

What is Echoes?

As stated in proposal: "An investigation into the impact of learning of young children's (2 groups TD school children and AS children) language usage during collaborative task performance with other autonomous agents."

What are the objectives?

1. Determine the appropriate scope of the research
2. Determine the resources (human and technical required)

What is the long-term objective?

The development of computer technology for

- (1) providing children of different cognitive, social and communicative abilities with an opportunity to explore issues arising during language use in social interactions and
- (2) providing researchers with research tools for investigating the relationship between children's social and communication skills and their learning

Areas relevant to ECHOES

1. Autism Spectrum Disorders (ASD) and Asperger's syndrome
2. Augmentative and Alternative Socio-Communication intervention methods for ASD people.
3. Technology design

1. Autism Spectrum Disorders (ASD) and Asperger's syndrome

- Ontogeny of socio-communicative functions in Autism
- Theory of mind
- Communicative functions.
- Social Interactions.

2. Augmentative and Alternative Socio-Communication intervention methods for ASD people.

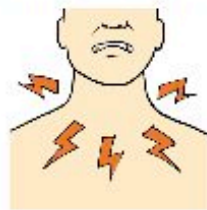
- Speech generation devices
- Graphic symbols
- Manual signs
- Gestures (Buffington, 1998)
- Computer-based interventions
- Social stories.



suction mouth



pain in throat



thirsty



take splints off



go away



hot



cold



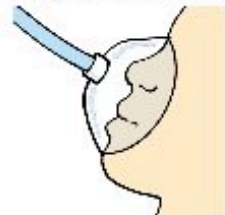
leave me alone



don't touch



adjust mask



I love you



change channel



blurred vision



intravenous



stay with me



want to go home



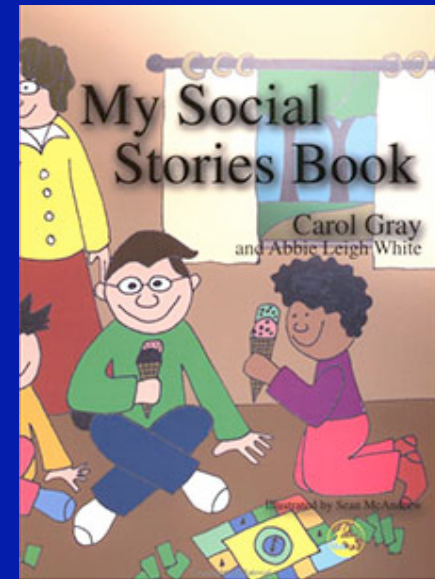
Some examples:

- Robots as therapy partners: (Werry et al. 2000,2001)
- Computer to teach AS children recognition of emotions (Silver, Oakes, 2001)
- Virtual environments for AS adolescents (Parsons, 2004)
- Bubble Dialogue program (Rajendran, 2000)
- Computer programs for communicative functions (Hetzroni, 2004)

Some examples

- Social stories™ (Howley&Arnold, 2005)
- Strategies for improving social interaction (Attwood, 2000)

* Not aware of computer
Versions of both approaches



3. Technology design

- Design paradigms
- Current technology
 - Multimodal interfaces : Reactive colours
 - Embodied user interfaces/agent
 - Tangible interfaces (Hornecker)
 - Locative media - blast theory
 - Games and Narratives
 - Eye tracking
 - Natural Language Dialogue
 - Affective and Cognitive modelling

- An Indication of aspects of game design specific for AS adolescents (Loeppky, 2006)
- Design issues in single and collaborative VR environments for social skill learning (Kerr, 2002)
- General guidelines for participatory design for people with cognitive disabilities (Fischer, 2000)

- Hybrid board/video games
- Gaming in AS students (Loeppky, 2006)
- Storytelling in pervasive games

Research questions

Theme 1: Socio-Communicative skills

- i. What is the degree of usage of AS children's communicative skills (verbal and non-verbal) in technological collaborative settings?
- ii. Do communicative impairments (verbal and non-verbal) improve with a technological collaborative setting?
- ii. What is the degree of usage of AS children's social skills in technological collaborative settings?
- iii. Do social skills impairments improve with a technological collaborative setting?

Theme 2: ECHOES technology

- i. Is the use of multimodal, tangible technology useful for Asperger children for showing functional requesting, natural speech production and increasing social-communication behaviour?
- ii. What would be the nature of such technology?
- iii. How do we develop such a technology?

c. Theme 3: Impact of socio-communicative skills in Education

1. Does the use technology empower ASD children so that they become aware of the social nature of interactions and the importance of social-communication behaviour for learning?
2. Does awareness of lack of socio-communicative skills in interactions empower children to lead a more successful academic life?
3. Does the support of communicative skills development impact on learning?

The computer environment

- Level 1 (The Mirror?): The aim is to get the child to identify themselves with the mirror-avatar through exercising control over it and exploring their body, body limits, facial expressions as reflected in the mirror-avatar. Another objective is to become aware of an object as different from them and to observe themselves manipulating the object.

- Level 2: Transactional model: At this level the objectives are to engage the child in an interaction with another agent. The child is still represented as an avatar, but takes a more *agentive* role and this is why their mirror-avatar becomes their projection-avatar.

Since levels 1 and 2 assume the awareness of communication skills (pointing, eye-gazing, gestures, etc) level 3 needs to add a social dimension to the environment.

Level 3? Social dimension, full collaboration takes places.

Where are we with the studies and what we still need to do?

- 2 Studies have been done:
 - Wendy interviewed 3 participants and sent out a questionnaire to other 2 (avg. age = 9)
 - The answers indicate:
 - Children are very experienced with video games.
 - 2 children preferred designing own experience, 2 playing only and 1 preferred both.

- Games are rewarding because they allow you to: remember things (in relation to video-control use), crash objects, because they are predictable.
 - They each use a variety of platforms and games.
 - Games are perceived as enjoyable as they allow unusual tasks.

- The second study consists on an on-line questionnaire.

- Questionnaire: <http://www.lkl.ac.uk/ltu/surveys/survey.php?sid=73>
- Results: http://www.lkl.ac.uk/ltu/surveys/edit_survey.php?sid=73

What I think needs to be considered

- Do we want Echoes to be a research tool?
- Will we analyse the impact of Echoes in learning?
- How are we going to evaluate Echoes?