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► To cite this version:

Claudia S. Bianchini, Fabrizio Borgia, Patrice Dalle, Maria de Marsico. Resource production of written forms of Sign Languages by a user-centered editor, SWift (SignWriting improved fast transcriber).. VIII International Conference on Language Resources and Evaluation (LREC2012), ELRA, May 2012, Istanbul, Turkey. pp.135, 10.13140/RG.2.1.5127.6646 . hal-02558675

HAL Id: hal-02558675

<https://hal.science/hal-02558675>

Submitted on 13 May 2020

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Resource production of written forms of sign languages by a user-centered editor:

SWift (SignWriting improved fast transcriber)

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INTRODUCTION

278 million people worldwide are deaf or have hearing difficulties, and many of them use sign language as their mother tongue.

Sign languages, similarly to many other world languages, have not developed their own writing system yet.

Most digital resources (such as the WWW) are only available in verbal language, which is difficult to acquire for the deaf.

A deaf person who wants to venture into the digital world must overcome several linguistic barriers, just like those he faces in everyday life!

SWIFT FEATURES

Swift allows digital representation of sign languages using SignWriting framework.

It has been designed and tested for over one year in close contact with the SLDS team, which includes deaf researchers, therefore a true sample of the main target users. SWift's features are:

Web-based application, developed using XHTML, Javascript, PHP, ActionScript.

User-friendly interface, featuring:

- Minimization of the information provided by each screen
- Intuitive and familiar icons (triggering mouseover-animated clips for further explanation).
- Minimization of text labels

The user does not need to “learn” how to use the interface, he should rather “understand” it.

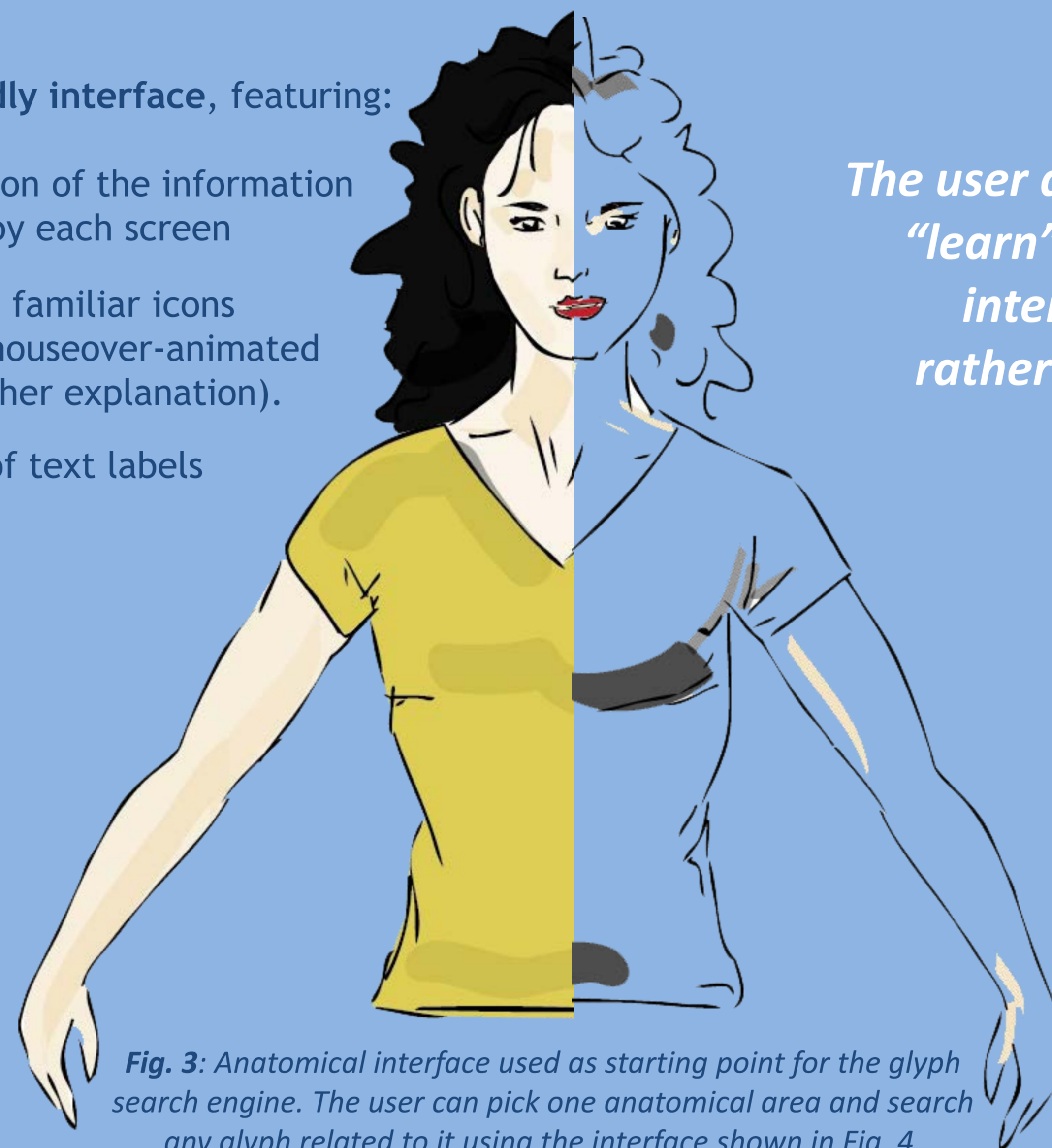


Fig. 3: Anatomical interface used as starting point for the glyph search engine. The user can pick one anatomical area and search any glyph related to it using the interface shown in Fig. 4.

Glyph search engine, featuring an anatomical interface (Fig. 3) allowing the user to reach any glyph in few seconds, simply by choosing its traits (Fig. 4).

Glyph hint system, suggesting the user a set of compatible glyphs he might want to insert next, to save search time.

SIGNWRITING (SW)

SignWriting (SW) is a graphical framework which uses visual symbols (called **glyphs**) to represent both manual (configurations, movements, etc.) and non-manual (facial expressions, gaze, etc.) components of signs.

Researches of SLDS team in Rome have shown that SW can be used to properly represent sign languages.

SW can be used either to write or to transcribe signed speech.

SW alphabet currently lists about 37,000 glyphs.



Fig. 1: The LIS sign for “various” written using SW.

SCREENSHOTS

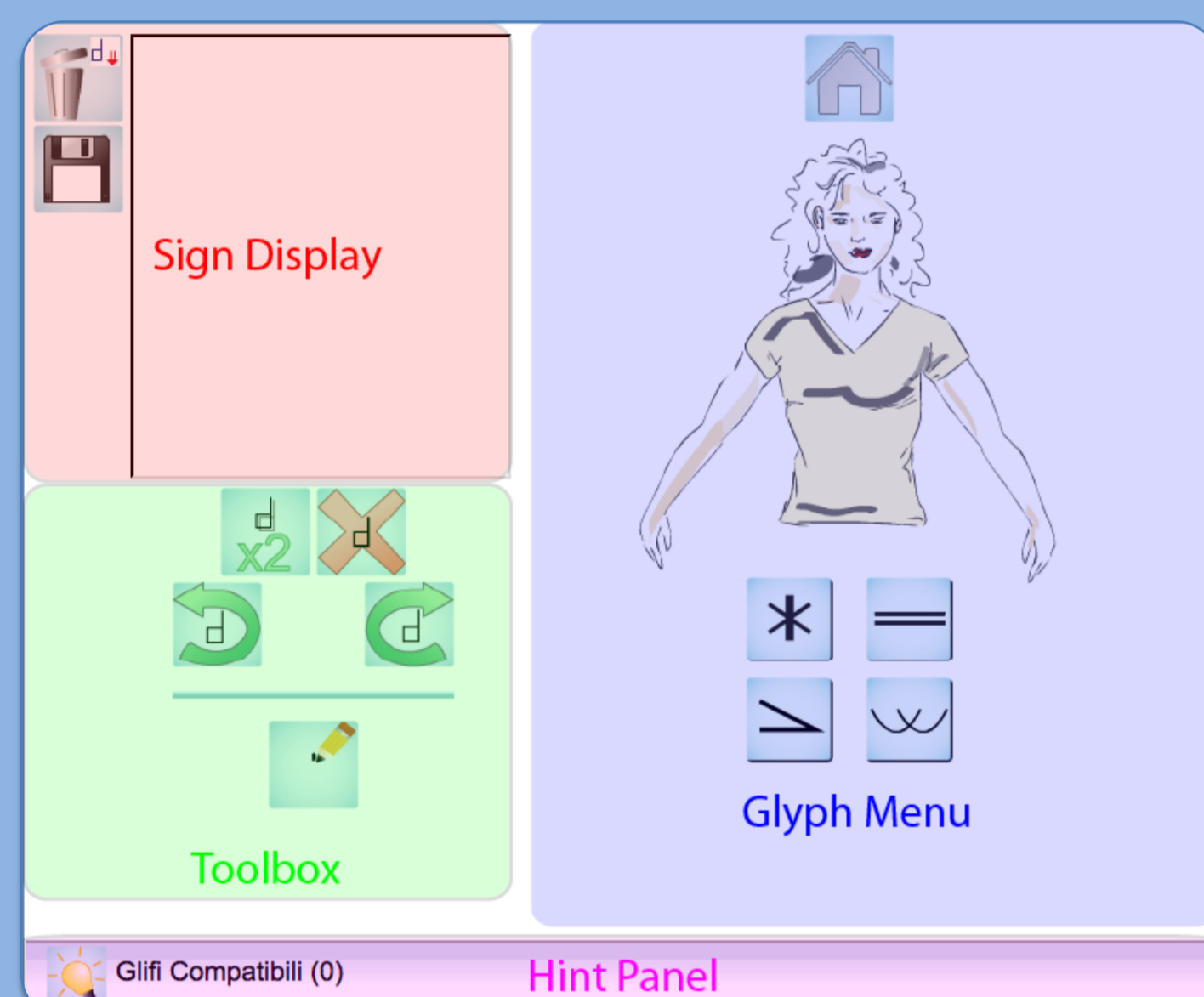


Fig. 2: Home screen of SWift, split in four areas of interest (highlighted by different colors).

SCREENSHOTS



Fig. 4: SWift's glyph search engine in action. The user is here viewing all glyphs which may be performed with the left hand using two fingers.

CORPUS MANAGEMENT

Any sign composed by the user can be saved on SWift's database, to aid in linguistic research. The sign is associated with its component glyphs and with some user-provided data (sign title, etc.). The frequency of occurrence of each involved glyph is incremented in the process.

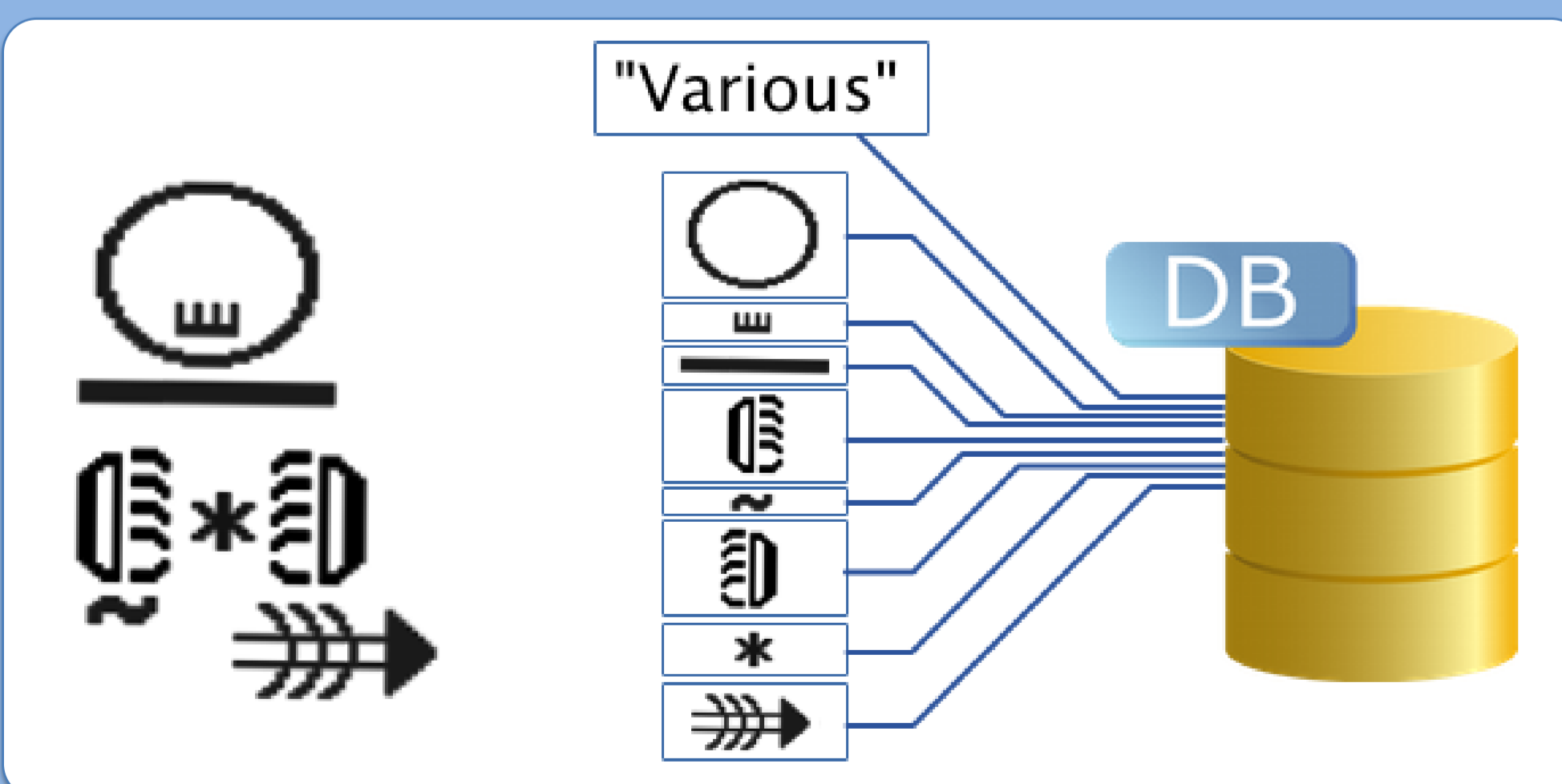
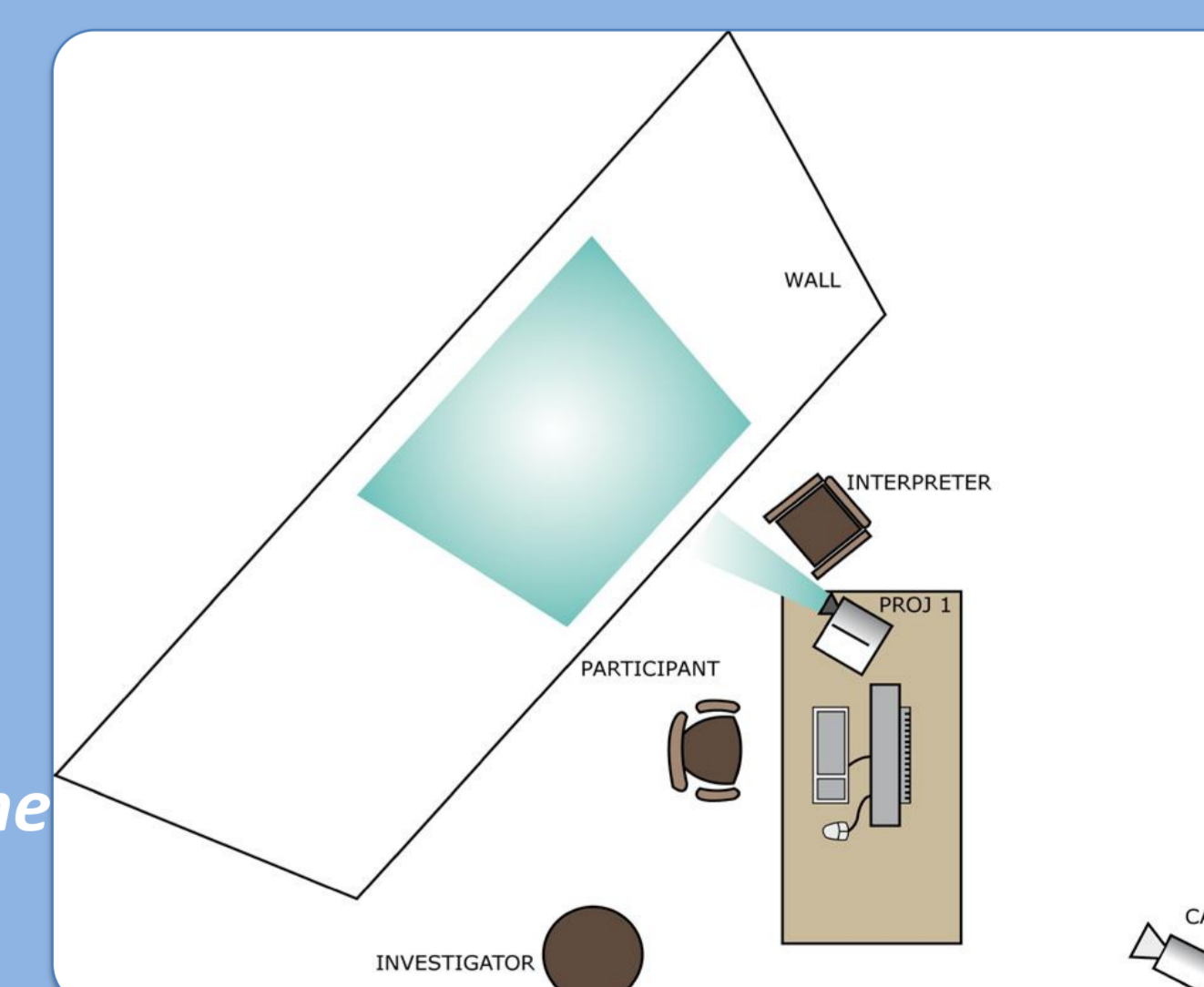


Fig. 5: Sketch of SWift's remote saving process.

TESTING

SWift's capabilities and usability were tested adapting the “Think-Aloud Protocol” in order to “fit” the needs of deaf users. The method has been named “**Sign-Along Protocol**”.

The participant is required to perform a list of tasks using SWift. Meanwhile, he is asked to sign anything that comes to his/her mind.



87.5 % users successfully decoded the interface
75 % interacted correctly with the glyph search engine

Fig. 6: Spatial setting devised for SWift's evaluation.

CONCLUSIONS

An accurate design process, and a thorough test phase have granted SWift all the necessary features to become a widely-used SW editor. The application will help to weather the barriers keeping the deaf community out of the digital world.

Two development lines have been identified for the **future of SWift**:

- replacement of the current glyph search engine with an **OCR-like recognition engine** allowing the user to “free-hand” draw a glyph, which will be analyzed and recognized by the system
- upgrade SWift with a **semi-automatic image processing engine** allowing the users to produce signs and to interact by gesture in front of a webcam

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