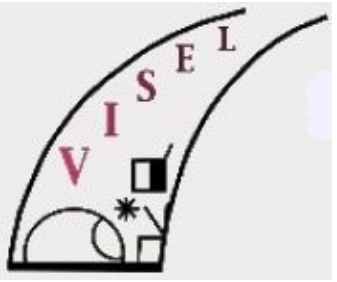

Language Resources and Visual Communication in a Deaf-Centered Multimodal E-Learning Environment: Issues to be Addressed

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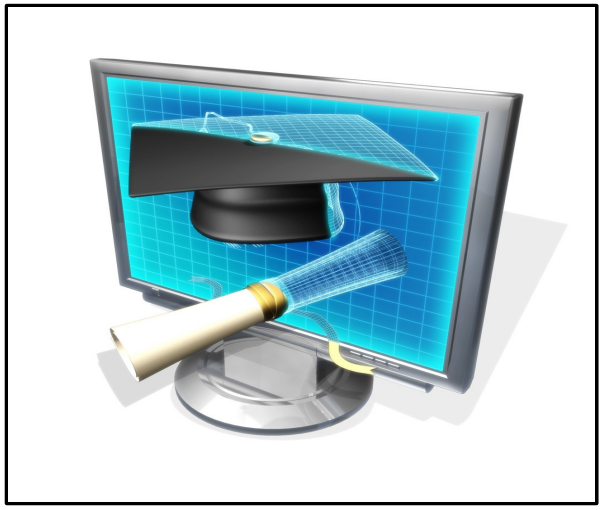
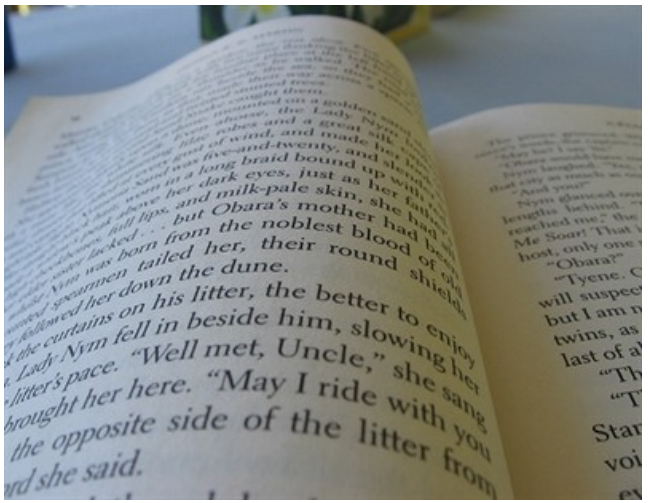
LREC 2010
Workshop on Supporting eLearning with Language Resources and Semantic Data
Valletta, Malta, May 22nd, 2010

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





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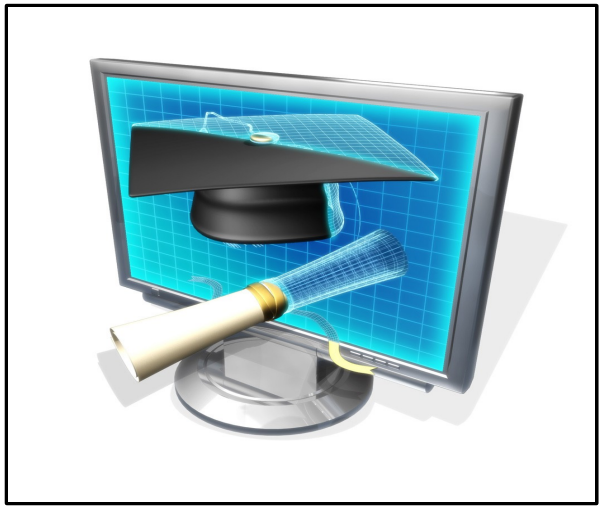
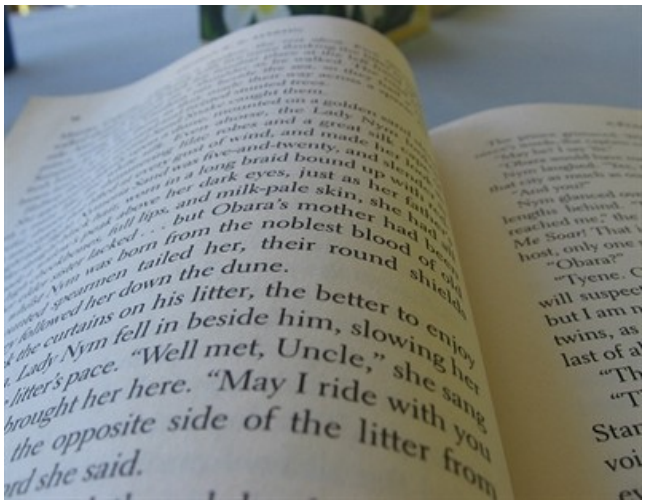




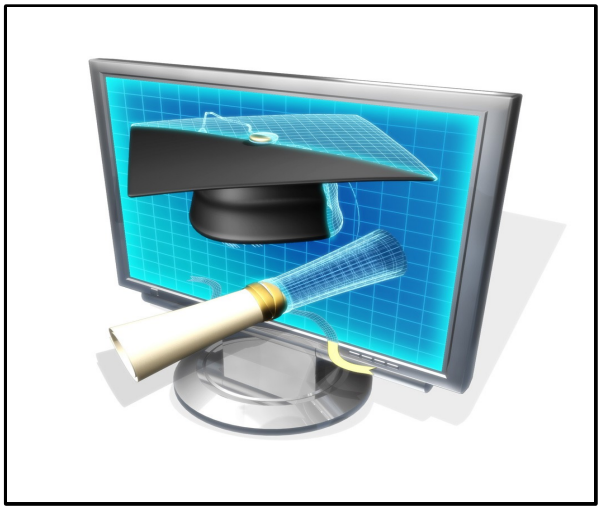
Problems we aim to address (2): Two Groups of Deaf Learners

(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:

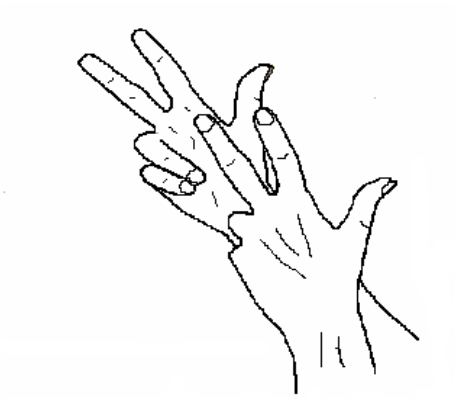
- Sign language linguistics, deaf studies, gesture studies, cognitive sciences (ISTC-CNR, Rome) [Project leader]

- 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 envoronments (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)

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,

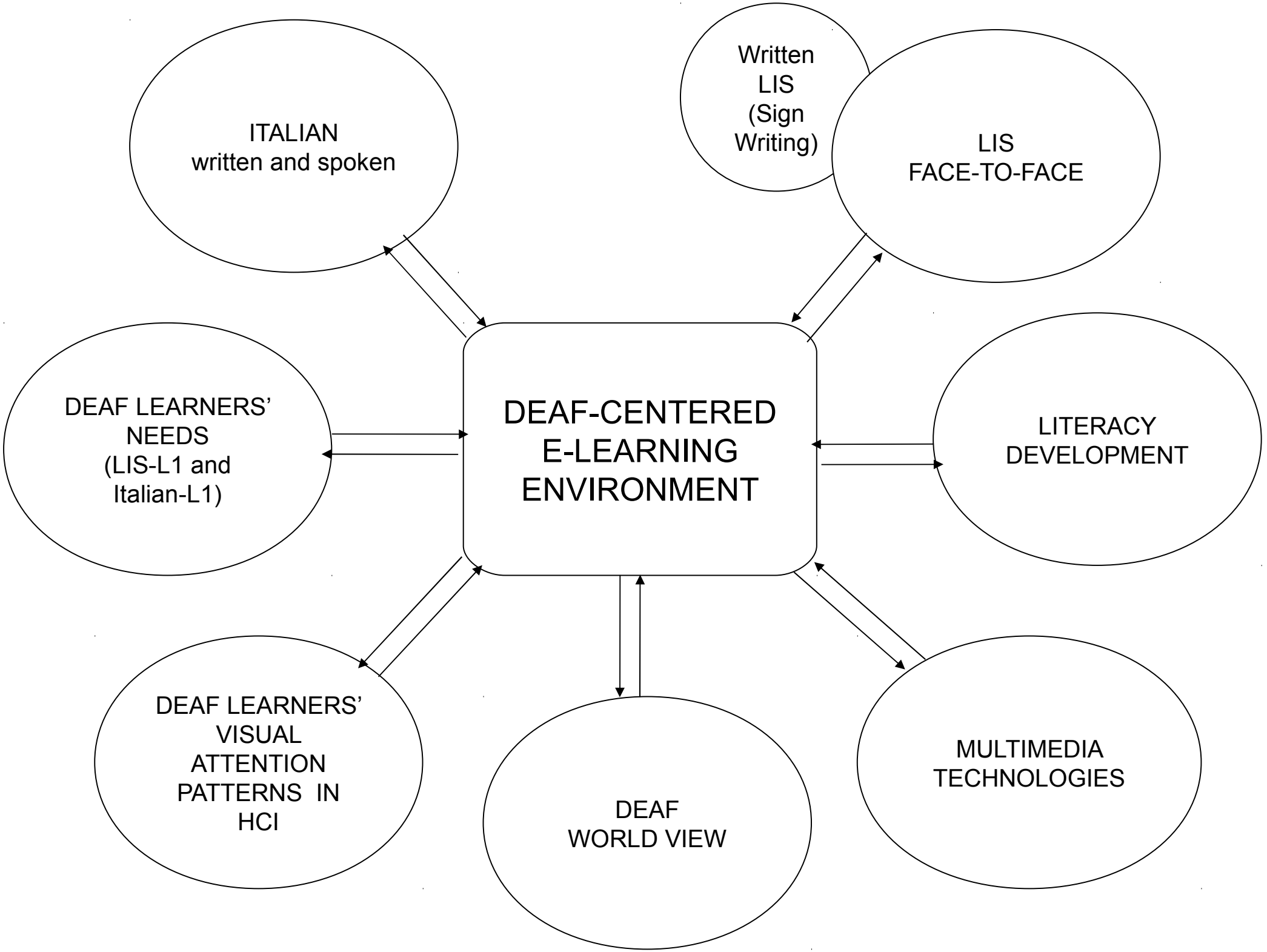
with deaf persons

not just ***for*** or ***on*** deaf people

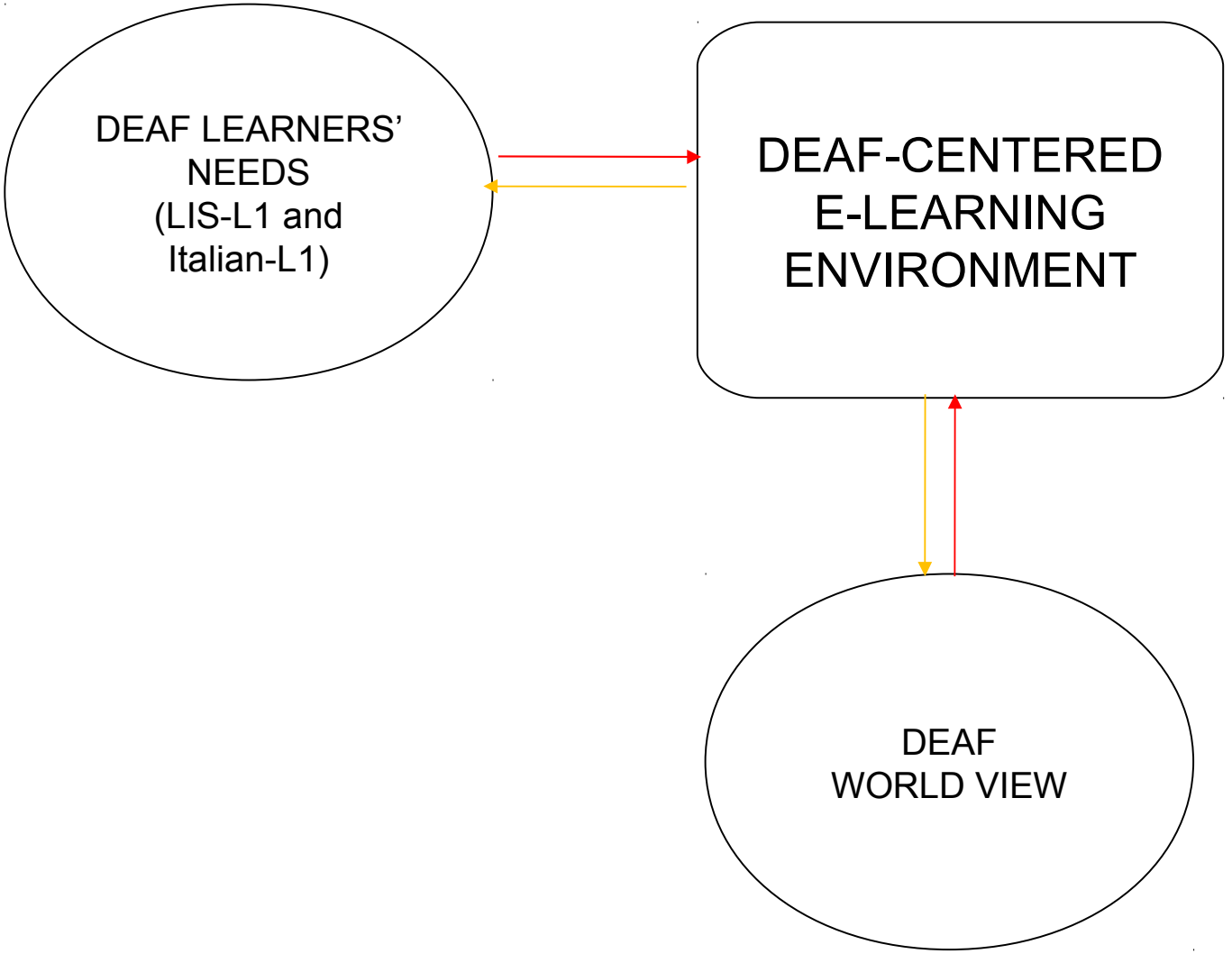
A Deaf-Centered E-Learning Environment

- 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:
- chosing 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


ITALIAN
written and spoken
Written
LIS
(Sign
Writing)
LIS
FACE-TO-FACE
DEAF LEARNERS'
NEEDS
(LIS-L1 and
Italian-L1)
DEAF-CENTERED
E-LEARNING
ENVIRONMENT
LITERACY
DEVELOPMENT
DEAF LEARNERS'
VISUAL
ATTENTION
PATTERNS IN
HCI
DEAF
WORLD VIEW
MULTIMEDIA
TECHNOLOGIES

Active involvement of deaf colleagues



Explore the communicative-linguistic needs of each group of DL

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

Our DELE aims at addressing the needs of **both**

Signing deaf learners

Non signing deaf learners

because both such groups experience difficulties in

LITERACY DEVELOPMENT

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

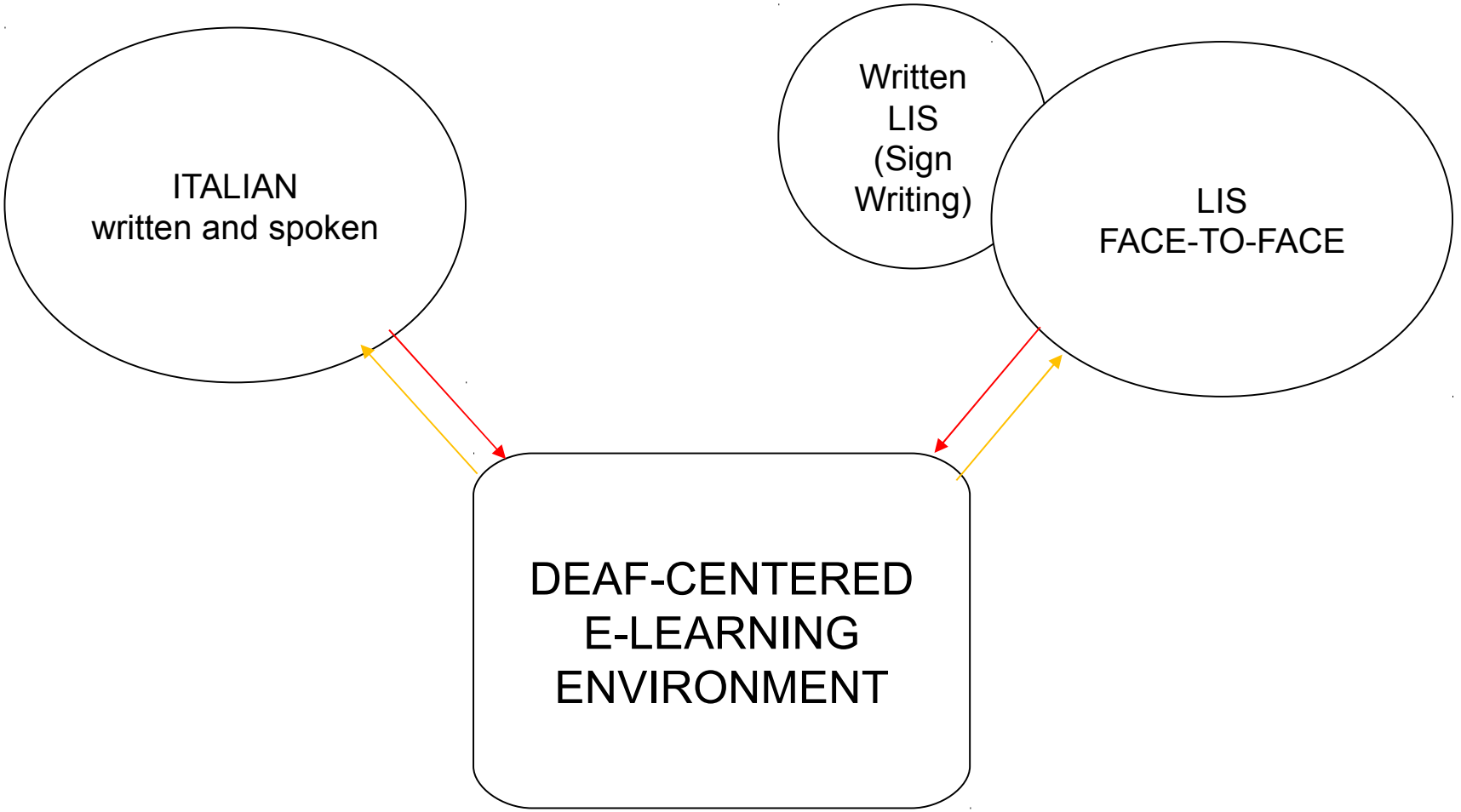
- For all DL (LIS-L1 & Italian-L1): written and spoken Italian texts, implemented by:
  - Text-easification procedures, and graphic illustrations for facilitating DL's access to materials in *written Italian*
  - Speech-to-text captioning for granting visual accessibility to instructional / explanatory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

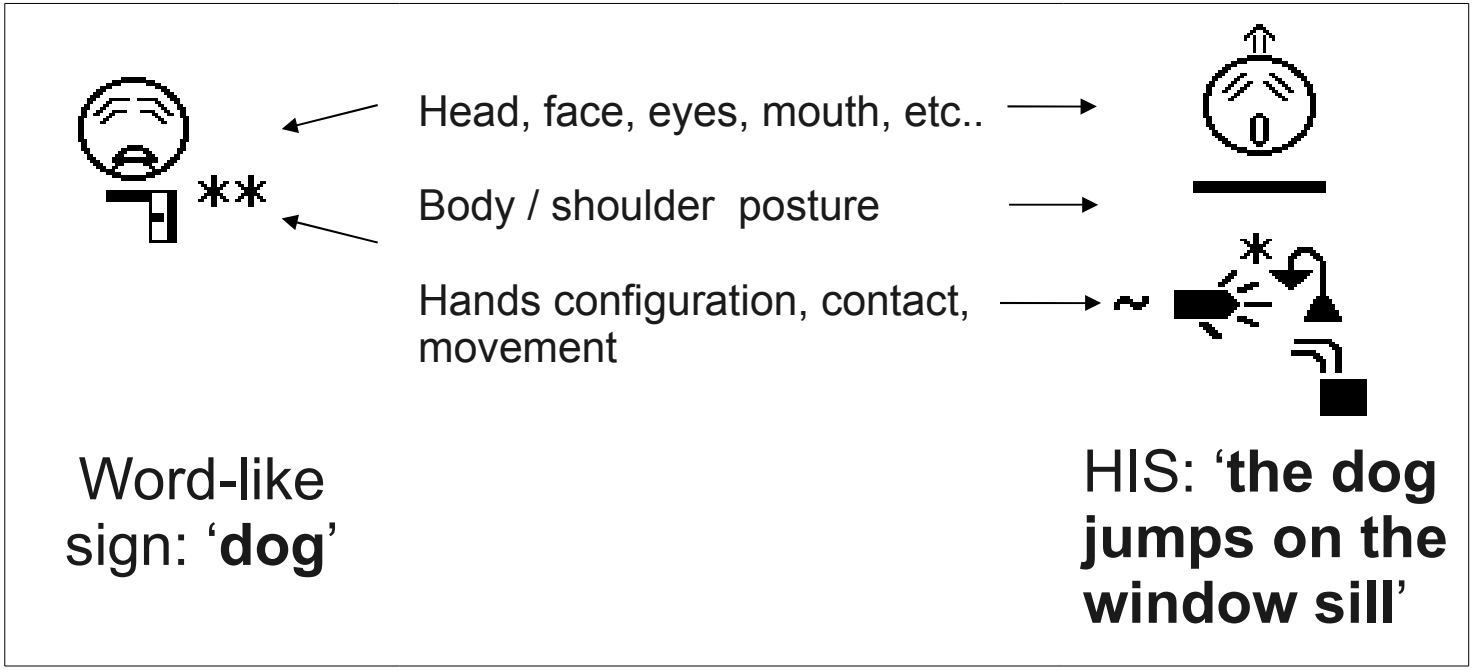


Key structural differences Between LIS and spoken/written Italian: word-like signs vs. Highly Iconic Structures*

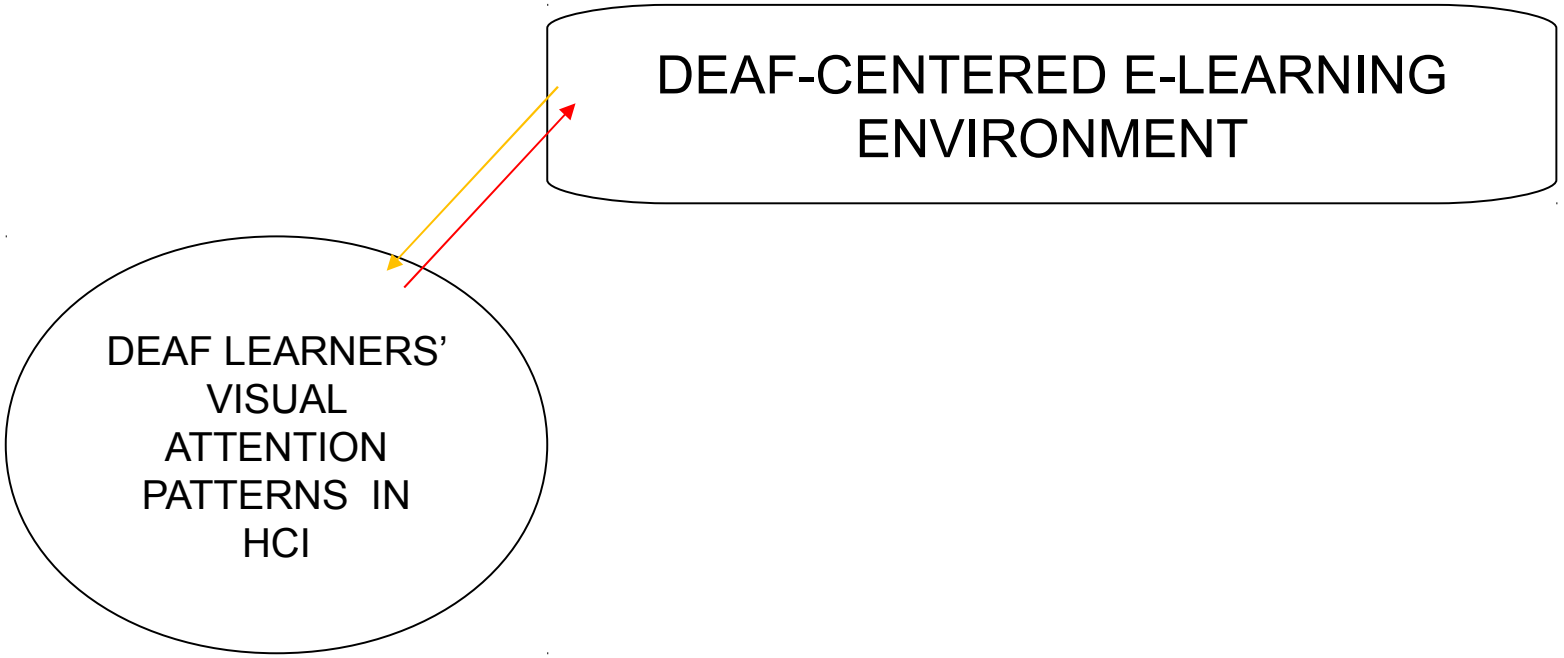
 Word-like sign: **“dog”**	 Non-word-like Higly Iconic Structure (HIS) “**the dog jumps on the window sill**”

* 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

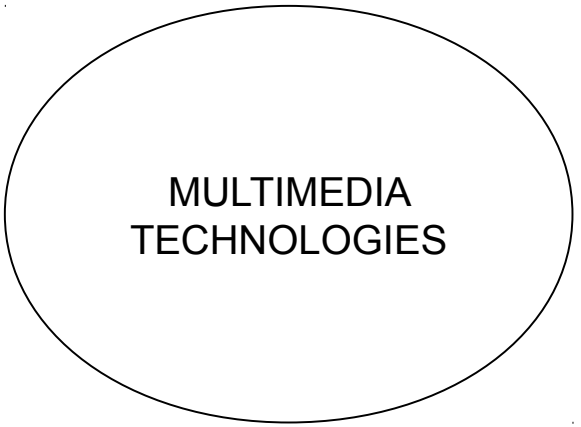


DL's visual attention patterns



- 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

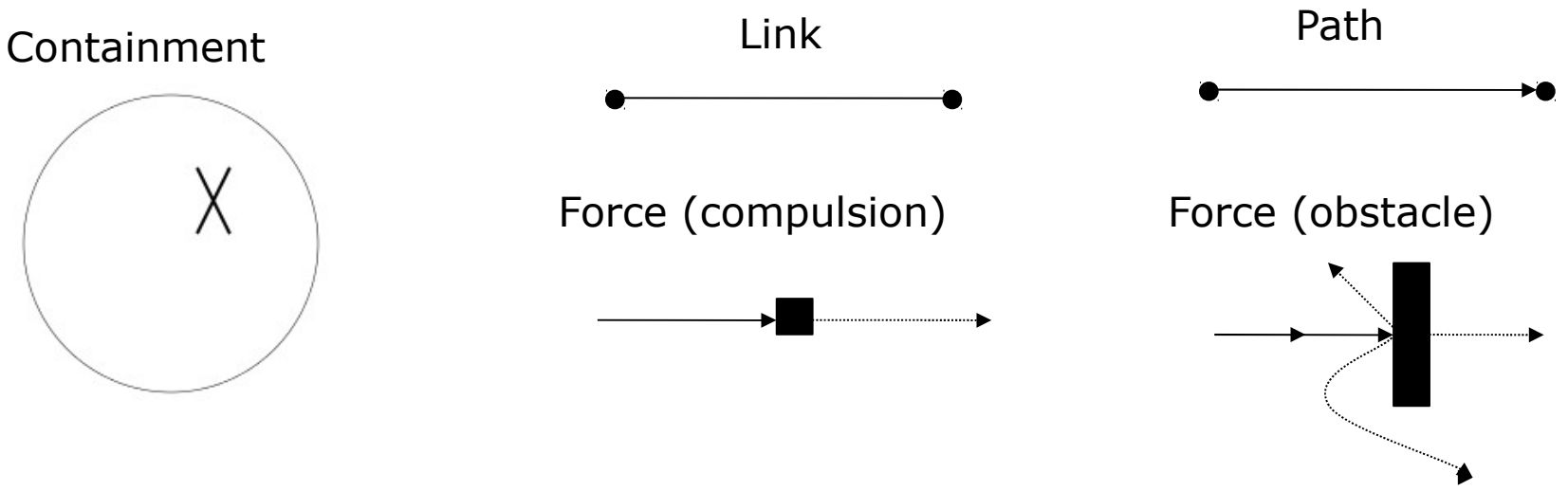
The DELE Design



- 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).

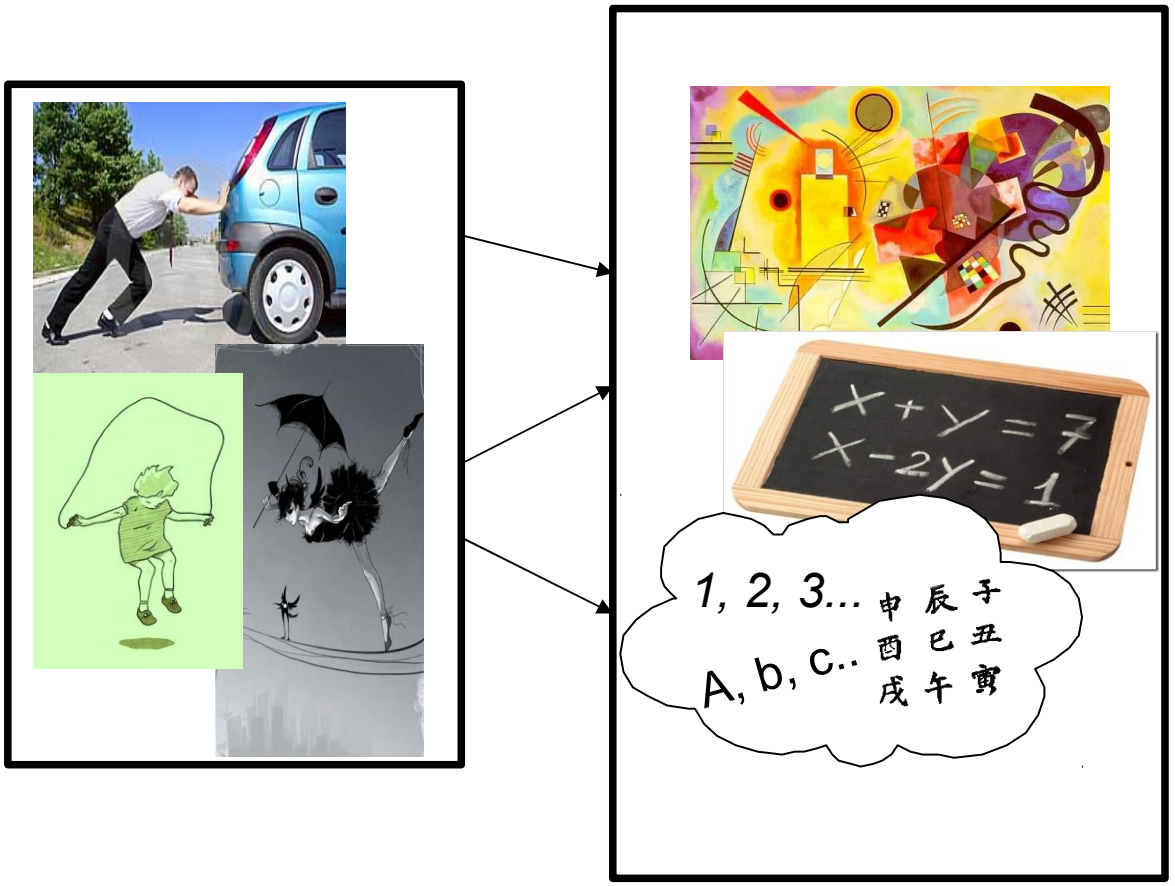
Cognitive Embodiment

- 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



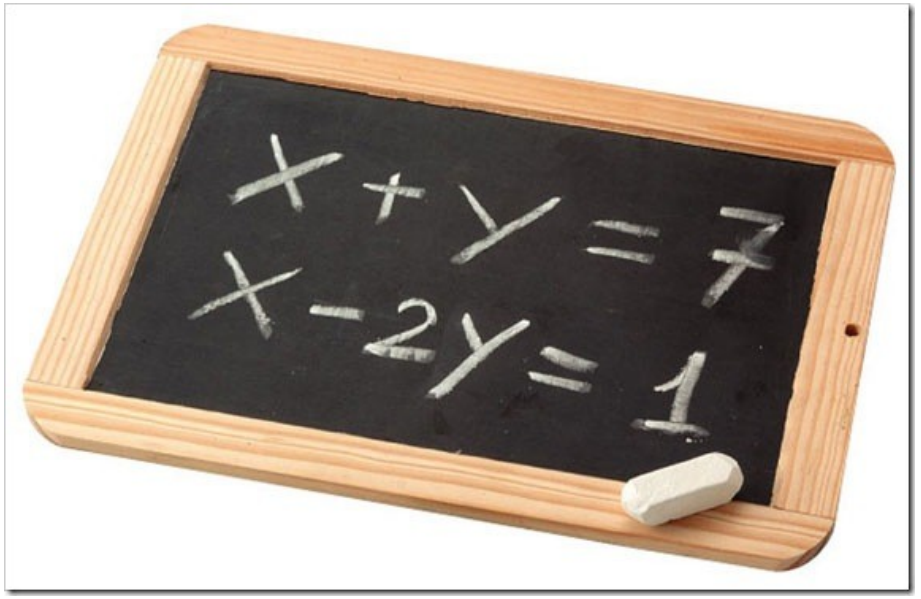
Cognitive Embodiment (2)

- Conceptual Metaphor, Conceptual Methonimy and Conceptual Blend are most important cognitive structures that we use to project our Image Schematic understanding into conceptual domains

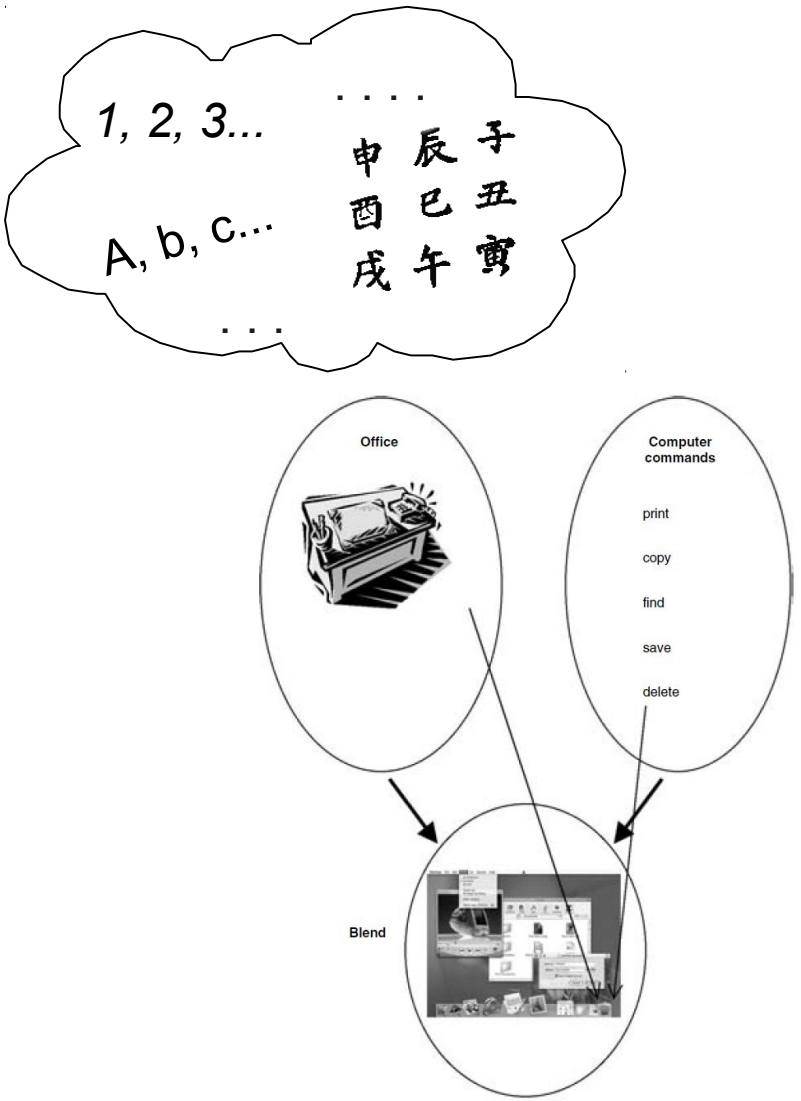


Cognitive Embodiment (3)

Examples of such cognitive functions can be found in mathematics, where most of the abstract concepts that are used can be seen as methaphorical projections of some physical domains (Lakoff & Nuñez, 2000)



Cognitive Embodiment (4)



- 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)

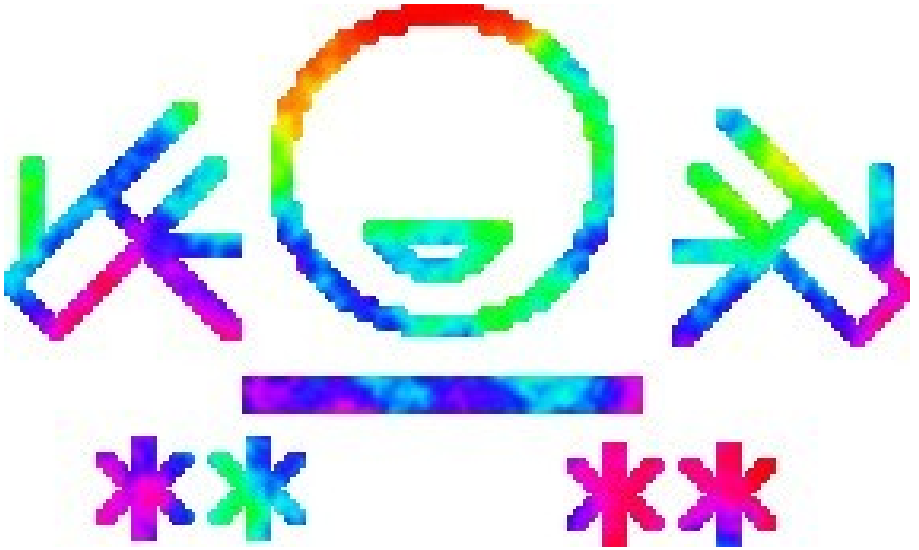
Storytelling and Learning

- 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*, whithin 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!



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Acknowledgements

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