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Can we think of a tactile learning resource based on sign language structures?

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This paper questions how the spatial representation of sign language speech can be thought of as a tool for the education of students with deafblindness, and as an aid to their parents or teachers.

Sign languages are spatialized languages that show discourse. According to the "theory of iconicity", the speaker, expressing himself, performs cognitive operations that allow him to transfer imaginary or real experiences into the three-dimensional discursive universe. These transfers show the shape and/or size of an entity, the movement of an actor or offer the possibility for the speaker to become the entity which he/she speaks about.

Thus, taking into account certain adaptations, the projection of this discourse in a two-dimensional space offers the possibility to think about new pedagogical resources, in particular for people who use sign language, whether deaf or deafblind.

Our presentation will first follow the path of our reflection based on the example of a tale signed, redesigned and drawn for parents or teachers of a deafblind child. We will then describe the multilingual and multimodal collaborative platform Ocelles in OpenData, which addresses the difficulties of distributing tactile educational resources. This website respects the accessibility criteria of the WAI and allows to propose 2D modeling in the form of accessible pdf files accompanied by speech in sign language and written text in the

language of the country (for example: French sign language, written French). Each file will include the areas thought out from the sign language story and how to approach them with the child. Each zone will indicate the type of materials and textures expected, which parents, or teachers, will have to stick in the spaces shown. Thus, deafblind learners, for instance, will have access to this new tactile resource in addition to those offered by the site in sign language and in written form. Finally, beyond the production of resources, we will broaden our reflection on interculturality between parents, children and professional researchers in order to co-construct resources for a more inclusive society.

Thinking of knowledge transmission in an inclusive perspective means thinking of the construction of knowledge in a continuum in which each protagonist, whether learning or knowing, can find their place and learn from the other. Our work stems from the field experience, taking into account the daily life of the authors but also the expectations of future contributors to this participatory research.

For the average child, the usefulness of storytelling is no longer to be demonstrated in its spatial and temporal construction, in the acquisition of language and in the development of its identity (Platiel, 1993). Initially, our work will be established in collaboration with parents of deafblind children and may eventually be extended to teachers working with this audience.

Our objectives are both pedagogical and linguistic. From a pedagogical point of view, we wish to:

- provide the target audience with educational resources for their children/students
- make participants aware of the needs of their children/pupils through a socio-constructivist approach
- provide resources that can be adapted to the pace and needs of students and their families which could be summed up as natural positive parent-child interaction and meaningful symbolic communication: information exchange, discussing everyday-life situations , telling stories and fairy tales
- consider the transferability of the protocol to other media and to a wider audience with a view to an inclusive society
- consider how meeting specific needs can be appropriate for a wider audience
- test the relevance of the Ocelles project for its response to the needs of the target audience

From a linguistic point of view, we would like to explore the interest of using the spatialization of a sign language discourse to develop history materials for deafblind learners.

Our reflection here focuses on the implementation of an adapted collaborative tool, which would allow parents of deafblind children to read/tell stories with their children. We will first describe the paradigm in which the genesis of this research is based. We will present the results of a survey conducted to understand better the uses and needs of parents. We will identify the first guidelines for our tool and for the operation of the multilingual collaborative platform Ocelles, which our work is based on. We will conclude by addressing a reflection on

interculturality between parents, children, researchers and professionals in order to co-construct resources for a more inclusive society.

Genesis

The acquisition of "fundamental" gestures, such as eating, drinking,... can sometimes be a source of difficulty for some deafblind students. Ivan Sokolyansky developed principles and methods of teaching deafblind children in Russia. He approved of the importance of spatial skills and the development of linguistic tools, in and in relation to a familiar framework punctuated by routines.

According to I. Sokolyansky, the teacher includes the child into active interaction, instructing him/her on how to use various objects. A deafblind child gets to know the objects around him only when the teacher tries to impart the simplest daily living skill to him or her to satisfy his / her natural needs. A child is taught how to use a spoon, a plate, how to sit on a chair, at a table, how to lie down on a bed, place his or her head on a pillow, cover up in a blanket, etc. A child generalizes means of interaction with objects of a certain kind, and attempts to act independently (Sokolyansky, 1989). Teaching means of communication should begin with gestures referencing well-known objects and actions, which are commonly encountered in everyday life. The next stage concerns the child's verbal speech development, when gestures, which have been reinforced earlier, are replaced by their fingerspelled form. After mastering fingerspelling, the child is taught the Braille alphabet. Sokolyansky developed a system of training texts. The first texts are composed according to the following rules: they are devoted to situations from the daily life of the child, consist of 3 to 5 simple sentences, all objects present in the described situation are marked in turn (Sokolyansky,1989; Basilova,2015).

We assume that stories of similar content and built on the same principles would be available to children who have not yet mastered or unable to master reading skills, provided that gestures and alternative means of communication are used.

The stories told to children using different media are perfectly integrated with this approach to the education of deafblind children. Therefore, the rest of our reflection is based on the use of the narrative techniques of a storyteller analyzed by Cuxac (Cuxac, 2007). The speaker may, in a vocal language, add sounds with low illustrative contents such as standardised onomatopoeias or imitations of significant sounds more faithful to the sound reality, in addition to the use of words specific to oral expression. At the same time, the storyteller may also mimic the gestures, attitudes and feelings of the characters, describe the shape of the objects... Another possibility is to separate the two ways: that of saying and that of showing the scenes of the fragmented story. In this second approach, the information provided by the visual-gesture illustration will be significant compared to that of the audio-phonatory illustration, and will allow for a better understanding of the story's plot. (Cuxac, 2007).

In sign language, two discursive aims coexist (Cuxac, 2000). The speaker may switch from one discursive strategy to another and choose between two representational paths, one that allows to say by giving something to see, by showing, by illustrating, and the other that allows to say without giving anything to see. According to the "theory of iconicity" or the "semiological model of the bifurcation of aims", some linguistic structures of sign language called "transfers" seem quite similar to the elements present in co-verbal gestures. These cognitive operations make it possible to transfer real or imaginary experiences into the discursive space, present in front of the speaker, by weakly anamorphosing them. This three-dimensional discursive space is called

"space of signing". (Cuxac, 2000, p. 24). Three main transfer structures exist (Cuxac, 1996) (Cuxac, 2000):

- Size and/or shape transfers that allow the speaker to represent the size and/or shape, partial or global, of places, objects, or characters
- Situational transfers that allow the speaker to represent the movements of the actors in the space of signing in relation to a stable rental benchmark
- Personal transfers that allow the speaker to reproduce one or more actions performed or suffered by an actor in the process of the statement. The narrator then uses his whole body to "become" the actant he is talking about, whether he is a person, an animal, a plant or any other object.

Transfers can then combine with each other to create more complex structures.

In the space of signing, different scenes representing different places with different characters or objects at different times (Cuxac, 2007) may therefore be achieved over time.

We observed how productive the illustrative structures of sign languages are. We were able to see that the best way to have a rather good idea of an object is to draw it -- in the case of sign language, to draw it in space. All over the world, deaf people use such accurate linguistic structures, whose evocation power is no longer in question.

In this perspective, we hypothesize that a narrative in sign language, in which the elements of the discourse are already organized in space-time, seems particularly relevant for the creation of tactile books. We therefore inscribe our work in this paradigm, whose foundations lie in the theory of iconicity (Cuxac, 2000) and the work of Ivan Sokolyansky (1989).

Expression of uses and needs

The theoretical approach to our work must be based on the experience of parents. We have therefore established a questionnaire to find out how they communicate with their children and the place given to storytelling in their daily lives. The questionnaire contains 14 items devoted to 3 main topics: the features of parent-child communication (means and themes), experience of reading or telling stories with the child in the family (including special tools which parents use to make the content of stories available and clear) and parents' thoughts and ideas regarding new tools which could be useful for developing storytelling with their children.

26 parents have participated in the survey so far. 25 of them were mothers and one was a father of children from 3 to 13 years old having dual sensory impairment of different degrees and etiology (including cerebral visual impairments and deafblindness as a part of severe multiple disabilities). Analyzing their responses, we can make some preliminary conclusions.

- Only 3 of 26 children definitely understand and can use oral speech.
- Most of parents practice reading, telling stories to their child and do it every day, but not all of them know if the child understands the content well. Most of them understand this activity as oral speech. And tell stories to the child despite of being not sure if the child understands the content or even being sure that he/she doesn't understand.
- All parents recognize the importance of this activity for different aspects of their child's development and communication with him/her.
- Most parents need new ideas for stories.

- Most recognize the importance and availability of stories about daily routines.
- Most talk about the benefits of sign language (including tactile sign language) in communicating with a child and the hope to use it in the future. Some parents don't think that sign language is an appropriate communication tool for their child, because the child has severe motor disability or is totally blind but can understand and use oral speech.
- Most of respondents mention a tactile book as one of the means of explaining the content of a story.
- Most of respondents would like to participate in the creation of a story book for their children but some of them say that they don't imagine how.

Guidelines for creating a tactile book

In order to widen the spectrum of future users as much as possible, we must first reflect on the structure of the envisaged narrative and now think about a possible progression. We therefore choose to start the story from elements of everyday life, and then move towards abstraction with, for example, three different stage and clear breaks between each:

1st stage everyday things	**Breakdown Extraordinary highlight**	**2nd stage** elements of everyday life + contribution of an imaginary element	**Breakdown Extraordinary highlight**	**3rd stage** elements of everyday life + contribution of an imaginary element

The advantage of such a structure will eventually allow to modify one of the times, without modifying the other two. Several stories can thus be constructed and exchanged between the parents.

We decide, in accordance with the answers to our survey, to focus on the first step of the story. Indeed, this stage seems to be a key point in the development of the majority of the children whose parents we interviewed. We are also aware of the granularity of the situations. The theme addressed in this step may thus be in the process of being acquired, consolidated or considered as a more or less long-term objective. A first pilot version was devoted to how to eat with a plate. Our experimental protocol is based on exchanges between researchers and users. This first version also seems necessary to us, to involve parents in our project and support them in their reflection.

Sign language speech is an original speech created in collaboration with fellow Russian and French sign language teachers, based on previous constraints.

We would like to include the use of the story in a pedagogical progression, so we plan to offer parents an educational kit so that they can accompany their child in the discovery of the story.

Creating a story for a child with deafblindness, we have to take into account the following:

- Materials available for tactile perception (textures, shapes, spatial representations)
- Available level of symbolisation

- Available content (Like the first training texts developed by Sokolyansky the first story should contain 4-5 phrases of 2-3 words/signs, all present objects should be defined, the story should be addressed to the child).

We assume that starting to tell stories in accordance with our guidance is possible if the child is already able to keep visual attention on objects or explore them with hands, to take objects and put them in specific places, to understand simple nonverbal instructions, to understand functions of familiar objects and maybe to use real objects as symbols.

The text and video resources we provide will highlight three fundamental steps:

1. Playing / living a real situation (having a meal for instance).

2. Playing the same action with the doll.

3. A story about this real situation in a tactile book with a sign and / or verbal explanation.

Depending on the profile of the students, not all steps will necessarily be completed.

With some of the children, on the contrary, it may be possible to keep developing storytelling skills, relying on Elena Goncharova's method to form reading activity (Goncharova, 2018). The next stories in the tactile book may look like:

4. A story about a similar situation in the life of another person.

5. The story of the life of abstract characters.

6. A story with a fictional component / fairy tale.

The tactile book is made up of a succession of plates. Given the random distribution of participants on the Russian territory, educational resources and exchanges will be carried out via the Internet. The sheets will be downloaded from the Ocelles.fr website (in accessible pdf format, created using the Indesign software to ensure optimal accessibility). The transition and number of new elements between the boards may vary depending on the student's abstraction skills. Each board contains the areas of the drawing that parents will have to complete with materials of different textures. Taking into account local constraints, textures may be very different, so it is necessary to support parents in their choices (give examples) according to the context. For instance, it may be interesting to use a texture similar to that of a garment to represent it, so that the student can make the link between the object and its symbolic representation.

Ocelles

How was the Ocelles project born? This is acmultilingual and multimodal collaborative project, which aims to define all concepts, in all fields of knowledge and in all languages (written, oral or signed). (Moreau, et al., 2010). It receives financial support from the Ministries of National Education, Research and Culture in France. It is also under the aegis of the General Delegation for the French Language and the Languages of France.

Ocelles is a tool, originally conceived to meet the needs of deaf people, and is therefore part of an inclusive society that is ready to respond to a much larger spectrum of users. It is intended not only for those communicating in sign language, but also for those communicating with the help of any other written or oral languages. Indeed, its use is bijective and can be useful to any citizen wishing to get plurilingual support, especially to teachers who may teach deaf, deafblind or allophone students, or to students in the perspective of inclusive classes. Its collaborative

nature and its dynamic architecture also make it possible to foresee the needs at school, at the university, but also in companies and more widely within an inclusive society.

Ocelles is based on the same principle as the semiotic triangle described above, but proposing to make explicit the links between systems of different linguistic signs. The website is divided into three types of spaces: “Definitions”, “Signs” and “Projects” linked together in the image of the vertices of the semiotic triangle, with a block system inside. Each block can present content according to the three modalities: written, oral or signed. Content may be co-authored by several editors and will automatically be validated by a group of experts in the concept, but also in the language in which it is expressed, before being visible to everybody. The amount of contents is unlimited, and each can be labelled by one of three levels of complexity: beginner, intermediate, or advanced.

The space of the site gathers the "Definitions" pages which allow at least to define the properties of the signified. Therefore, each page has a definition that:

- must be self-sufficient, without resorting to others pages or other definitions,
- should begin with a generic term,
- should not be circular and contain a root of the term to be defined as it is sometimes found in some dictionaries, as, for example, in the Cambridge online dictionary “seller : a person who sells something”[1].

Other contents can be added at will to complete the definition: examples, linguistic remarks, pedagogical remarks, etc. To strengthen the conceptual involvement of the users, links refer to concepts close or opposite to that of the visited page. This space also contains the different signifiers of the denotata described, each of which refers to the second "Signs" space that allows to group the places where they are used on a map and illustrating contents, for example their use in context or linguistic, or etymological analyzes, etc. specific to each. Lastly, the "Project" space allows for a pedagogical reappropriation of the contents from the two previous spaces, in which each user can create a project, by inviting his collaborators, - not making results visible to other users, if he/she does not wish so. This space makes it possible to arrange the existing contents or create the new ones according to certain needs for example:

- creation of courses, creation of contents for visiting a cultural site,
- creation of practical fact sheets for the explanation of administrative procedures ... This last space is therefore to be paralleled with the third vertex of the semiotic triangle "the referent".

It is in this last "Project" area that we will store the previous materials for families. One place will be reserved for upcoming documents adapted to children, another place will be dedicated to parents. The different versions of the resources created will be accessible in order to analyze the progress of our reflection. A forum will allow for the exchange of experiences and users will eventually be able to submit their own achievements in order to share them with other parents. Indeed, given the number of families involved, sharing resources and ideas seems obvious.

The Ocelles research gave us the opportunity to be confronted with a great number of issues related to language, pedagogy, web design or even ethics.

[1]http://dictionary.cambridge.org/fr/dictionnaire/anglais/seller

Conclusion

As mentioned before, much of our work consists in a reflection on languages and speech acts, in terms of efficiency, relevant strategies for better understanding, and misunderstood phenomena. We reinvest our understanding and expression capacities, by producing pedagogical resources.

Objectively in the researcher's position, parents of deafblind children must be able to meet their children's needs and analyze the invariants necessary to make their own stories. The objective is therefore ultimately the identification of the scheme allowing for the implementation of a tool, i.e. the identification of the invariant organization of the conduct of a subject that allows to deal with the same class of situations (Vergnaud, 2001, p. 111). However, we are aware of the potential difficulties of implementation, given the diversity and the difficulties of fine-tuning the analysis of the situations experienced, which are difficult for all the protagonists to grasp. This work is therefore rooted in an intercultural approach, in which each participant, whether a researcher, parent or child, contributes with his or her knowledge and learns from that of others. The objective is not a heap of knowledge, but a co-construction, in which each person develops his or her individual representations to collectively build new ones. The longer-term objective is also to mobilize this "new knowledge" on a daily basis and in the production of new educational resources.

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