

COGNITIVE FITNESS IN IMMERSIVE VIRTUAL WORLDS

- Designing a Learning Environment for People Suffering from Aphasia



Professional background

- Teacher
- Speech and Reading Pathologist at *Institute of Language, Speech, and Brain Disorders*
- People with aphasia – focus on ICT
- Master in ICT and Learning
- Teaching Associate Professor

Aphasia is a language disorder that results from damage to parts of the brain that are responsible for language.

Aphasia usually occurs suddenly, often as the result of a stroke or head injury, but it may also develop slowly, as in the case of a brain tumor.

The disorder impairs both the expression and understanding of language as well as reading and writing.

Aphasia may co-occur with speech disorders such as dysarthria or apraxia of speech, which also result from brain damage.

Constructivistic view on knowledge and learning

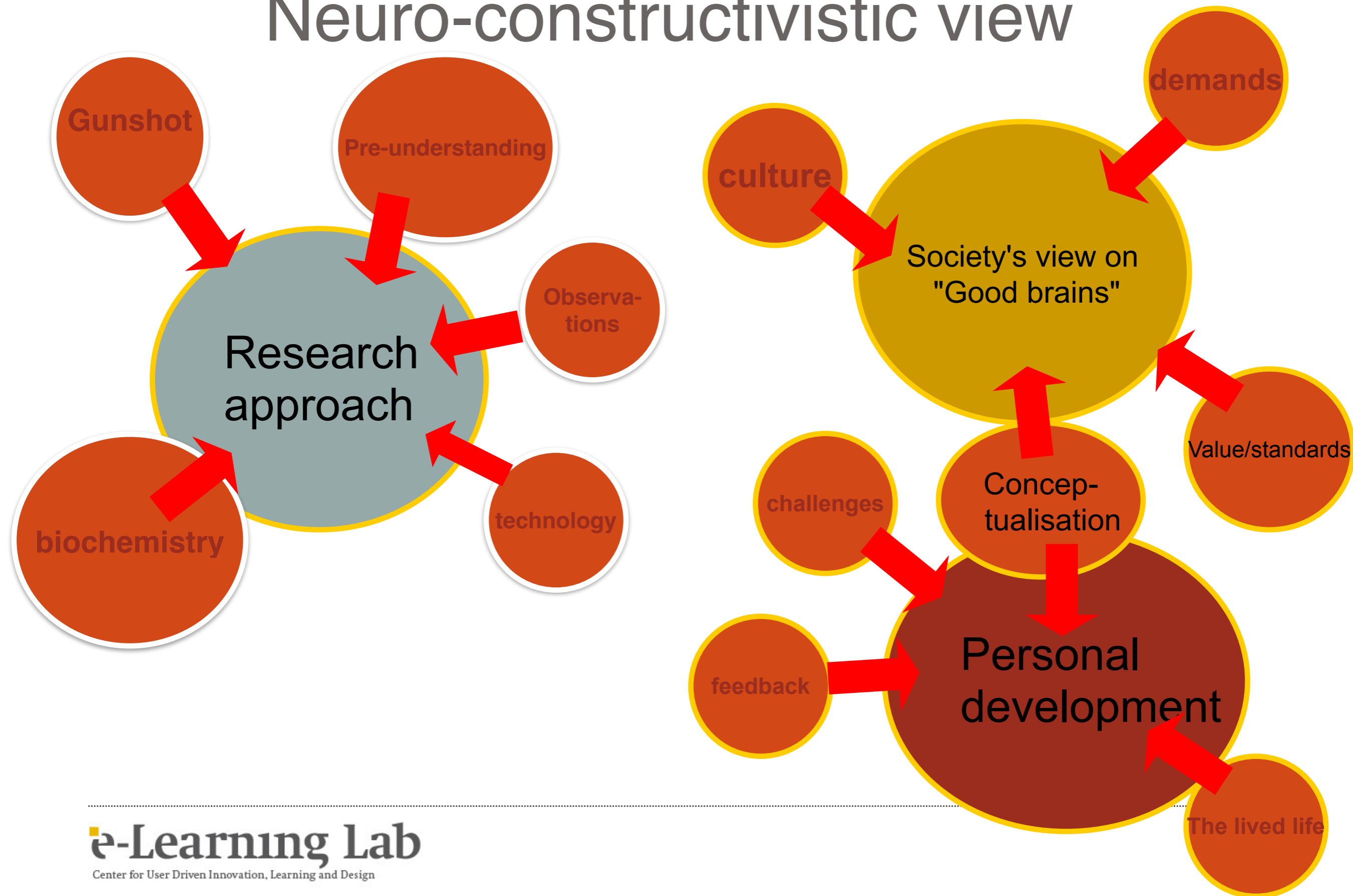
- **Neuroconstructivistic** view on the brain (Luria, Goldberg, Fredens)
- **Cognitive Learning** (Piaget)

An interest in how individuals restore strategies for their own learning, how they receive informations, interpret them and try to progress and establish a link to what they already know

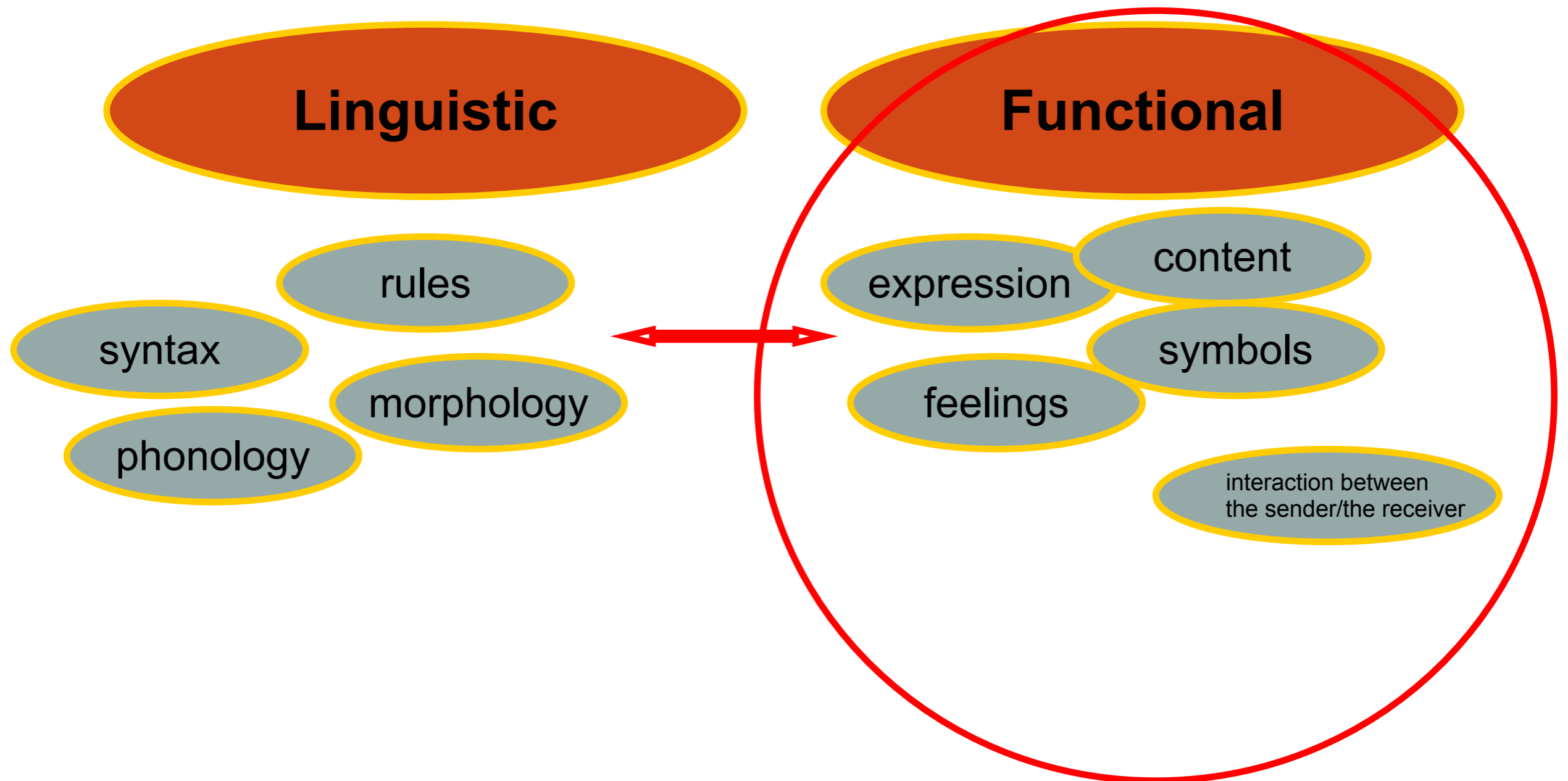
BUT - The human cognition can not be viewed in isolation. The cognitive processes must be seen as part of a wide range of social contexts.

- **Social learning** (Vygotsky)
Learning through participation in communities in the interaction between participants. (Lave & Wenger)

Neuro-constructivistic view



Language



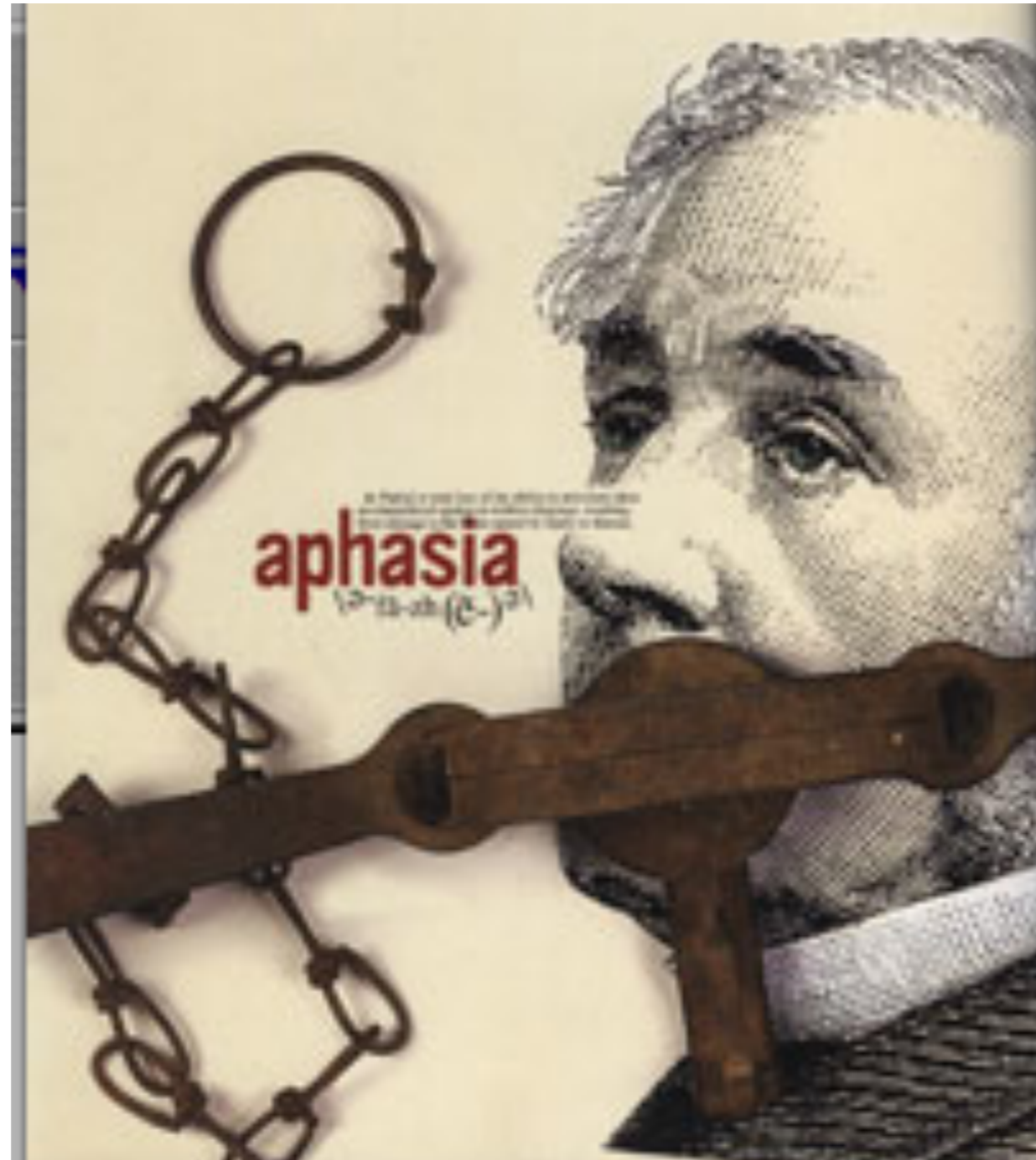
Language

The language is perceived as a means of:

- contact
- communication
- learning
- recognition

Language can be characterized as a bringing-into-speech of a person and thus a part of identity and learning

Identity



Identity and Aphasia

- Based on the fundamental considerations about the link between language and mental activity, it is believed that the aphasia also will affect the victims' self-understanding and have implications for the identity
- Aphasia makes it difficult to communicate with the surroundings, thus the opportunity to try out his ideas and opinions are impaired
- The ability to maintain their own thoughts and opinions - thought processes is complicated
- A person with language difficulties will be able to experience a change in external way to deal with and react to - it is seen as someone with a different identity (Shadden, Hagstrom & Koski 2008)

ATA (face-to-face)

The screenshot shows the 'Ansigt til Ansigt' web portal. The header includes the site logo, navigation links (Oversigt, Nyheder, Profiler, Forum, E-mail, Kalender, Opgaver, Logbog, Indstillinger), and user information ([Ulla Konnerup - Expert] - Til forsiden - Admin - Log ud). The main content area is divided into several sections:

- Oprettet opgave:** 'Er du tørstig eller søvrig?' by Ulla Konnerup, dated 9. marts 2006.
- Modtaget opgavebesvarelse:** 'Fantastiske fortællinger' by Annelise Clausen, dated 31. maj 2006.
- E-mail:** 'Vejledning til Basecube - til kursister' by Ulla Konnerup, dated 7. juni 2006.
- ATA kursister Aalborg:** 'Torsdag d. 15 juni 2006' by Ulla Konnerup, dated 6. juni 2006.
- Kursusdag på Sygehus Vendsyssel, Hjørring:** 'med assistance af en "ferierende kollega"' by Ulla Konnerup, dated 2. juni 2006.
- Smil:** '... se hvad jeg har fået af Janni :-)' by Ulla Konnerup, dated 2. juni 2006.
- Afasi i et kommunikativt perspektiv:** 'tanker om en logopædisk værktøjskasse' by Ulla Konnerup, dated 5. maj 2006.

On the right side, there are additional widgets: 'Onlinelisten' showing a list of users, 'Nyhedskanaler' with news snippets, and 'Debat' with a list of discussion threads. A search bar is located at the bottom right.

- DDN 2001-2004
- 2004 Basecube
- Basecube integrates several dynamic tools – such as email, editor-based exercises and articles, blogs, Skype, calendar and forum for discussions.

Make oneself
communicative
assert

Participation
in
communities
of practices

Informal
learning
processes

Exercises

Former research

New pedagogical possibilities and methods for participants with aphasia in a 2.0 virtual environment.

How does the virtual environment support:

1. The development of the participants' language skills and communicative competence?
2. The participants' accessibility to and participation in discussion forays and in society as a whole?
3. The re-establishment of identity after a brain injury

Findings

Besides formalized teaching the virtual environment provides many options of communication:

- being able to communicate and learn via various forms of perception
- being able to use preferred learning- and communication strategies
- meeting people of the same standing
- opportunity for self-reflection and self-presentation via profiles and weblogs
- increased extent of competence of action
- a strengthening of cognitive functions
- being able to take responsibility for their own learning and the sense of being part of a community, and a the feeling of being “present”.

Conclusion

- a need for a re-formulation of the speech pedagogical practices and the development of a new net-based aphasia pedagogy, where participation in social communities, narrativity, self-reflection, and self-presentation are emphasized

The Idea: From web 2.0 to 3.0

Experiences as a speech therapist (ATA, MIL thesis)

Web 2.0



Web 3.0

strengthen cognition, communication and acting competency

Avatar mediated (3D)

Community-centered learning and communication
Knowledge sharing
Experience sharing
Interaction
Participation
Arguing
Reflection

Bodily immersion and interacting through avatar mediating
The brain is activated by ideas about actions and experiences and actions on a conception level might stimulate nerve cells
Provide the opportunity for use of multiple sensory stimuli,
and for the promotion and development of the nervous
lence in the brain

PhD Project

Cognitive Fitness in 3D Immersive Virtual Worlds Developing a learning design for people with aphasia

The purpose is to study, how interaction in a virtual cognitive fitness center might contribute reconstruction of the communication competency among people with aphasia caused by a brain injury (due to i.e. apoplexy or other injuries where the blood vessels of the brain are damaged) The project will focus on how learning in communities of practice, knowledge-sharing, perception and emotional impacts in the 3D metaverse affects actions, socialization and communication.

Mirroring

Nerve cells can proliferate throughout life, and that the damaged nerve cells can form new ramifications, that new neurons are developing on the basis of stem cells and nerve cells can divide, if they are stimulated. (Bjarkam, 2004; Goldberg, 2005)

Mirror neurons, respond to other people's acts in the same way as if they themselves had performed the act - meaning that the brain is activated by ideas about actions (Rizzolatti 2008).

If the nervous system is challenged and stimulated and senses and emotions are affected positively, the neuroplasticity will make people able to learn throughout their lives - even after a brain injury.

Being challenged the brain develops; and context and feedback plays a key role in the ability to learn. (Bjarkam, 2004, Peace, 2004, Goldberg, 2005).

Embodiment

The project is based on an assumption that the involvement of body and nonverbal activities will affect the brain reestablishing process positively and promote cognitive and communicative functions.

3D virtual worlds provide the opportunity for use of multiple sensory stimuli, and for the promotion and development of the nervous lanes in the brain. Moreover, experiences and action on a conception level might stimulate nerve cells.

Research Questions

- *How can the participation and interaction in 3D virtual worlds develop, socialize and train cognition, action- and communication skills of people with brain injuries?*
- *How do 3D virtual worlds offer special opportunities to facilitate learning and (re)development of the communicative competence in an active interaction with the media, other participants and professionals and thus develop skills and strategies that enable them to maintain themselves as knowing and formed human beings?*

Methodological approach

- User involvement
- Theories on Social Learning, Language (Aphasia), Virtual Worlds and the brain (injuries and restorations) Identity (dynamic /constructed by your experiences)
- Case studies (in a virtual environment)