SWift, a user-centered digital editor for SignWriting within SWORD project

Fabrizio Borgia\textsuperscript{1,2}, Claudia S. Bianchini\textsuperscript{3}, Maria De Marsico\textsuperscript{2}

\textsuperscript{1} Universit\`e Toulouse III - Paul Sabatier
\textsuperscript{2} Sapienza Universit\`a di Roma
\textsuperscript{3} Universit\`e de Poitiers
Outline

- Introduction
- SignWriting digital editors - Overview
- SignWriting digital editors - Challenges
- SWift - Introduction
- SWift – Overview
- SWift - Advanced features
- SWift – Supporting different ISWA versions
- SWift - Testing
- Conclusions and Future

SWift, a user-centered digital editor for SignWriting within SWORD project
Introduction

- A pencil and a piece of paper are the only required items to produce signs using SignWriting.

- Since the early years the need to produce a digital version of the system was evident.

- The informatization of the system, started in 1986 with the SignWriter computer program, allowed SignWriting to achieve a wider diffusion through:
  - Newspaper
  - Books
  - Websites
  - Other digital resources
Introduction

- Digital versions of the glyphs were created

- The conceptual organization of the glyph images was ensured by assigning to each of them a unique ISWA code
SignWriting digital editors

Overview

- SignWriting digital editors are the tools that enable the creation of digital resources written in SignWriting.

- In other words, they are critical for the informatization of SignWriting and therefore the “digital transcription” of SLs.

- Many applications have been produced by different teams, delivered in different ways, ranging from desktop to web applications.
SignWriting digital editors

Overview

- Most SignWriting digital editors basically provide the same functionalities

- Despite differences in design and implementation existing from one editor to another, such functionalities are:
  - Search for (or type) glyphs which belong to the ISWA
  - Insert the chosen glyphs onto an area which is designated for the composition of the sign
  - Manage the glyphs on the sign composition area
  - Save the sign in one (or more) formats

SWift, a user-centered digital editor for SignWriting within SWORD project
Digital SignWriting
Overview

Sign Composition

Glyph Search

SWift, a user-centered digital editor for SignWriting within SWORD project
Digital SignWriting Challenges

General:

- The system should provide at least:
  - An area to compose the desired sign(s)
  - An area to search for the desired glyphs(s)

- Achieve the best possible level of usability

- Achieve the best possible level of accessibility (at least deaf-oriented accessibility)
  - Minimize the use of text (Vocal Language)
  - Visual-oriented organization
Digital SignWriting Challenges

Glyph Search Area:

- The large amount of glyphs requires a robust yet intuitive organization of the glyph search area.
- The organization of the glyph search area should reflect the organization of the International SignWriting Alphabet (ISWA).
- The glyph search area should provide a user-friendly navigation context for finding and fetching glyphs.
- SignWriting beginners should be able to find their orientation within the glyph search area too.

SWift, a user-centered digital editor for SignWriting within SWORD project.
SignWriting improved fast transcriber

- Provides all the features of a SignWriting digital editor
- Produced by “Sapienza” University of Rome, in partnership with the research team at ISTC-CNR (which includes many deaf people)
- New features with respect to other digital editors
- Key requirements: usability and accessibility
- Application tested with deaf participants
+ SWift

SWift, a user-centered digital editor for SignWriting within SWORD project
SWift
Basic features

- Sign composition area and glyph search areas
  - Interaction via click, and drag-and-drop
  - Natural organization of the search space according to intuitive criteria (e.g., the part of body involved)

- Functionalities for glyph editing
  - Rotation, duplication, deletion, etc.

- Multiple save options
  - PNG, XML and remote save

- “Open” functionality to edit signs composed previously

- Each sign is save in a database with the list of its component glyphs
  - Support for linguistic analysis
SWift, a user-centered digital editor for SignWriting within SWORD project
SWift Overview

- Support for SignWriting beginners
  - Presence of graphic elements within the glyph search area, to guide the user towards the correct glyph
  - Buttons that are used to modify glyphs have very simple icons
  - Use of mouseover-activated animations (instead of textual labels) to provide additional information to the user (e.g., the meaning of buttons to modify glyphs in the composition area)
SWift Overview

- Support for SignWriting beginners
  - The puppet: a stylized human figure helps the user to choose the appropriate anatomic area (head, hands, etc.) of the glyph
  - Animations on mouseover show a set of example glyphs for any area
SWift
Overview

- Support for SignWriting beginners
  - The puppet: a stylized human figure helps the user to choose the appropriate anatomic area (head, hands, etc.) of the glyph
  - Animations on mouseover show a set of example glyphs for any area

SWift, a user-centered digital editor for SignWriting within SWORD project
SWift Overview

- As the user chooses a glyph area, he/she is presented with a search interface customized for that particular area.
SWift, a user-centered digital editor for SignWriting within SWORD project

A label and an icon explain the user what kind of glyphs are available through the group of boxes beneath.
SWift Overview

Choose Boxes:
- Provide independent choices for a certain glyph feature
- The user can use any number of combined criteria
- No predefined order of choice

A label and an icon explain the user what kind of glyphs are available through the group of boxes beneath.
SWift Overview

As the user performs a choice...

The set of glyphs meeting the requirements of the user is updated.

SWift, a user-centered digital editor for SignWriting within SWORD project
SWift
Overview

The more choices the user makes...
The more accurate and restricted becomes the set of result glyphs

SWift, a user-centered digital editor for SignWriting within SWORD project
SWift Overview

The more choices the user makes...
The more accurate and restricted becomes the set of result glyphs

SWift, a user-centered digital editor for SignWriting within SWORD project
SWift
Advanced features

- **Glyph Hint Panel**
  - Shows a set of glyphs that are compatible with those the user inserted in the sign composition area.
  - The glyphs are immediately draggable on the sign composition area.
  - Hints come from an analysis based on the frequency of co-occurrences of the glyphs in the sign database.
  - Statistics are updated immediately after any sign is saved in SWift format.
  - The proposed glyph exclusively belong to the anatomical area the user is currently searching.

- **Sign Hint Panel** implemented but untested
SWift
Advanced features

Glyph Hint Panel
- Compatible glyphs belonging to the current area (hands).
- Immediately draggable on the sign composition area

SWift, a user-centered digital editor for SignWriting within SWORD project
SWift
Advanced features

Glyph Hint Panel
- Compatible glyphs belonging to the current area (contacts).
- Immediately draggable on the sign composition area

SWift, a user-centered digital editor for SignWriting within SWORD project
SWift

Advanced features

- Custom glyphs handwriting support.

- Many SignWriting users tend to “invent” *ad hoc* glyphs during the writing process
  - This happens when the user is not able to find the glyph he/she is looking for
  - The *ad hoc* glyphs are consistent with the rules and organization of SignWriting, so they can be understood by other users

- We designed and developed a functionality to support the handwriting of *ad hoc* glyphs
SWift
Advanced features

- Custom glyphs handwriting support.

The user handwrites an *ad hoc* glyph.
SWift

Advanced features

- Custom glyphs handwriting support.

The *ad hoc* glyph is inserted onto the sign composition area.
**SWift**

**Advanced features**

- **Signed Stories Support**
  - **SWift** can be used to compose whole signed stories, rather than single signs
SWift
Supporting different ISWA versions

- SWift can support multiple ISWA versions:
  - ISWA2008
  - ISWA2010
  - ISWA Bianchini

- However, the business logic of the glyph search area is based on ISWA Bianchini
SWift Testing

- SWift has been tested with a number of SignWriting-proficient participants

- A deaf-oriented adaptation of the Think-Aloud Protocol (by C. Lewis and J. Rieman) was necessary in order to perform the test

- The devised test was named “Think by Signs” protocol

- The results of the test underlined a very good usability level

- Critical areas of intervention were identified within the application
For more information about the testing of SWift, and for detailed result, please refer to:


Conclusions and Future

- SWift is a new digital editor with novel capabilities with respect to other digital editors

- SWift is framed within the SWORD (SignWriting Oriented Resources for the Deaf) project

- SWORD will represent a step towards full integration of deaf people in digital society