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Lessons from Helen Keller: How to Make the Comics Accessible?

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Abstract. This paper addresses the lack of accessibility of the comics for deaf or hard-of-hearing readers. Comics are a major cultural object, used in many different contexts with, as much as different purposes (leisure, education, advertising, etc.). We report here the results of an experimentation during a communication operation, including a regular exhibition made of panels and a digital mirroring of the contents, with extra materials and information. This digital part, accessible through our institution website, was the support of our proposition.

Keywords. Comics, Deaf, Hard of Hearing, Sign Language

1. Introduction

The context of this research was given by an exhibition on the fences of our university (Fig.1). The subject was the release of a comic book about the life of Helen Keller [1]. Extended to the subjects of accessibility for the deaf and blind people, the exhibition presented, on one side, some of the drawings and, on the other side, made the general public aware of the handicap and the accessibility.

Definitely oriented towards a mobile, seeing and literate public, this exhibition could not exist without the setting up of alternative modalities. Two dematerialized (on line) versions of the exhibition were therefore considered: one accessible for the blind or visually impaired people and another for the deaf or hard of hearing ones, but who were managing the French Sign Language.

This article focuses only on the approach we have taken in designing the accessibility of a digitized comic book for the signing readers.

Most of the time, deaf people are more likely able to communicate through a signed language (e.g. American Sign Language, French Sign Language, etc.) and a signed transcription of the written contents is the most efficient way to make the comics accessible for deaf readers. If the W3C accessibility guidelines [2] present textual alternatives as a first level of accessibility (A) for deaf or hard of hearing readers, the presence of a sign language alternative allows to reach the maximum level (AAA).

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Figure 1 View of the exhibition on the fences and a page from the comic book

The recommended way to achieve that is to add a video showing a signed translation beside the original content, like for the news on TV. The use of SMIL 1.0 or 2.0 [3] is also suggested by the W3C to mix and synchronize the streams. Usually, the video showing the sign language interpreter is positioned in a corner of the screen.

This kind of split screen and synchronized streams lead to many usability questions: is this positioning the best configuration to minimize cognitive load and to maximize efficiency? Is this configuration makes watchers able to catch all the information, both the comments and the video contents? In the comic books case, in which aesthetics are a critical part, how can we achieve accessibility needs while respecting the author work?

2. State of the Art

Too few content producers adopt a systematic approach to accessibility and those who do not necessarily seek the maximum level recommended by the standard (in our case, the alternative content transposed in a sign language). However, some interesting researches have been carried out, in the last years, in the context of the accessibility of digital or digitized documents for deaf users.

Kushalnagar et al. [4] studies the accessibility of a video player for deaf and visually impaired users. It shows that, for a certain category of visually impaired people, with a very limited field of vision, subtitling is ineffective. Indeed, their absence of peripheral vision and the simultaneity of the flows systematically lead to a loss of information during the changes of context. Its proposal is to pause the flow on which the user does not pay attention, which is detected via an eye tracking device.

The same author compares in [5] the relevance and effectiveness of subtitling and transcription, which involve more or less important context breaks. As Lang [6] shows, the addition of a visual representation of a audio content systematically involves a cognitive overload for the user. It is therefore essential to design accessible devices to minimize this cognitive overload and attention dispersion [7].

The work of Ponsard et al. [8] And Ho et al. [9] Focus on the automatic analysis of the structure of comic pages. Indeed, a large number of comic strips, available in a dematerialized way, are simple scans of the original paper. Their manipulation and their visualization are therefore very constrained on the digital platforms, since the information is organized on the model of the book (i.e. the double page). His work aims at lowering the granularity at the level of the panel, or even balloons, in order to be able to propose finer and more adaptable interactions (order of reading, vocalization, scrolling, etc.)

In addition to this, even if sign language video is the preferred modality, its implementation in digital tools forces us to address important issues of usability. Hibbard et al. [10] Describes the phenomenon of vlogging (the video equivalent of the blog) as well as the new uses or appropriations realized by the signing users community. Malla Osman et al. [11] Also addresses these issues in an online forum context, also based solely on video. Content navigation, scaling (theme, discussion, message), temporality, information retrieval are paradigms to rethink with video content, especially when they are part of a consistent association of digital objects.

It is also important to emphasize the particular context of the comic strip, in which aesthetics occupies a special place. Different proposals exist around this medium as, for example, the automated transposition of a film into a comic book [12,13]. As an artistic work, one can reasonably wonder about the most appropriate way to increase the level of accessibility while respecting the aesthetic intentions of the author (s).

3. Methods

3.1. Aims

Our proposal has been developed with the following constraints, which might seem to be antagonistic at first sight:

- Fully assume the place of the signing person in each of the panel of the comic strip and achieve satisfactory visual comfort, even high as to the signed transcription.
- Allow the user to visualize the artistic proposal of the author, without any alteration.

3.2. Parallel vs sequential presentation

We decided to make the information available sequentially: the user decide of the moment and duration he access to the picture and to the signed sequence. This sequencing makes it possible to avoid the cognitive overloads and / or the losses of information encountered in the case of presentation of parallel streams. We have chosen to go much further than the current proposals for sign language translation by maximizing the integration of sign language content into the work.

To avoid the usual and artificial presence of the signing person in the bottom right corner of the screen, we made sure that he or she originates in the context of the panel and made the transition between the two states as smooth as possible.

In case of narrative text, the actor comes out, for example, from behind a tree present in the panel and positions himself in the scenery before beginning to sign. If they are dialogues, then the signing actors will appear in the positions and in the postures of the characters they translate, following a video fade. We have gone from sign language interpreters to sign language masters, and actor leadership has played a fundamental role in this process.

3.3. The production pipeline

A production pipeline has therefore been defined to result in this interactive content. For each panel, it is therefore necessary to:

- Define the actor's play: possible appearance and displacement
- Define the sequence of signs used for the signed translation. As we shall see later, the sign language allows a kind of liberty, which is close to a creative approach.
- Record on a green background the previous intentions (Fig.2)
- Clean and / or adapt the original panel in order to integrate the video in sign language (Fig.3)
- Post-produce the video to isolate the actor (s) (Fig.2)
- Integrate the video to the panel and set up the transitions (Fig.4)

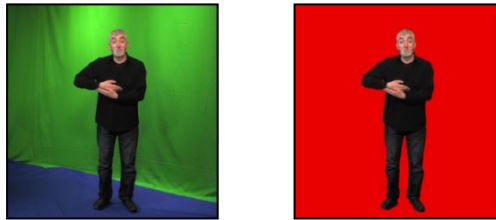


Figure 2 The signing actor on a green/blue background and the post production result



Figure 3 Original (left) and prepared (right) pictures



Figure 4 Actor and background integration (left) and result (right)

4. Design and Development

4.1. Interaction Design

Compared to a regular digital comic strip, our version can be switched between two states: the still image and the signed video. Thus, we first needed to tell the reader that an alternative (signed) content is available on the panel and second, to provide him/her visual cues about how accessing it.

To specify the availability of this alternative content, we implemented different interactions such as:

- Changing the appearance of the panel when the pointer flies over it
- Changing the appearance of the character(s) when the pointer flies over it
- Changing the appearance of the text balloon (s) when the pointer flies over it
- Adding the regular video control widgets close to the panel

4.2. The prototype

A light web prototype of reading platform (a player) has been developed based on usual technologies and languages, such as an Apache webserver, HTML5 and Javascript.

This player provides 3 levels of access for the comic content, based on the original (non-digital) book: the whole page, a single panel (the original one, pictured and still) and the signed content (the video in sign language).

4.2.1. The page level

As we started from the digitization of the paper book, we kept its original internal structure, even if we are convinced that a digital book must have a specific structure and navigation, depending on the platform. But this approach was out of the scope of this current work, which was centered on the accessibility issue. The consequence is that the entry level for the reader is the page level, as shown in Figure 1 (right), like the book.

Starting from here, the reader can observe the entire board, composed with the different panels and perceive the author's intention sometimes linked to their arrangement. The reader can decide to select a panel to have a better visual representation of it.

4.2.2. The panel level

Resized according to the screen resolution, the chosen panel is perceptible and readable with a high level of comfort. This level allows the reader to manage the following two states:

- The initial state displays the panel as created by the author.
- The user can decide to switch to the video mode to benefit from the transcription in sign language.

5. Experiment and Results

We designed and evaluate our prototype with a population of deaf users (5 users, 3 males, 2 females, mean age 32 y.o.). All were used to use digital devices and they were provided for the test a tablet connected to our webserver. They were asked to navigate and read the panels and/or watch the signed contents.

All of them were enthusiasts about the service provided by our prototype and 3 of them told that it was innovative and useful. They appreciated the effort to remain the signed part close to the original picture, with attention given to the actors' postures and clothing. But they also gave us bad feedback on the quality of the transitions effects we choose to add between the still image and the beginning of the signed movie.

6. Discussion

Even if the first results are encouraging, there are some major issues to address thanks to this work.

Indeed, if the availability of all the patrimonial heritage of the great masters of the 9th art, and more broadly the immense production of comics already available, may appear as an objective to be achieved, it comes with various problems within the framework of our prototype:

- The inability for the signer to translate movements to take the exact position of the drawn character
- The difficulty of having an actor sign a balloon whose character is invisible or out of the panel's field
- The implausibility of having a human signing the words of an animal or object (Fig. 5)
- The difficulty of managing, on the same panel, the appearance of several actors

Our prototype does not pretend to answer these questions for now. It is mainly adapted to the publishing of original works that consider, from the early stages of the design process, the different technical constraints but also ensure a certain financial sustainability. Created with a focus on providing the same enjoyment and reading experience, these comic strips could be broadcast in several formats.

But beyond the purely interactive aspects or visualization of information, this work makes it possible to address the question of the place of accessibility approach, by positioning it, in an original way, in a context of artistic creation.

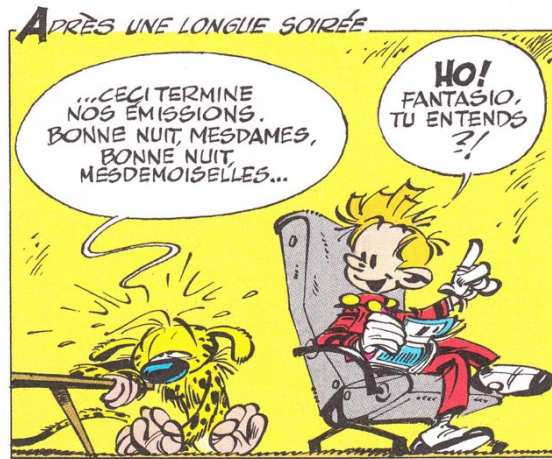


Figure 5 How to manage the appearance of a actor signing the Marsupilami (© Franquin – Dupuis) ?

7. Perspectives

Our approach to adapt comic strips in sign language makes it possible to make a more natural access to this major cultural object, for the Deaf. It gives them a very direct access to the content by using their first language.

An obvious next step of this project is the use of our prototype to language learning. By proposing such a bilingual version (oral language + signed language), it is possible to have new learning materials for signing people but also for hearing people who are learning a signed language. Interesting developments are possible, including parallel vs. independent presentations of textual and signed versions, interactive versions for learners (with manual text completion, for instance).

Even beyond this purely linguistic context, interesting perspectives emerge in other areas of learning. Proposals for the use of cartoons as a pedagogical medium appear [14,15] If these experiments prove fruitful, their accessibility will be indispensable in order not to exclude pupil populations from these educational innovations.

Our next work will be dedicated to increase the automation of this process, which is entirely manual for now. One of the main issue is the production of the signed content. Even if a fully automated process is not realistic yet (automated translation from oral languages to signed ones, and vice versa, are still work in progress in research laboratories), the crowdsourcing approach might be an interesting way to achieve a production level, as described in [16, 17]. This kind of collaborative work already exists in the subtitling production context (see [18] for instance). We could imagine a collaboration with translation school in sign languages all over the world to produce the localized signed contents, as a part of their curriculum.

Finally, we also plan to work directly with comic book authors to explore the possibility of thinking upstream about the integration of these video contents. This approach could lead to new ways of writing and to design this cultural object, or even lead to alternative/new propositions, between drawing and cinema, as turbomedia is for example [19].

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