ASC-Inclusion

Interactive Emotion Games

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ASC-Inclusion: a Virtual Environment Teaching Children with ASC to Understand and Express Emotions

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Project Description

- A Virtual Environment (VE) to help children with ASC aged 4-9 improve their ability to recognize and express emotions through face, voice and body language.
- State of the art technologies developed to analyse the emotions expressed by children with ASC.

Images 1-3: screen shots from ASC-Inclusion games

Background

- Individuals with ASC show difficulty **recognizing** and **expressing** emotions [1]. Specifically, they are impaired at:
  - Directing appropriate facial expressions to others [2].
  - Modulating their vocal intonation appropriately when expressing emotion [3].
  - Using appropriate gestures and body language [4].
  - Integrating non-verbal communicative cues with speech [5].
- Emotion understanding does not develop spontaneously in individuals with ASC, but can be taught explicitly. **Teaching emotion recognition and expression to individuals with ASC could reduce their risk of social exclusion.**

Project Rationale

- Individuals with ASC prefer predictable, rule-based environments [6].
- Within such environments, they show **good systemizing** skills, compared to controls [6].
- If provided with a system of emotions, systemizing skills could possibly be harnessed to help individuals with autism learn to recognize emotions [7].
- Computers provide individuals with ASC with such a predictable, rule-based environment, enabling them to capitalize on their systemizing skills. Computerized socio-emotional training in ASC has been shown to change behaviour, as well as brain functioning [8].

Objectives

- **Analyse** the children's facial expressions, vocal intonations and body gestures.
- **Train** children in emotions recognition and expression.
- **Personalize** settings according to children's individual needs.
- **Support** professionals, parents and carers using the project tools.

Acknowledgements

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SEVENTH FRAMEWORK PROGRAMME

Psychological Intervention Meets Technological Innovation

- **An Interactive emotion training program embedded in a fun online VE**
  - **Research-based lessons** designed by clinical experts.
  - **Interactive tools and activities** capturing children's attention: dozens of entertaining games, applications and enrichment activities.
  - **A smart reward system** to maintain children's long term engagement using virtual world motivational elements: design their avatar, decorate its home and purchase virtual items for their home/avatar, using virtual money they have earned on curricular activities.
  - Created in an **iterative process involving children with ASC and their families.**
  - Supported by panels of ASC professionals.
- **State of the art technologies to analyse children's expression of emotions**
  Computerized analysis of facial expressions, vocal intonation, body language, and their integration.

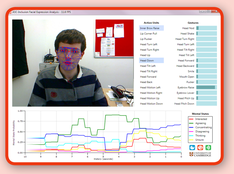


Image 4: Facial expression analyser

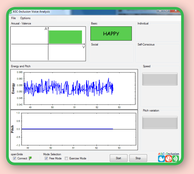


Image 5: Voice analyser

Image 6: Body gestures analyser

- **Support for parents, therapists and educational staff.**
  - Forums to interact with other parents and professionals.
  - Complementary offline activities and teaching materials to download.

Method

- Development was based on ongoing evaluation of the VE's content during its development in The UK, Israel, Sweden and Poland.
- A clinical trial evaluating 8 weeks of use of the VE prototype, by 6-9 years old children with ASC is conducted in the four countries above.
- Evaluation utilized face, voice, body, and integrative emotion recognition tasks (see poster 159.151) as well as generalization measures (SRS, Vinland-Socialization).

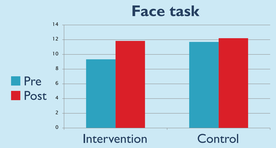
Preliminary Evaluation Results

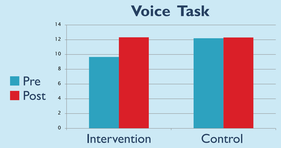
- In the UK, 15 children with ASC used the VE, and were tested pre and post intervention.

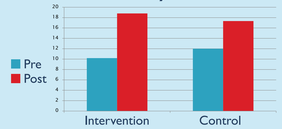
TASK	Mean PRE (SE)	Mean POST (SE)	t (14)
Body	14.33 (1.34)	18.73 (.61)	5.14**
Integration	11.13 (1.03)	13.47 (.72)	2.79*
Questionnaire	**Mean PRE (SE)**	**Mean POST (SE)**	**t (13)**
SRS	114.78 (7.27)	110.43 (8.25)	1.24
Vineland Social	67.63 (3.91)	71.45 (3.92)	2.99*

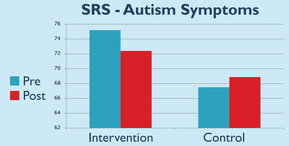
*p<.05
**p<.01

- Using the VE had a significant effect on both close generalization tasks, as well as the distant generalization measure of socialization.
- 16 children with ASC used the VE in Israel so far (6 intervention 10 control).









- Significant improvement of the intervention group, compared to controls, was found on voice and body tasks. Face task and SRS effects are nearing significance.
- 12 children and their parents tried the computerized emotion analyzer, which correctly recognized 80% of the children's expressions.

Conclusion

- The virtual environment developed by ASC-Inclusion project provides an entertaining educational environment, which successfully trains children to recognize and express emotions.
- The emotion analyzer demonstrates encouraging abilities to recognize emotions in children with ASC.
- With completion of the clinical trials, the VE is planned to be commercialized under the name EmotiPlay.

References

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