Language Resources and Visual Communication in a Deaf-Centered Multimodal E-Learning Environment: Issues to be Addressed

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Problems we aim to address (1): Deaf Learners, E-learning and Literacy Skills
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Problems we aim to address (2): Two Groups of Deaf Learners

(1) DL who prefer to communicate in the national sign language (SL), in our case: Italian Sign Language (LIS): DL/LIS-L1

(2) DL who prefer to communicate in the national spoken/written language: DL/Italian-L1.
Problems we aim to address (3): E-Learning and Sing Language

• SL translations and instructional materials are included in many existing e-learning environments to respond to the needs of _signing_ DL

• *one cannot neglect the needs of DL who prefer to use the vocal/written national language*
Problems we aim to address (4): Linguistics issues

- All SL are face-to-face languages, without a written tradition - and this may influence signing DL approach to literacy (along with the minority status of SL);
- There are important structural differences between SL and vocal / written languages, and this may also influence signing DL spoken/written language skills.
Problems we aim to address (5): Visual attention patterns

Hearing users patterns
Problems we aim to address (5): Visual attention patterns

Deaf users patterns
Proposals from ongoing research within the VISEL project (2009-2012): Five Teams

Five Research teams are involved in the Project, providing interdisciplinary competence & expertise across the fields of:

- Sign language linguistics, deaf studies, gesture studies, cognitive sciences (ISTC-CNR, Rome) [Project leader]

- Special and bilingual education for DL, Foreign language teaching via E-learning (ISSR, Rome)

- HCI and visual learning in e-learning environments (PCL, University of Rome ‘Sapienza)

- Foreign language teaching in both traditional environments (DSSC team, University of Rome Sapienza), and e-learning environments (DSU team, University of Siena for Foreign Students, Siena, Italy)
Our target population of DL

High School and University students, young deaf professionals (including SL teachers, deaf educators)
Trying to develop a deaf-centered e-learning environment (DELE)

The DELE is grounded upon the idea that research aimed at creating useful products for deaf users needs to be developed, from the very start, with deaf persons, not just for or on deaf people.
A Deaf-Centered E-Learning Environment

• The project leader team includes deaf colleagues, highly proficient in Italian Sign Language (LIS), who:

  • participate as co-protagonists in planning and developing the entire research project, not only as “end users” or “end evaluators”, e.g. contributing to:

  • choosing the contents of the e-learning environment, the forms in which they will be presented to DL, evaluating the multimedia tools and methodologies to be used etc.

• In addition, all the hearing members of the same team know LIS (good or advanced knowledge), and hearing and deaf members alike have a long-time expertise in interacting with both signers and non signers deaf children and adults.
A schematic overview of the DELE we aim to develop
DEAF-CENTERED E-LEARNING ENVIRONMENT

- DEAF LEARNERS’ NEEDS (LIS-L1 and Italian-L1)
- DEAF LEARNERS’ VISUAL ATTENTION PATTERNS IN HCI
- DEAF WORLD VIEW
- MULTIMEDIA TECHNOLOGIES
- LITERACY DEVELOPMENT
- LIS FACE-TO-FACE
- DEAF WORLD VIEW
- ITALIAN written and spoken
- Written LIS (Sign Writing)
Active involvement of deaf colleagues

DEAF LEARNERS’ NEEDS (LIS-L1 and Italian-L1)

DEAF-CENTERED E-LEARNING ENVIRONMENT

DEAF WORLD VIEW
Our DELE aims at addressing the needs of both deaf learners because both such groups experience difficulties in literacy development.

**DEAF LEARNERS’ NEEDS**
(LIS-L1 and Italian-L1)

**Signing deaf learners**

**Non signing deaf learners**

Explore the communicative-linguistic needs of each group of DL
Expectations from the preliminary explorations

• Obtain novel, relevant information on the linguistic-cognitive profile of the two groups

• Clarifying if, and/or how, for DL/LIS-L1, knowledge of LIS may, or may not, interfere with the acquisition and use of spoken/written Italian. This in turn will:

• Provide us indications on how we may need to differentiate the multilingual and multimodal materials for promoting literacy development in both groups of DL.
Language resources we plan to use

• For all DL (LIS-L1 & Italian-L1): written and spoken Italian texts, implemented by:
  – Text-easification procedures, and graphic illustrations for facilitating DL’s access to materials in *written Italian*
  – Speech-to-text captioning for granting visual accessibility to instructional / explanatory materials in *spoken Italian*

• For signing DL (LIS-L1):
  a) SL videos providing instructional and explanatory materials in *face-to-face LIS*
  b) materials in *written LIS (encoded in SignWriting)* which we have reasons to believe may contribute to enhance deaf signers’ metalinguistic skills*.

*See: Di Renzo & al, 2006; Gianfreda & al, 2009; Antinoro Pizzuto & al, 2008*
Language resources we plan to use (2)

ITALIAN written and spoken

Written LIS (Sign Writing)

LIS FACE-TO-FACE

DEAF-CENTERED E-LEARNING ENVIRONMENT
Key structural differences between LIS and spoken/written Italian: word-like signs vs. Highly Iconic Structures*

Word-like sign: “dog”

Non-word-like Highly Iconic Structure (HIS)
“the dog jumps on the window sill”

* On the relevance of word-like signs vs HIS in SL structure see Cuxac, 2000; Cuxac & Antinoro Pizzuto, 2010. On the importance of SL written forms for fostering deaf signers’ metalinguistic skills, see Di Renzo & al, 2006; Gianfreda & al, 2009.
Written LIS and metalinguistic skills: written representations

Word-like sign: ‘**dog’

HIS: ‘the dog jumps on the window sill’
DL’s visual attention patterns

- Analyze DL's visual attention patterns
- Compare these patterns with those of hearing learners
- Obtain a better understanding of how visual information needs to be spatially and temporally structured
The DELE Design

- How can we design a DELE appropriate to DL’s visual world view?
- Steps towards a visually based graphic interface and an interaction paradigm based on the cognitive embodiment approach (Capuano & al, submitted).
Cognitive Embodiment

- All our knowledge grows up from bodily-based structures called *Image Schemata*
- Image Schemata are pre-conceptual, non-propositional structures that derive from our bodily experience of the world
Cognitive Embodiment (2)

- Conceptual Metaphor, Conceptual Methonimy and Conceptual Blend are most important cognitive structures that we use to project our Image Schematic understanding into conceptual domains.
Examples of such cognitive functions can be found in mathematics, where most of the abstract concepts that are used can be seen as metaphorical projections of some physical domains (Lakoff & Nuñez, 2000)
Also in Vocal and Written Language many concepts are understood through Conceptual Metaphors (Johnson, 2007; Lakoff, 1997).

Conceptual Metaphor seems to be a very powerful tool to be exploited also in Human Computer Interaction design (Imaz & Benyon, 2007).
Storytelling and Learning

- Storytelling is a very pervasive metaphor in our experience of understanding new concepts.
- The most simple way that can be used to learn something is to tell it as a story with a beginning, some steps and a conclusion.
- Such a process can be visually represented as a motion along a path.
Deafness and embodiment of learning

- We could try to exploit such theories to develop a story-based learning process
- The user "lives" the learning process experiencing it **physically**, within the virtual environment, as a story with a start place, several learning steps and a final goal
- The deaf-peculiar visual way of grasping information could be exploited
- Many difficulties of deaf users concerning their access of text-based interfaces may hopefully be overcome
THANKS!


References (cntd)


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