Learning within Interactive Environments

Bérengère Houdou

Man Vehicle Laboratory

virtual reality

‘To see a painting versus to walk in a painting:
an experiment on sense-making through virtual reality.’

Antonieti, Cantoia (2000)

robotics

‘Design Issues on interactive environments
for children with autism.’

Dautenhahn, Werry (2000)

LEARNING

Acquiring information

Storing information

Acquiring skills

'Inert' knowledge

Making sense

Interpreting reality

'Active' knowledge

INTERACTIVE ENVIRONMENTS designed for learning should support:

1.Active learners to engage in interaction with environments that are constructed.

2.Intentional learners willingly trying to achieve cognitive objectives.

3.Conversational learners engaged in dialogue with other learners.

4.Reflective learners articulating what they have learned and reflecting on the decisions that were included in the process.

5.Ampliative learners who generate assumptions, attributes and implications of what they learn.

virtual reality

Antonieti, Cantoia (2000)

‘To see a painting versus to walk in a painting…’

Focus = thinking process & ‘making sense’, rather than perceptual.

Field = visual art.

Hypothesis = different cognitive activities required for learning are activated by virtual reality, as compared to those elicited by traditional instructional tools.

virtual reality

Antonieti, Cantoia (2000)

Virtual Reality condition

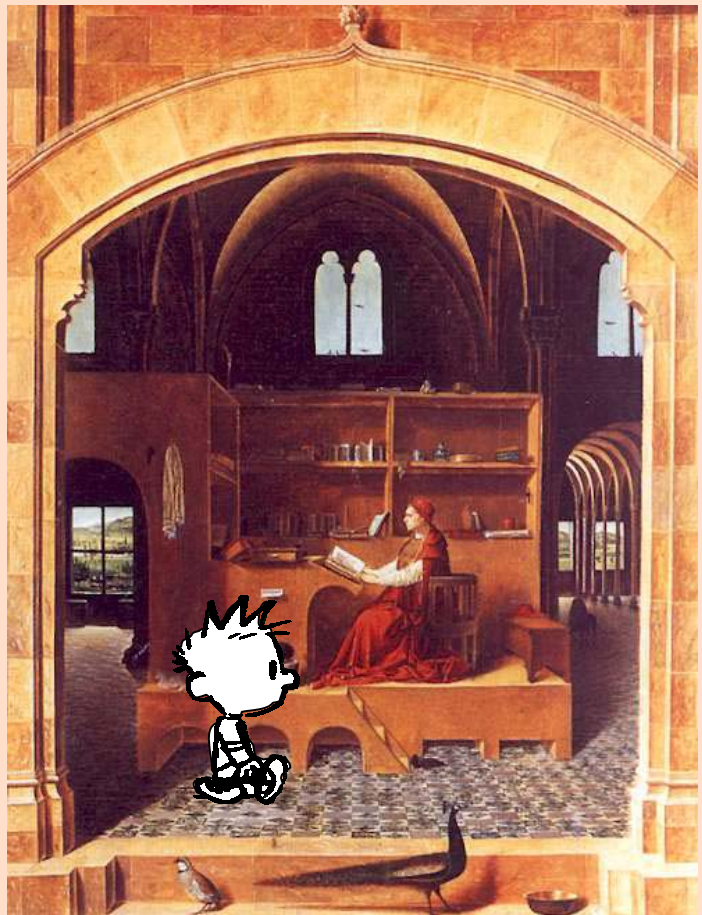
Virtual guided tour

Possible to ‘walk’ inside the painting

Reflection condition

Visual inspection

National Gallery Museum in London



virtual reality
Antonieti, Cantoia (2000)

4 dimensions of making sense

Title of the painting

•content (character, perceptual-spatial elements, abstract elements or meta-perspective elements)

•kind (descriptive, inferential, imaginative)

•number of concepts

Meaning of the painting

•content (character, environment, abstract elements)

•kind (descriptive, technical, personal, interpretative)

•aim (cultural, explanatory, literary, personal, general)

Questions risen by the painting

•number

•content (perceptual, cultural, personal, meaning, meta-questions)

•detailed/general elements

Comment about the painting

•content (technical, personal, psychological)

•kind (perceptual, associative, abstract)

virtual reality
Antonieti, Cantoia (2000)

Results

- Each subject developped a consistent interpretation of the painting across the tasks.

- In contrast with the usual Reflection condition, Virtual Reality immersion induced subjects to :

  •think not to ‘what’ they face, but to ‘why’ and ‘how’ something is in front of them.

  •develop abstraction skills to model the environment

  •Use their imagination

virtual reality

Antonieti, Cantoia (2000)

- Compared to traditional learning tools, virtual reality provides new learning contexts by allowing peculiar perceptual perspectives.
- Immersion in a virtual environment stimulates more imagination and abstraction.

Which of these two properties should be reinforced when designing a virtual environment for learning? And how?

To what extent does virtual reality in this experiment respect each of the 5 principles for designing interactive environments?

Robotics

Dautenhahn, Werry (2000)

‘Design Issues on interactive environments for children with autism.’

Focus = interpreting reality, social interactions.

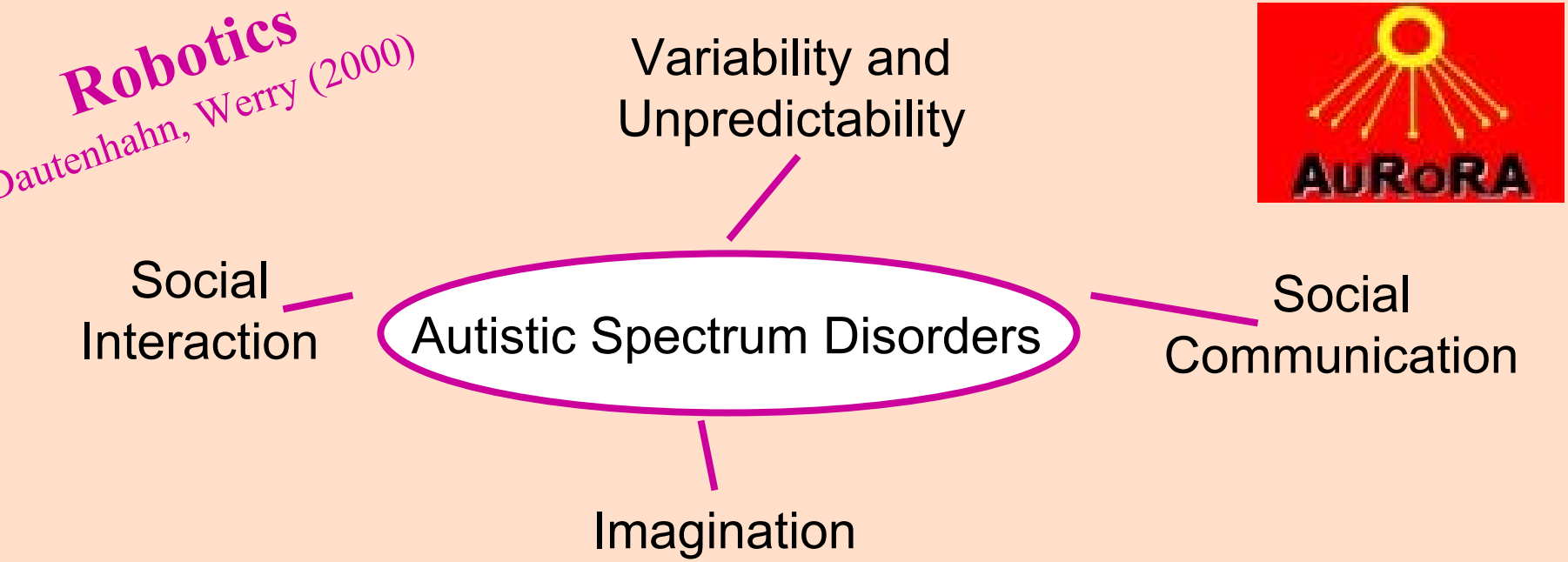
Field = autism therapy.

Hypothesis = an active exploration (improvisational and self-directed) of a learning environment with a robot can help children with autism to develop their human social behavior.

= a robot can be designed to play the role of a social mediator

Robotics
Dautenhahn, Werry (2000)

- autonomy (not remote-controlled)
- mobility
- unconstrained and unstructured interactions
- non-humanoid



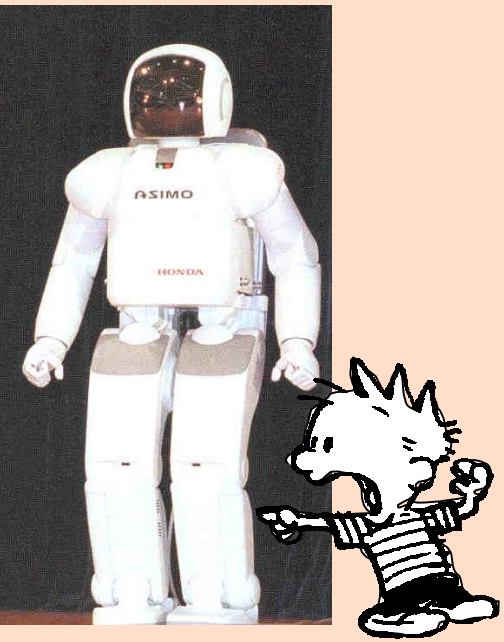
Tabular 1: Therapies for Children with Autism

Name	ABA Therapy (Applied Behaviour Analysis)	TEACCH (Treatment and Education of Autistic and related Communication handicapped Children)	Holding Therapy	Music Therapy
Description	Usually a one-to-one series of consultations with a therapist. Undesirable actions and behaviours are ignored, while desired behaviours are rewarded.	Preferably a one-to-one session, but normally a small group of around two to four children for each therapist. Situations are constructed and the desired response is prompted and rewarded.	The goal of this treatment is to bridge the gap between the child and the caregiver. The caregiver will attempt to comfort the child. The caregiver may hold the child for a period of time, even if the child struggles against this.	The medium of music is used to encourage the child to interact and learn communication skills. Simple songs are used with rhythm to teach the child various nouns and concepts.
Structure	ABA therapy is highly structured, involving concentrated sessions of learning responses to stimulus and situations.	TEACCH therapy is structured around a series of short activities. Desired responses are rewarded, while undesired behaviours are ignored and not rewarded. Activities are kept brief to minimise boredom, and naturally occurring situations are taken advantage of.	The caregiver will sit with the child and offer physical closeness at times of stress. This allows the process to be relatively unstructured.	The treatment is structured around the child and the songs and sounds that the child is able to use.
Freedom of Expression	Freedom of movement and expression is limited.	Movement is limited within the bounds of the activity. However, expression is actively encouraged.	The child's expression is limited to contact and interaction.	The child is able to express himself freely, within the bounds of the musical medium used.
Spontaneity	Spontaneity is restricted due to the teaching method.	Spontaneity is encouraged in all activities. A spontaneous response from the child is often preferred to a strictly 'correct' answer.	Spontaneity is encouraged, along with an effort to reach out to the child.	Spontaneity is encouraged within the limits of the task and the structure of the therapy.
Intrusiveness (Personal sphere)	Not intrusive, but the highly structured routine and lack of the child's ability to avoid the teaching session can lead to distress.	The teaching is non-intrusive and the child is encouraged to respond but not forced.	This treatment can be very intrusive, often involving holding the child when they are struggling.	This method is non-intrusive.
Combination with other treatments	ABA is designed to be used without other methods, although some are complimentary.	TEACCH is designed to be used without other methods, but some can be complimentary and used in a home environment.	This treatment should be used in conjunction with other, more traditional, methods.	This system should be used with other treatments, and assumes that the child is aware of fundamental concepts and is vocal.

Robotics
Dautenhahn, Werry (2000)

Human-robot interactions

Problems of interface design

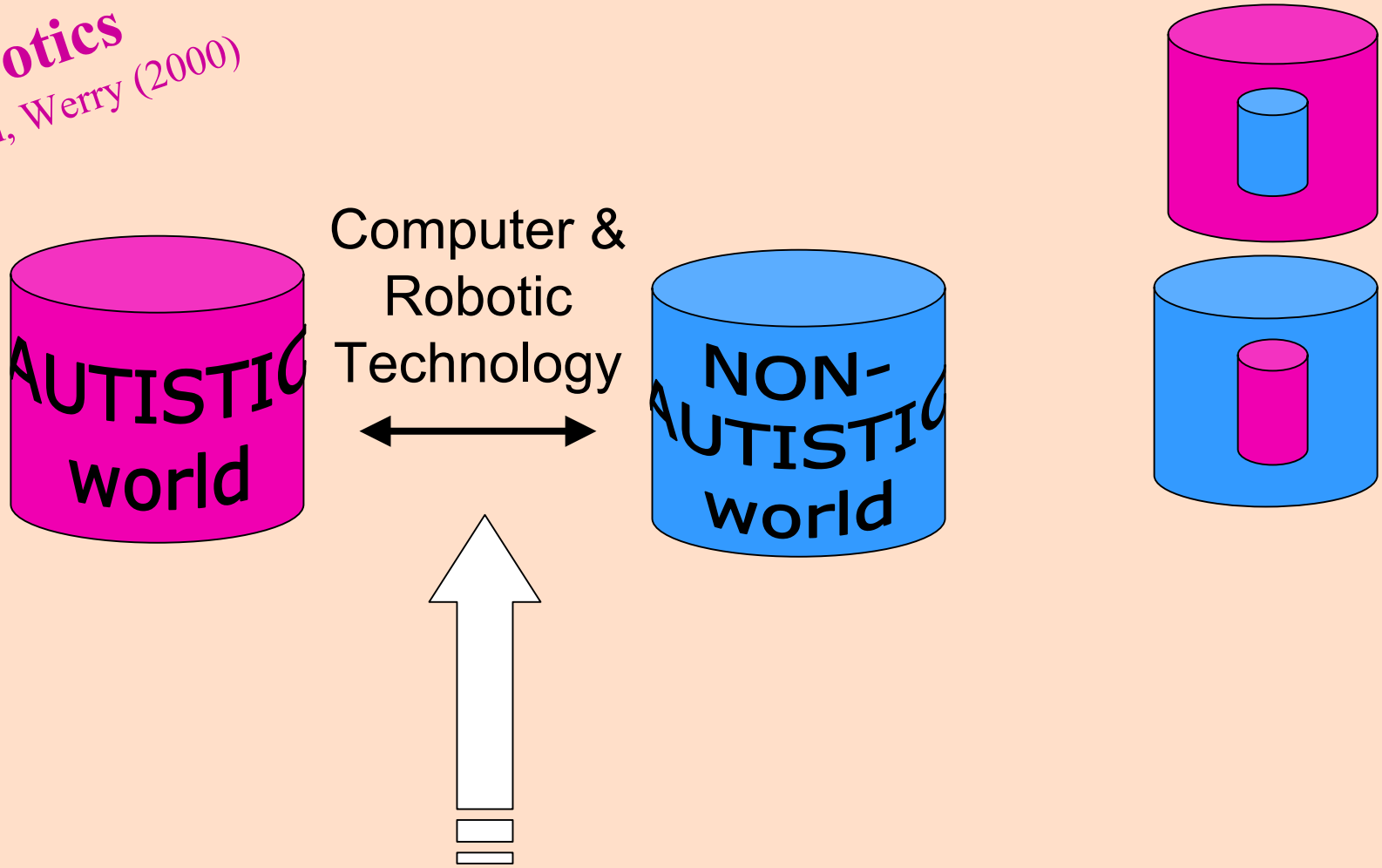


- Humans are not necessarely the best models for socially intelligent agents.
- It is the behavior and expression of a robot which makes it ‘humanoid’ and not how closely its morphology matches that of a human being.

What about an animal-robot?

Robotics

Dautenhahn, Werry (2000)



Autistic people should have the CHOICE.

Should they live in a specific world designed for them or should we teach them skills to adapt to the 'normal' world?

Other fields of application of robots for socialization?

Virtual Reality: a good tool to develop social skills?

Is it desirable to learn with the help of machines rather than humans?

If the learning system is a machine, what is the role of the instructor?

Is it possible to learn anything?

Which principle is the most important for learning?