E-Stories for Educating Deaf Children in Literacy. Description and Evaluation of the DAMA procedure

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Abstract

Deaf children have great difficulties in written comprehension. In this report, we illustrate a method, the DAMA procedure, we have developed to simplify stories for children in order to render them suitable for young Italian deaf readers. Preliminary experimental data demonstrate that the approach is effective even if further investigation is needed.

1 Introduction

Deaf children have substantial literacy difficulties [16,32]. This is, obviously enough, due to their hearing impairment which prevents them from being exposed to oral language, so that they cannot acquire language through a natural process. However, this condition is also due to the type of educational intervention they are faced with, which accustoms them to decoding single words and isolated sentences, rather than entire texts, thus making it difficult to gain an overview of the whole plot [15,33].

Facing the fact that the integration of deaf people in the society necessarily requires an acceptable level of literacy, we are working on a software literacy tool, called LODE [16,19], for supporting deaf children in improving their reading comprehension skills. In particular, LODE aims to stimulate children working on their inference skills being the inference phase an essential step of the reading comprehension process [16]. To this end, LODE proposes to the child, first, an entire story and then a series of comprehension exercises aiming to stimulate the child reasoning globally on the read story.

To favour the child’s focusing on the inference aspect and not on other factors involved in the reading comprehension skills, such as the decoding skills or the meta-cognitive skills [33], LODE proposes stories simplified in an appropriate way.

In this report, we focus on how the LODE’s stories archive has been designed. In particular, we describe DAMA, the procedure we developed to reduce the complexity of existing stories to adapt them to our objective.

Our target group are deaf children in the age range of 8 to 13.

This report is organised as follows: first, Section 2 presents the advantages of using narratives in literacy learning. Section 3 introduces the literacy problems of our target group, the deaf children. Then, Section 4 describes in detail the DAMA procedure. Section 5 presents the description and the results of a preliminary test with deaf children to evaluate the readability of our stories. Finally, Section 6 reports on some conclusions whereas Section 7 ends with few words on our future plans.
2 Stories for learning

Stories offer children a whole imaginary world, made up of language and pictures, that they can enter and enjoy. They provide knowledge and cultural information, just as emotional, social and intellectual stimuli for supporting the development of their own cognitive processes [7][10][22][28].

Carefully chosen literature allows children to develop their receptive and expressive language skills in an entertaining, meaningful context [11][35].

Listening to stories supports learning vocabulary in another language [24] whereas reading engaging stories helps children learn it more quickly [12][13].

Ryokai et al. [27] demonstrated that a virtual peer called Sam, who tell stories collaboratively with children, helped them improve their language. In particular, by working with the virtual peer, the stories became more sophisticated and explicit through the use of quoted speech and spatial and temporal expressions.

3 Literacy and Deaf Children

The word literacy refers to the ability to read and write at a level that lets one understand and communicate ideas in a literate society, thus to be integrated in that society. Literacy skills are critical both for children’s academic success and for their future achievements in the professional world. Moreover, it is claimed that reading and writing abilities also have an effect on the thinking process [4].

Learning to read and write is extremely difficult for deaf children because these activities are based on verbal language, which is definitely not deaf people’s natural/first language [18]. Indeed, they miss that natural exposure to verbal language, a fact that causes a considerable delay (3–5 years) in learning to read and write as compared to hearing children [29]. This is also the case for those children who have a cochlear implantation if this was implanted after the age of 2 [11].

With regard to the reading ability of deaf children, they have problems at at least three levels of comprehension: lexical, morphological and inferential. At lexical level, they generally have a vocabulary limited to a few words and they tend to connect the meaning to the context, having difficulties in generalizing it [14].

They often fail in detecting the meaning of idiomatic expressions, metaphors and allegories [26]. Moreover, to understand the meaning of an unknown word, intuitiveness generally helps to deduce its meaning from the context, resorting to personal experience. Unfortunately even if they share the same experience as hearing people, deaf children cannot rely on comparable word knowledge.

Some studies affirm that deaf pupils tend to focus on activities concerning the comprehension of isolated words or single sentences, loosing the global view of the text [5][36]. They often reason on isolated concepts rather than trying to relate (distant) concepts in written texts. This attitude partly depends on the kind of “literacy interventions addressed to deaf children” which prefers to ”focus on single sentences and the grammatical aspects of text production” [2]. As a matter of fact, educators often propose that deaf children concentrate on reading and writing tasks based on single sentences, so that the ability to infer information from the text itself develops with difficulty [36][25][34][28].

Information technology (IT) techniques are a great resource for those who works with deaf children. Characteristics such as high memory capacity, visualization abilities, hyperlink techniques as well as sophisticated artificial intelligence techniques can be used to build new effective educational tools able to improve this situation.

4 How to Create the E-stories: the DAMA procedure

There are two main aspects to be considered when looking for stories for deaf children. First, stories should attract children’s attention to help them maintain their concentration on what they are reading.
Deaf children are tendentially untrained readers and get rapidly bored, therefore the text’s appeal becomes vital to keep their attention high. Second, stories should be suitable for the children’s literacy levels. Indeed, a too easy story may bore the reader whereas a too difficult one may be frustrating. Both aspects relate to the children’s age and literacy level which do not correlate linearly with each other. In fact, it is not infrequent that a deaf pre-adolescent is less literate than a younger child.

To create a database of stories that could satisfy these requirements, we defined the Detecting-Annotating-Modifying-Archiving (DAMA) procedure. This procedure is the base for the development of a software tool that will semi-automatically create an archive of e-stories for deaf children.

Similar tools already exist for specific fields and users. Carrol et al. [9], for example, developed a system for text simplification to help people with aphasia to understand English newspaper articles. Candido et al. [8] presented an on-line authoring tool for simplifying Brazilian Portuguese texts. The originality of our work relies on the type of considered textual material, i.e. stories for deaf children. The specificity of our target users requires an attentive studies of their linguistic difficulties.

The procedure consists of four steps: detecting a story, annotating the original version of the story, modifying it, classifying and archiving it in an electronic repository. The four steps are described in details in the following sections.

### 4.1 Detection

Starting from the assumption that deaf children generally do not achieve a good reading level (see Section [3]), we looked for stories which were rather short and lexically simple.

From the first tests we conducted with hearing children [8], we observed that if we propose a well known story, the children tend to approach text and game exercises basing their answers on the knowledge they think they have about the story itself, so that the educational purpose is missed.

We therefore tried to collect a number of less known stories [2]. Our principal input source was the web where we tried to gain Creative common licensed works, in order to avoid copyright problems. The six stories we collected this way were then divided into two groups of three stories each: one for younger children (8 to 10 year old) and one for older ones (11 to 13 year old). For the first group we selected fairy tales whose protagonists are animals, which is quite typical for children’s literature. Whether for the second we searched for stories based on humans’experience. This last choice should exert a greater appeal to the older target group as the chance to identify with the stories protagonists becomes greater.

### 4.2 Annotation

Each story in the database is stored as a simple textual file. The content of this file is divided into two parts: the header and the story text. This structure allows, when necessary, an easy software processing of each stored story.

The story text is an annotated version of the story. We annotated the following elements: a) words that do not appear in the “Lessico elementare” [21], a frequency lexicon of words well known by primary school children; b) all those linguistic elements that could represent a difficulty for the target group (i.e. pronouns, clitics etc.); c) subordinate clauses.

The header is organized as a list of items as shown in the following:

```
word-number (#W) the value of this item is a measure of the length of the story;
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1The concept of “well known story” related to deaf children is quite debatable. Deaf children do not have the possibility to approach the (oral) storytelling tradition like normal hearing children and their relationship to the written text is, as we have already pointed out, painful and often unfruitful. So it is very probable that the majority of deaf children do not know the famous stories hearing children enjoy the most.

2We almost immediately abandoned the idea to write the stories ourselves as the skills required for such a task exceed our specific competences. Moreover, the timing imposed for the project was to be strictly respected.
**vocabulary-level (Voc)** the value of this item is established on the number of words that are not included in the "Lessico elementare" [21] or have a rank (more than 1000) attesting their relative low frequency;

**difficult linguistic elements-number (#L)** this value stands for the number of pronouns, clitics and subordinate clauses present in the original story;

**difficulty-rate (GIdx)** the value of this item has been computed using the readability formula Gulpsease [20], a readability index tuned on Italian; this index has a value between 0 (null readability) and 100 (maximum readability);

**characters-number (#Cha)**: we define as one character also a group of people/animals/elements, if they appear as an unicum in the story (i.e. the set of ducklings is considered as one single character);

**archive level (AL)** in the archive we have two main levels: L1, which refers to stories for children aged 8 to 10; and L2, which refers to stories for children aged 11 to 13. In general, stories in L1 are suitable for children attending the third, fourth and fifth class of the primary school, whereas stories in L2 are suitable for children attending the first, second and third class of the secondary school;

**copyright (CR)** the value of this item can be NO, if the story is an invented one or extracted from online free material; it can be YES if it was extracted from a commercial book and we asked for an official permission to use it;

### 4.3 Modification

In this phase we worked at the simplification of the story. It consisted of two steps: first of all, the text was shortened and rewritten with a reduced number of subordinate clauses, of (multiple) pronouns and of clitics etc.; second, words that are not included in the "Lessico elementare" [21] are either paraphrased or substituted with synonyms which do appear in the list.

After the modify procedure we made sure that the new version of stories have a Gulpsease index between 80 and 100 [20].

### 4.4 Archiviation

In each group of stories we provided texts with an ascending difficulty levels from elementary through advanced.

This subdivision is not correlated to any chronological age of LODE’s users because language performance in deaf children is not directly related to chronological age [31]. However, we have decided to build these three groups because this type of structure allows a better organization of the educational process: the user starts with elementary stories; when he/she performs correctly the comprehension exercises based on these types of stories, he/she can move to intermediate stories and so on. In this way, the child will never get frustrated about tasks not corresponding to his/her actual capacities.

### 5 A preliminary evaluation of DAMA

#### 5.1 Objective

The aim of our test was checking if stories modified following the DAMA procedure are readable and understandable for deaf children.
5.2 Participants

The pilot test took place during a workshop dedicated to families of deaf children with cochlear implantation (CI), *The 18th National Days on Prosthesis, Cochlear Implants and Speech Therapy* organized in Trento (Italy) by the association *Servizio di Consultenza Pedagogica*. While parents attended the workshop, their children kindly accepted to participate in our evaluation.

Fourteen Italian children, eleven boys and three girls, were involved. Among these, there were five hearing children and nine profoundly deaf children, all oralist, six with cochlear implants (CI) and three with audio aids. The deaf children formed the experimental group, identified in the following with the letter A, whereas the hearing children formed the control group, identified in the following with the letter B. Both groups A and B were divided into two sub–groups: respectively, A1 (seven children) – B1 (two children), formed by children aged six to ten, and A2 (two children) – B2 (three children), formed by children aged eleven to fourteen.

5.3 Method

The test was organised in four distinct phases.

The first phase consisted of collecting the participants’ personal data. To this end, children’s parents were asked to fill in a questionnaire (see Appendix B). The second phase consisted of a basic course for children to learn how to use Tuxyaint (see Figure 1). This phase took place in the morning and lasted two hours. Children learnt the main functionalities of the software tool.

The third phase consisted of reading the story and completing a series of comprehension exercises. The test designers decided which story each child should read, basing the decision on the child’s age. Each child read the written instructions provided (see Appendix C) and inserted his/her name in the appropriate space (see Figure 1). On one hand, the child was allowed to go back and forth through the story using the arrows on each side of the text, re-reading each page as many times as they needed. On the other hand, he/she had only a single trial to give the answer to each exercise. When he/she moved to a new exercise, he/she was not allowed to go back and change the previous answer.

When the child completed the exercise sequence, he/she was asked to create one or more drawings to illustrate the story they read using Tuxyaint. This was the fourth phase of the test.

5.4 Material

5.4.1 TuxPaint

Tuxyaint is a free drawing program for children. It has an easy-to-use interface and a virtual mascot who guides children through the different activities. Tuxyaint presents children with a blank canvas and a variety of drawing tools. Easy to install, it runs on a variety of platforms and also works well on old, slow systems. Supporting documentation and useful tutorials are available on the web site.

5.4.2 The e-Stories

For our test, we used four stories: *Francesco e la dieta* (239 words long), and *Picnic con le formiche* (367 words long), for children aged ten to fourteen, and *L’aquila e il sasso* (172 words long) and *Il villaggio di Ventolà* (309 words long) for children aged eight to ten (see Appendix A for the Italian and English versions of these stories). The value of some parameters concerning each story are presented in Table 1.

A simple web application was designed to present the stories to the participants. This application first visualises the content of a story subdivided into pages, about thirty words per page (see Figure 2 for an example of a page of a story), and then presents twelve comprehension exercises based on the content.
of the story, such as those proposed in Figure 1, aiming at testing the direct comprehension of the text (see Figure 1a), the comprehension of the temporal dimension (see Figure 1b), the syntax comprehension (see Figure 1c), and the children's inference ability (see Figure 1d).

Figure 2: Example of a story page for the test
a) direct comprehension

b) temporal order

c) syntax check

d) inferences 1

e) inferences 2

f) temporal prepositions

Figure 3: The sequence of comprehension exercises
5.5 Results and Discussion

Eight participants, five deaf children and three hearing children (three in A1, two in A2, one in B1 and two in B2) finished the test. Other three kids participated up to the second phase (training with Tux Paint) but refused to read the story and do the exercises. Other two children were not able to read, so we stopped their test. And finally, we do not have the test results of the last involved child because his computer crashed during the test.

5.5.1 Quantitative results

We gathered information on the time spent in reading the story and in doing the exercises and information on the number of correct answers given to the comprehension exercises. The time spent in reading the story is extremely various, ranging from 36 seconds to 8 minutes, which is natural due to the age range of the participants. The time necessary for answering the twelve questions is also spread over a wide range, from 2 minutes to 16 minutes. Almost all deaf and hearing children managed to give full correct answers to the comprehension exercises (see Figure 4); only one child had a low answer rate (three to twelve, see Figure 4e). There is no correlation between the number of correct answers and the time spent on giving them ($\rho = -0.23$) or the number of correct answers and the time spent in reading the story ($\rho = -0.09$).

5.5.2 Qualitative results

Training with TuxPaint, was a successful event in our test. All children actively attended at the short course of two hours. They all learnt how to use its main functionalities: how to load and save drawings, and how to use the main drawings tools. In particular, they liked the rubber stamp (see, for example, Figure 4d).

We collected eight final drawings to analyse (see Figure 4). In our analysis, we looked for two aspects: first, the presence of at least one of the main characters of the story; second, the representation of at least one of the main actions of the story. We agree that the child had understood the story at least partially, only if both these aspects were found in his/her drawing.

In five cases (Figure 4b,c,d,g,h), the drawing clearly illustrates an action of the story, and at least one of the story’s main characters is represented. Following our criterion, this means that the five test takers understood at least part of the read story. And this result is confirmed by the high number of correct answers given to the comprehension exercises. In two other drawings (see Figure 4e,g), the main character is present, but it is not clear to the evaluator which action is represented. It seems that these two children did not understand the story. And this is confirmed by the low rate of correct answers given by them. Finally, in a single case (Figure 4a) the interpretation of the drawing and the answer rate did not fit together: the answer rate is high (11/12), but the drawing is not meaningful. This could mean that the child understood the story but was not able to use Tux Paint.
Figure 4: Drawings of five deaf children (b)(c)(d)(e)(f) and of three hearing children (a)(g)(h)
6 Conclusions

This report describes the DAMA procedure, developed to create more readable stories for deaf children.

The effectiveness of the proposed procedure was preliminary tested with a small group of deaf and hearing children.

The participants in our test were relaxed and collaborative during the test. Both hearing and deaf children gave an high percentage of correct answers to the comprehension exercises. This demonstrate that the proposed stories are readable.

Drawings made by the children after reading the stories, illustrating what they read, are interesting and meaningful. The drawings’ content overlaps on average the results of the traditional comprehension exercises.

Even if these preliminary results are promising, they need to be confirmed with further experiments based on more stories and involving a more significant number of deaf children, both oralists and signers.

7 Future Work

As future work, a software tool to automatize, at least partially, the DAMA procedure should be implemented. Moreover, further tests with other stories should be organised to pick up adjunctive information for improving our procedure.

Appendix A. The Stories

This appendix proposes the four stories used for the pilot test. Table 1 presents some data for the Italian version of each story. Tables 2, 3, 4, 5 present the stories’ content, in English on the left, and in Italian on the right.

<table>
<thead>
<tr>
<th>Title</th>
<th>#W</th>
<th>Voc</th>
<th>#L</th>
<th>GIdx</th>
<th>#Cha</th>
<th>AL</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>L’aquila e il sasso</td>
<td>172</td>
<td>3</td>
<td>72</td>
<td>L1M</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>il paese di Ventolà</td>
<td>309</td>
<td>5</td>
<td>60</td>
<td>L1D</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Francesco e la dieta</td>
<td>239</td>
<td>7</td>
<td>71</td>
<td>L2M</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Il picnic con le formiche</td>
<td>367</td>
<td>9</td>
<td>59</td>
<td>L2D</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The hen and the eagle were great friends. A day the hen visited the eagle. While the hen and the eagle spoke, the hen saw a coloured pebble on the table. The hen said: Can I carry the coloured pebble to my house? My chicks like playing with pebbles. The eagle answered: Yes, but you must be careful! Do not lose the pebble. It is a gift of my father. The hen answered yes. Then, she took the pebble and went home.

The chicks played with the coloured pebble all the day. Before sleeping, the chicks hid the pebble underground. The day after, the chicks looked for the pebble but they did not find it.

After a week, the eagle visited the hen. The eagle wanted its coloured pebble. The chicks did not know where it was. Then the hen began to look for the pebble.

After waiting for a long time, the eagle got angry. The eagle wanted to take away a chick. In that moment the hen arrived with the pebble in the spout. The eagle flew away with the pebble while the hen embraced its chicks.

La gallina e laquila erano molto amici. Un giorno la gallina andó a trovare laquila. Mentre la gallina e laquila parlavano, la gallina vide un sasso colorato sul tavolo.

La gallina disse: Posso portare il sasso colorato a casa? Ai miei pulcini piace giocare con i sassi.

Laquila rispose: Sí, ma stai attenta! Non perdere il sasso. É un regalo del mio papá La gallina rispose di sí. Poi prese il sasso e andó a casa.

I pulcini giocarono con il sasso colorato tutto il giorno. Prima di dormire, i pulcini nascosero il sasso sotto terra. Il giorno dopo, i pulcini cercarono il sasso ma non lo trovarono.

Dopo una settimana, laquila andó dalla gallina. L’aquila voleva il suo sasso colorato. I pulcini non sapevano dov’era. Allora la gallina cominciò a cercare il sasso.

Dopo aver aspettato a lungo, laquila si arrabbió. Laquila voleva portare via un pulcino. In quel momento la gallina arrivó con il sasso nel becco. Laquila voló via con il sasso mentre la gallina abbracciava i suoi pulcini.
Ventolà is a village under the Mount Fog. This mount frightens the inhabitants of Ventolà, because often from its top unexpected and strong winds come down. Before the winds reach the village, the inhabitants hear very loud thunders. The winds last few minutes but they are so strong that the inhabitants run into their house. Someone says that a frightful giant lives hidden on the top of the mountain but nobody never went on to check it.

One day, a child called Totò decides to go up on the top of the Mount Fog in order to discover if the giant really exists. All people try to convince him not to go. But Totò has decided.

After greeting her mother and papa, Totò begins to go up on the mount. After some hours, he arrives on the top. There, Totò sees a cavern and within it an enormous giant. The giant is so large that his feet exit from the cove and sink into the snow. The giant is good and kind and says to Totò: Do not approach to me! The inhabitants of Ventolà never carry the sheep on the mountain. Thus I do not have the wool in order to make a pair of stockings to keep warm my feet. I always have the cold and I often make very strong sneezes. Totò understands all and exclaims: The thunders and the wind that we feel to impeller are in reality yours sneezes!

Totò returns quickly to the village and tells to the inhabitants the story of the giant. All people decide to help the giant. While the women make a pair of beautiful red stockings, the men prepare a tea with herbs in order to recover the cold of the giant. Then the men go up on the Mount Fog with Totò and give to the giant the stockings and the tea. From that day the giant has not sneezed anymore and the inhabitants of Ventolà have changed the name to their village: the village now calls Solebello!
Table 4: FRANCISCO AND THE DIET – FRANCESCO E LA DIETA

Francisco is twelve year old, he is clever and very greedy of cookies. Every day Francisco eats candies, chocolate and ice-creams. One day, the mother takes Francisco to the doctor. The doctor visits Francisco and says to him: Francisco, you are fattened! Do not eat cookies for one week!

On Sunday evening, the mother tells to Francisco: Tomorrow you starts the diet. For breakfast, you can only have a tea.

However, on Monday morning Francisco wakes up early and secretly eats two slices of cake. Then, Francisco goes to the kitchen and drinks his tea. The mother is very happy. After breakfast, Francisco goes to school.

In the afternoon Francisco comes back home. He is sad because he is very hungry. He looks for cookies but they are finished. Thus Francisco calls his friend Mark and asks him for some chocolate cookies.

Mark goes to Francisco’s house. When the mother sleeps, Mark gives the cookies to Francisco. Now Francisco is happy. Before dinner, Francisco has already finished all cookies.

On Thursday, the mother takes Francisco to the zoo. In a cage, Francisco sees monkeys who are eating bananas. While the mother speaks with a friend, Francisco enters in the cage. After scaring the monkeys, Francisco steals monkeys’ bananas and hides them in his backpack. In the evening, secretly, he eats all the bananas.

On Saturday, the mother decides to weigh Francisco. Francisco puts the feet on the balance. The mother reads the weight and faints. The weight of Francisco is increased!

Francisco ha dodici anni, è furbo e molto goloso di dolci. Ogni giorno Francesco mangia caramelle, cioccolata e gelato. Un giorno la mamma porta Francesco dal dottore. Il dottore visita Francesco e gli dice: Francesco, sei ingrassato! Prova a non mangiare dolci per una settimana!


Nel pomeriggio Francesco torna a casa. È triste perché ha molta fame. Cerca i biscotti ma sono finiti. Così Francesco telefona al suo amico Marco e gli chiede di portargli dei biscotti al cioccolato.

Marco va a casa di Francesco. Mentre la mamma dorme, Marco dà i biscotti a Francesco. Adesso Francesco è contento. Prima di cena, Francesco ha già finito tutti i biscotti.


Sabato, la mamma decide di pesare Francesco. Francesco mette i piedi sulla bilancia. La mamma legge il peso e sviene. Il peso di Francesco è aumentato!
One day the grandmother proposed to her grandsons Federico, Letizia and Carolina, to have a picnic. The three children accepted happily. The grandmother and the grandsons then went to the kitchen. The grandmother prepared a cake with chocolate while Federico and Letizia prepared some sandwiches. Carolina instead prepared two bottles of cold tea. After that the grandmother had put sandwiches, the cake and the bottles of tea in a big basket, grandmother and grandsons left.

When they found a beautiful meadow, they stopped. The grandmother spread a blanket on the grass and then they sit down to admire the nature. The day was really beautiful: the sun shone high in the blue sky and it was warm. Before eating sandwiches, Federico asked: Do we have a walk?. Letizia, Carolina and the grandmother stood up quickly and went towards the forest.

While they walked, suddenly Federico exclaimed: Watch! There is a brown cricket. While all watched the cricket, the grandmother laughed and said: It is a tanned cricket!

A little bit farer, Letizia started to collect flowers. A butterfly put down itself over a daisy. The grandmother told to the grandsons: Before that the butterfly flights away, look under its taws. Do you see numbers? Those numbers make good.

Grandmother and grandsons continued to walk and when they arrived to a small lake they stopped. The grandmother sat on a large pebble to watch the geese in the small lake, while Federico taught to Letizia how to make a garland with the collected flowers. In the meantime, Carolina collected red apples from the branches of the trees. Suddenly, from an apple it dulled a caterpillar. Carolina exclaimed: Watch how pretty! It seems that he is appearing at a window.

To noon, the grandmother, Federico, Letizia and Carolina returned to the meadow and they sat down on the blanket. Carolina saw a black mountain over sandwiches and the cake. Federico shout: Our sandwiches and our cake are full of ants! What can we eat now? The grandmother said: The ants have been much clever! While we had a walk, the ants had a beautiful picnic! All laughed. The hungry Federico, Joy, Carolina and grandmother returned home but allegros and said: We have another picnic on next Sunday but without ants.

Un giorno la nonna propone ai nipoti Federico, Letizia e Carolina, di fare un picnic. I tre ragazzi accettarono contenti. La nonna e i nipoti allora andarono in cucina. La nonna preparò una torta al cioccolato mentre Federico e Letizia preparavano dei panini. Carolina invece preparò due bottiglie di tè freddo. Dopo che la nonna ebbe messo i panini, la torta e le bottiglie di tè in un grande cesto, nonna e nipoti partirono.

Quando ebbero trovato un bel prato, i quattro si fermarono. La nonna stese una coperta sul erba e tutti si sedettero ad ammirare la natura. La giornata era molto bella: il sole splendeva alto nel cielo azzurro e faceva caldo. Prima di mangiare i panini, Federico chiese: Andiamo a fare una passeggiata?. Letizia, Carolina e la nonna si alzarono subito in piedi e andarono verso il bosco.

Mentre camminavano, improvvisamente Federico esclamò: Guardate! C’è un grillo marrone! Mentre tutti guardavano il grillo, la nonna risse e disse: È un grillo abbronzato!

Un po più in là Letizia si mise a raccogliere fiori. Sopra una margherita si posò una farfalla. La nonna disse ai nipoti: Prima che la farfalla voli via, guardate sotto le sue ali. Si vedono dei numeri? Quei numeri portano fortuna.

Nonna e nipoti continuarono a camminare e quando arrivarono a un laghetto si fermarono. La nonna si sedette su un grosso sasso a guardare le papere nel laghetto, mentre Federico insegnava a Letizia a fare una ghirlanda con i fiori raccolti. Nel frattempo, Carolina raccoglieva delle mele rosse dai rami degli alberi. Allimprovviso, da una mela spuntò un bruco. Carolina esclamò: Guardate come carino! Sembra che si affacci alla finestra!

A mezzogiorno, la nonna, Federico, Letizia e Carolina tornarono al prato e si sedettero sopra la coperta. Carolina vide una montagna nera sopra i panini e la torta. Federico urlò: I nostri panini e la nostra torta sono pieni di formiche! Cosa mangiamo adesso?

La nonna disse: Le formiche sono state molto furbe! Mentre noi facevamo una passeggiata, le formiche hanno fatto un bel pic nic! Tutti risero. Federico, Letizia, Carolina e la nonna ritornarono a casa affamati ma allegri e dissero: Facciamo un altro picnic domenica prossima...ma senza formiche!
### Appendix B. The Questionnaire

#### Figure 5: Questionnaire for picking up personal data: Page 1

**Progetto LODE - Questionario per le famiglie**

Il presente questionario riguarda tutti i partecipanti, sia sordi sia udenti. Per i/e bambini/e udenti, compilare solo fino al punto 11 compreso. Tutti i dati forniti saranno utilizzati solamente a scopo scientifico e unicamente dal soggetto che li raccoglie. Essi saranno trattati nel pieno rispetto della legislazione vigente per la protezione dei dati personali - D.Lgs. 196/03.

#### Dati anagrafici

1. **Nome del/la bambino/a**

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2. **Sesso**

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3. **Tipologia bambino/a**

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<tbody>
<tr>
<td>sordo</td>
<td>udente</td>
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4. **Eventuali altri disturbi**

   [ ]

5. **Tipologia padre**

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6. **Tipologia madre**

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<td>sordo</td>
<td>udente</td>
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7. **Età del/la bambino/a (in anni)**

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<td>8</td>
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<td>10</td>
<td>11</td>
<td>12</td>
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8. **Classe frequentata**

   [ ]

9. **Luogo di nascita del/la bambino/a**

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<tbody>
<tr>
<td>Italia</td>
<td>altro</td>
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10. **Luogo di nascita del padre**

    |   |   |
    |---|---|
    | Italia | altro |

11. **Luogo di nascita della madre**

    |   |   |
    |---|---|
    | Italia | altro |

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2. Il nome del bambino è necessario per consentirne di collegare le informazioni raccolte ai risultati del test. Una volta raccolti i dati, il nome del bambino sarà sostituito nei nostri archivi con un codice per impedire l’riconoscimento. La versione cartacea del questionario compilato verrà distrutta.
### Dati relativi alla sordità

12. Grado di sordità orecchio sinistro
   - lieve
   - media
   - grave
   - profonda
   - Perdita utitiva in dB

13. Grado di sordità orecchio destro
   - lieve
   - media
   - grave
   - profonda
   - Perdita utitiva in dB

14. Età a cui è stata diagnosticata la sordità
   - alla nascita
   - 3 mesi
   - 6 mesi
   - 9 mesi
   - 1 anno
   - 2 anni
   - altro

15. Il bambino usa un/a
   - protesi DX
   - protesi SX
   - imp. cocleare DX
   - imp. cocleare SX
   - nessun ausilio

16. Età a cui è stato protesizzato/implantato
   - alla nascita
   - 1 anno
   - 2 anni
   - 3 anni
   - 4 anni
   - 5 anni
   - 6 anni
   - altro

### Dati linguisticì

17. Prima lingua appresa dal bambino
   - italiano
   - lingua italiana dei segni (LIB)
   - altro

18. Lingua del padre

19. Lingua della madre
   - italiano
   - lingua italiana dei segni (LIB)
   - altro

20. Tipo di riabilitazione
   - Ora lista (italiano)
   - Bimodale (italiano segnato)
   - Bilingue (italiano + LIB)

21. Il bambino conosce la LIB?
   - si
   - no

22. Se si, in che contesto la usa?
   - in casa
   - a scuola con assistente alla comunicazione
   - nel tempo libero (gruppi, associazioni)

23. A che età ha iniziato l’intervento logopedico?
   - 1 anno
   - 2 anni
   - 3 anni
   - 4 anni
   - 5 anni
   - 6 anni
   - altro
Abilità informative

24. Il bambino usa abitualmente il computer?
- [ ] si
- [ ] no

25. Se sì,
25.1. mediamente, quante volte alla settimana?
- [ ] 1 volta
- [ ] 2 volte
- [ ] 3 volte
- [ ] 4 volte
- [ ] 5 volte
- [ ] 6 volte
- [ ] tutti i giorni

25.2. mediamente, per quanto tempo a seduta?
- [ ] 15 minuti
- [ ] mezz'ora
- [ ] un'ora
- [ ] 2 ore
- [ ] più di due ore

25.3. lo fa da solo?
- [ ] si
- [ ] no, con l'aiuto di
- [ ] altro

Il sottoscritto,
[ ] genitore del/la bambino/a

accenente che il/la proprio/a figlio/figlia partecipi a una verifica dei livelli di capacità di comprensione del testo. I dati raccolti verranno trattati nel pieno rispetto della legislazione vigente per la protezione dei dati personali - D.Lgs. 196/03.

Data

FIRMA
References


