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**> Ada:
Short
overview**

The exhibition project "Ada - the intelligent space" offers an array of interesting opportunities for examining technology, artificial intelligence and human beings in connection with such subjects as biology, informatics, civics and language instruction.

This chapter contains:

- Information about Ada
- Quotes from scientists
- Recommendations for instruction

A: Factual information

Ada is a novel artificial organism

Ada is a space visitors can enter, one that makes contact with us. Ada perceives us; we can communicate with her and she reacts to us. It is up to us to determine what Ada wants to tell us and how we can induce certain behaviours.

The brain is our body's control centre. It allows us to perceive the world around us and react to internal and external stimuli. We are able to move in a deliberate fashion, to learn, to store, recall and link information, to plan, to dream, to communicate and much more. In addition, the brain controls our vital functions. It holds many of our individual characteristics and traits and thus makes us what we are.

What is "Ada - the intelligent space"?

Ada is a novel artificial organism, a creature in the shape of a space that can perceive and react to its surroundings. At the same time, her form facilitates a novel interaction between humans and machine that goes beyond the possibilities offered by a conventional computer, such as keyboard, mouse or joystick.

"Ada is a creature that likes to play, like a dog."

Prof. Klaus Hepp, ETH Zurich

Like we humans, Ada has sensory organs. She can see, hear and sense touch and contact. While Ada cannot communicate with words, she expresses herself through sounds, light and projections on the walls. She is an open artificial system based on the latest achievements of

neuroscience. Similar to humans – and in contrast to a conventional computer – she can process erroneous and imprecise information. She has the ability to direct her attention to a person or group of persons and play with them.

Unlike conventional computer systems based on rules, Ada consists of a neural network (see **>Ada knowledge: Processing data**) modelled after natural nervous systems. Ada is able to learn but is also "unpredictable," and her way of reacting to her environment is analogous to human emotional behaviour. She can coordinate her individual components and employ them in a goal-directed way. Yet Ada is also distinguished by having her own will.

What is the project trying to achieve?

On one hand, the way we simulate the human brain shows us how much we know about this complex organ and understand the processes occurring within. On the other, however, it enables us to better investigate precisely these processes by conducting experiments in artificial systems and comparing the results with that which we know from nature. These findings then influence the technological developments of tomorrow and thus also enhance the interaction between man and machine and other aspects.

"Ada is an organism, an artificial organism. She is a space that 'lives' and that wants to interact with people. When people participate, she is happy. When people do not participate, she is frustrated. What is the personality of a space? What does it mean when a space is in love or is angry?"

**Dr. Paul Verschure,
Project Leader Ada,
Institute of Neuroinformatics (INI)**

>Ada: Short overview

Today, for instance, when doors open automatically when we enter a room, then we might spontaneously perceive that as intelligent. When we go near the door without walking through it and it still opens, we find it irritating. If a porter were standing at the door, he would always know precisely when to open the door. The current technology is not actually intelligent after all, as it cannot tell the difference between these two situations (walking through and walking

by) in the way a real person could. Study of the brain will also provide us with insights into these processes that help us orient ourselves in a split second and then accordingly do the “right thing.”

“We want to learn from the brain and make use of this knowledge to develop new technologies.”

**Prof. Rodney Douglas,
Director of
Institute INI**

The project team named the intelligent space after mathematician Augusta Ada, Countess of Lovelace (1815–1852), the daughter of the poet Lord Byron. Among

other contributions, her works laid the foundation for the development of computers.

The software that makes Ada possible was developed at the Institute of Neuroinformatics, a joint institute of the University of Zurich and ETH Zurich. The Institute of Neuroinformatics is distinguished by the wide range of research disciplines represented. Researchers from the fields of biology, physics, mathematics, psychology, medicine, chemistry, informatics and engineering work together on various projects at the institute.

Definition of terms**•Artificial intelligence**

Biological nervous systems make use of natural intelligence. Artificial intelligence attempts to employ certain qualities of natural intelligence in machines and computers.

•Neuroinformatics

The study of the fundamental arithmetic principles (those that can be depicted mathematically or described through informatics) used by nervous systems and the application of these findings in various technologies.

B: Recommendations for instruction

Content and structure of school material



Sheets with border can be copied and distributed to students.

The school material contains suggestions for instruction in the following thematic areas

>1 Ada: Short overview

>2 Ada knowledge:

- 2a The human brain
- 2b Sensory organs
- 2c Processing data
- 2d Interaction

>3 Ada experience

>4 Ada reflection

>5 Ada competition

The chapter >Ada knowledge deals with the human brain and its simulation in the Ada project. First, the fundamental principles are discussed. Then in-depth information is provided regarding the input, that is, the reception of stimuli by the sensory organs. The third subchapter addresses the processing of this input (information processing) and the fourth looks at the output, the “response” to environmental stimuli in the form of communication and play behaviour.

The chapter >Ada experience offers the chance to experience and examine the project through play.

The fourth chapter >Ada reflection critically examines the development of artificial intelligence and its impact on society.

The eight-minute short film “Brainworkers” provides a good lead-in to the topic. A comparison between the human brain and Ada is illustrated in the enclosed poster, additional copies of which may be ordered.

Links

www.ada-exhibition.ch
www.expo.02.ch

Institute of Neuroinformatics
www.ini.unizh.ch

Neuroinformatics

Neuroinformatics is not a subject that can be studied per se at a Swiss college or university. Within the academic subjects biology, physics, mathematics, psychology, medicine, chemistry, informatics and engineering, students can explore the field of neuroinformatics and then at a later stage go more in depth.

University of Zurich and ETH Zurich
www.unizh.ch
www.ethz.ch