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The benefits of using the NAO robot in the lexical acquisition of children with ASD : a study of four students in an Autism Elementary Teaching Unit in France

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BACKGROUND

Autism can be characterised by a deficit in the processing of sensory information from the environment and a delay in social communication.

- Difficulty in understanding and responding to a verbal message.
- Acquisition of lexicon may be disrupted.

Oral reception & effectiveness of proposed interventions } Complex to evaluate

New technologies offer many possibilities for people with ASD and for professionals.

- NAO robot :
 - ✓ constant vocal intonation
 - ✓ controllable sensory stimulation
 - ✓ the most used with children with ASD

Could the NAO robot improve the child's receptive lexicon, and more broadly his communication ?

METHODS OF RESEARCH

Exploratory research

Objectives

To propose a reflexion on the mediation of NAO to develop the oral reception.
To question the evaluation of speech language therapy interventions.
To promote the link between SLT and other professionals.

Population

4 children with ASD aged 7 to 9 in an elementary autism teaching unit led by Association JB Thiery in France.
Low to very low level of oral reception/Oral and non oral communication mode.

Measured data

Expected response ; response time ; number of gazes ; initiated communication signs (verbal or non verbal).

Measurement of children's initial level of oral reception

Observations of the communication
Passation of the DPL-3 test

Comparison of 2 "groups" of 2 children

GH : group receiving intervention with a human
GR : group receiving intervention with NAO robot

Definition of the experimental protocol

Task : image designation
Evaluating the effectiveness of the intervention :
Evidence-based practice methodology ("ligne de base")

Terms of experimentation

Visual cues for children : pictograms
Filmed sessions and observation grid

The "ligne de base" methodology

- Training and evaluation of effects
- Two equivalent lists of items
- One is trained (list A) and the other controls the placebo and developmental effects (list B).



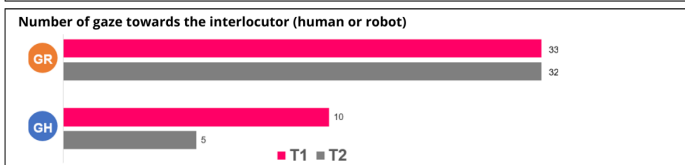
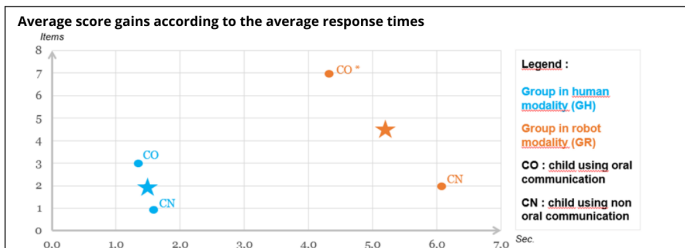
Construction of item lists

- 12 items per list
- Equivalent items in terms of syllabic length and frequency in the French language
- Criteria from the Manulex database
- Words unknown by children

Construction of the training

- 4 sessions
- Activities based on theoretical models
- Programming the robot with the Zora software

MAIN RESULTS



In post-test, GR responses to robot requests were faster than GH responses to human requests.

The number of correct responses from the GR oralizer child significantly increased.

The group trained with human (GH) improved much less.

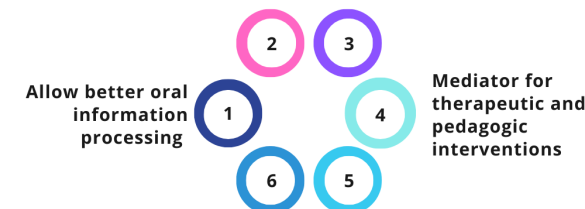
The GR produced more looks towards the robot, and maintained them over time.

The GH produced fewer looks and the number of looks decreased in the post-test.



DISCUSSIONS

Decrease sensory disturbances
High interest for oral lexical reception training



Necessity to develop a longitudinal and larger sample size study

Relevance and difficulty of clinical methodology due to high profile variability