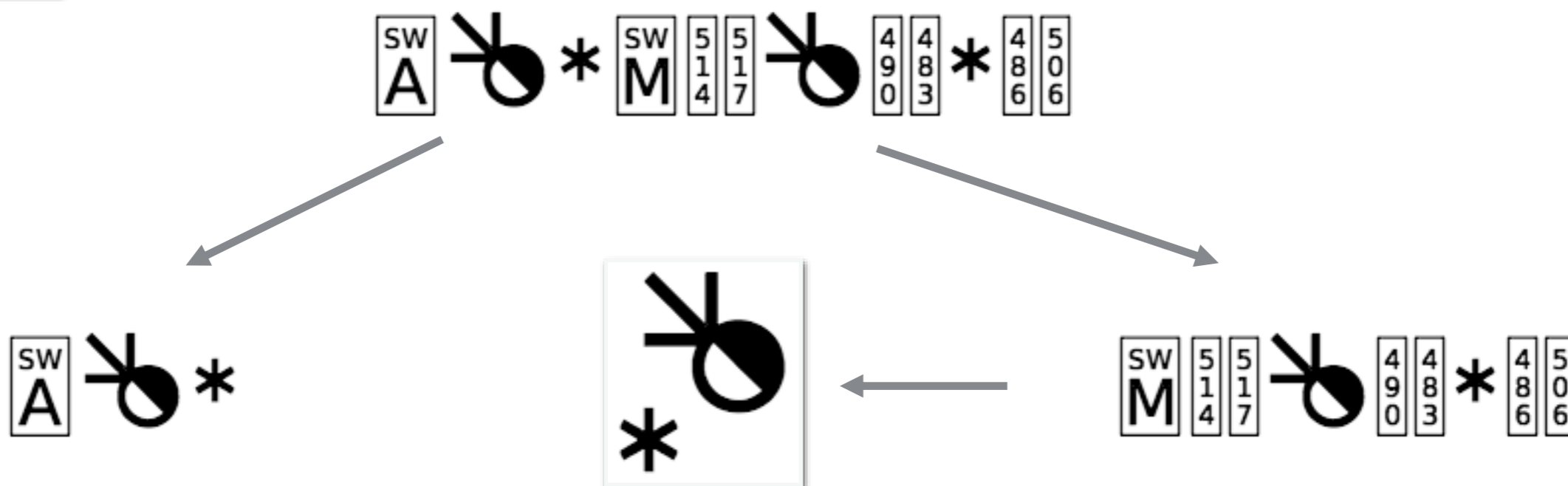
With the Universal Shaping Engine, SignWriting text can be correctly rendered by the operating system.

A 2-Dimensional font is being developed for the Sutton SignWriting script which leverages the Universal Shaping Engine.



SignWriting as Text

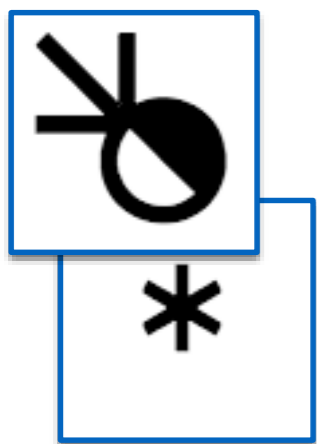
2-Dimensional Font



The Sutton SignWriting Two-D font will visualize a SignWriting word as a 2-dimensional cluster using the Universal Shaping Engine.

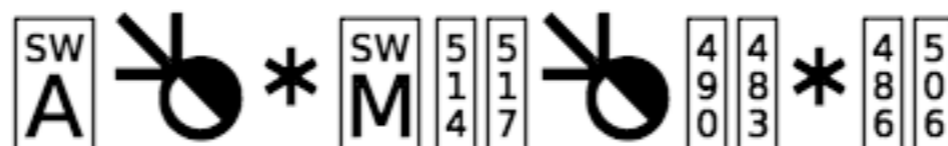
Planned development for 2018

https://meta.wikimedia.org/wiki/Grants:Project/slevinski/ASL_Wikipedia_2-D_Font_Development_for_SignWriting



SignWriting in Unicode

SWU



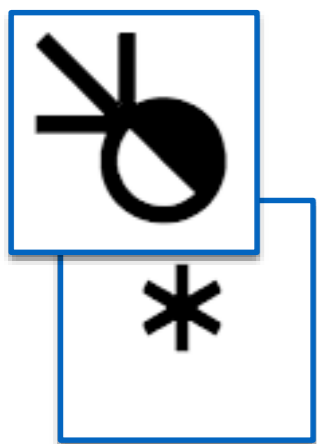
Experimental Unicode design

1-Dimensional Font available

2-Dimensional Font being developed

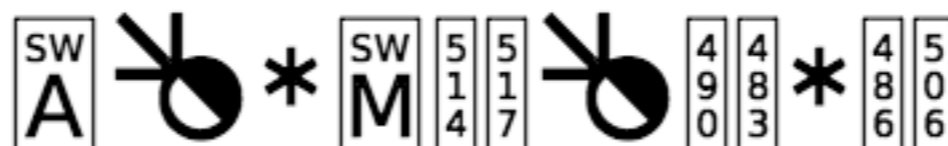
Submitted to the UTC July 2017

<http://www.unicode.org/L2/L2017/17220-signwriting-design-opt.pdf>



SignWriting in Unicode

SWU Codepoints



U+1D800 U+432B2 U+461E1 U+1D803 U+1D914 U+1D917
U+432B2 U+1D8FC U+1D8F5 U+461E1 U+1D8F8 U+1D90C



U+1D800



U+1D803



U+432B2



U+461E1

483 = U+1D8F5

514 = U+1D914

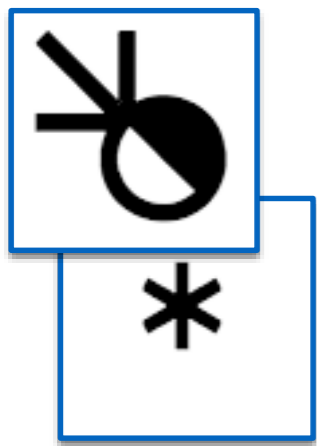
486 = U+1D8F8

506 = U+1D90C

490 = U+1D8FC

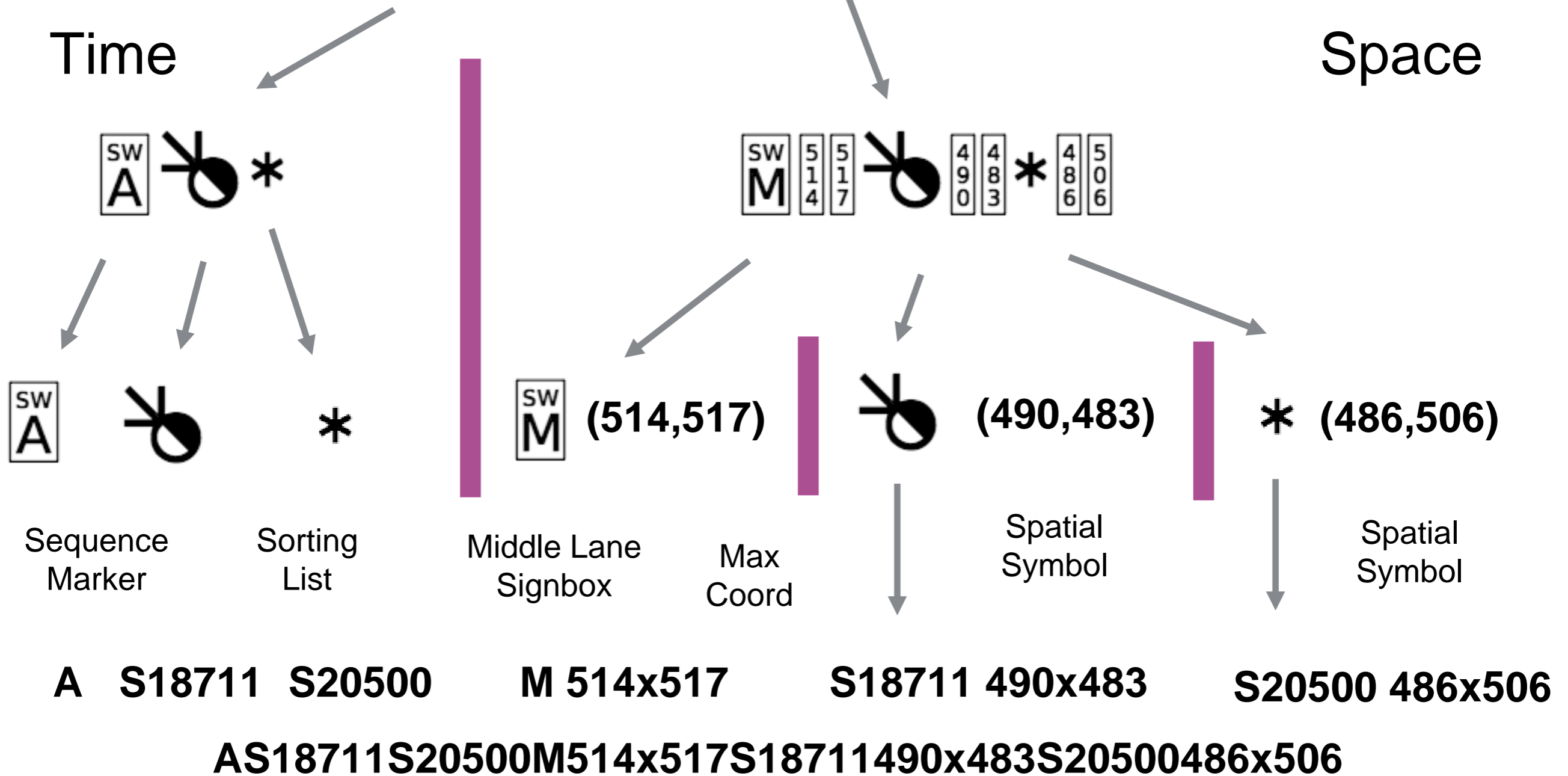
517 = U+1D917

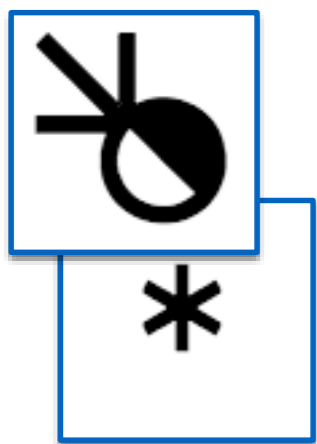
SWU conversion to ASCII



Time

Space





Formal SignWriting in ASCII

FSW



AS18711S20500M514x517S18711490x483S20500486x506

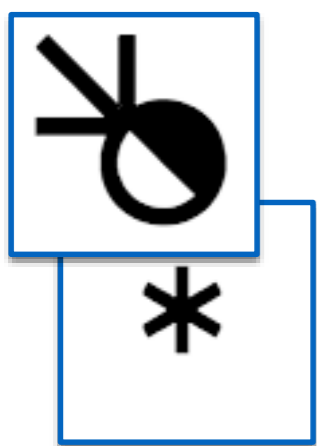
Mathematical names

ASCII characters only
ABLMRS0123456789xabcdef

Signs are written as unified words

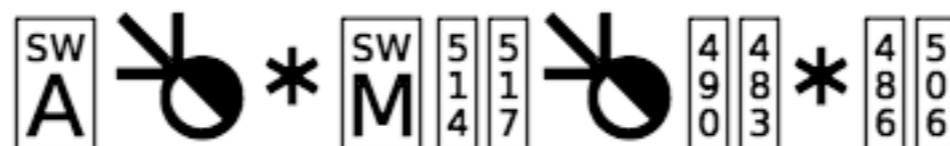
Stable since January 2012

<https://datatracker.ietf.org/doc/draft-slevinski-formal-signwriting/>



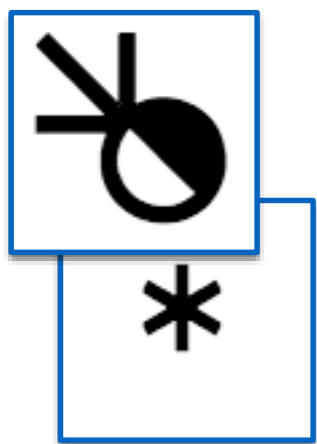
SignWriting as Image

PNG



```
data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAAABwAAAAiCAYAAABMfbLJAAADLkLEQVRYR62XX0gUURSHv6W1lrKC0Ki3CHupKAhCw3pYKCEIKihqS3ooFqwsJAUTYRExKSSFtjLIIopqKagHoQchCrZk6S8Y9RDkUo9WRAMCom385I5M4+zuzLrnZYe55/6+ueeee+7ZALNtM/AKeAAcBiZdfPTqPnAQSAJhYCqL33+vAw6nEuAlIKgsF/QScMr4RIC/hQA1ZyXwAlidB2oB+4E9cwF6hRYV6AVadKCgK4CnwFqX8F4BTgBFca19/8uB5y7Qi8BpA9xbaJZmSzStVnlrJVIVUAHsAG4CUWApSMwI/AZ+uIk5j0WuzHZC5fvJrNz6tc8fAWLAHWDMGnADzgf3c3o8Da4DPZvI7YJ0HsyfwdUcdFJ3Ci0yVsZLEg55nl43AkBtwyLZXntU80A4D691Ct9UAJ1xE904MUK2xxsZGysrKaGlp8cCbdtnpJ2ks0ePA1XA4PDowMLA4GAzS2dlJa2urF+iNQoDTFaa3t3esrq5uoUXxCO33CwyaIlAdj8en6uvr51nATCZDc3MzXV1duVY64hcosekV9vT0jDU0NMysUA0CNjU10d3dnQ067Bco/+vAsaqqqs1kMhnUHTpN0FgsRkdHhxvUd0glcg14q4dUKkVlZeUsYUhb2tpob293jrX4XaEElgDvdXTKy8szg40DgYoKldXZFoLESCQ51sAosK4QoAT2AQ/1UFpamkkkEoGamhpKStShwMTEBmlkkmg0mkmn0xZDh/V8oUDp6i7UnThjtbW146FQKNDX16d6bLeZ3sgNqDqqa0Z9TT5TxXkELM/heBS4pSSWjxMYAt4CP320fkrTlcA2YJUBa/5r4Bnwy/4xAmrHVS0/ARbwi60Tk4j80vmW62VcQgqdQnPS9JhPdI2Y9kHhiPvtW3KBBdSNXJvn6y6bD5jeh7mYtYeK/zVbo2Rp6rY+Y0rnXDgzcy3gAhM6NUP0dD4CqL0oigm4y+xRNkFVCB30gWlQBfxoQpkCzpq2T0fjAndb1pVt8Np75kua/YBCeg/Q/fYG+ArsNhMV0j/A42Kt0K5jdW06h567aT8f4qw0Wqmu70/A0a9/wfwA/wEZUdjPVl+mTQAAABJRu5ErkJggg==
```

Using the Symbol Fonts, a small code function can create a PNG image from an FSW or SWU string.



SignWriting Forms

Size comparison



	UTF-8	UTF-32	File
FSW ASCII word	47 bytes	188 bytes	N/A
SWU UNICODE word	48 bytes	48 bytes	N/A
PNG Loses word	1,186 bytes Base 64	4,744 bytes Base 64	640 bytes Binary
SVG Embeds word	767 bytes	2,860 bytes	767 bytes

A sign by any other name

August 28th, 2017
Revision 02

by **Stephen E Slevinski Jr**

slevinski@signwriting.org



Thanks for viewing.

Feedback, comments, and questions are welcomed.

<https://slevinski.github.io/SuttonSignWriting/>