

# **Acceptance of a virtual social environment by pre-schoolers with autism spectrum disorder**

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## **Background**

### **Impairment of reciprocal social behavior**

is a core deficit of Autism Spectrum Disorder (ASD). Social deficits are usually observable in the first year of life, and may play a major role in undermining ensuing social and language development

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## Long-Term Objective

Intervene as early as possible to teach child with ASD some of the basic social skills mastered by typically-developing children within the first year of life.

Expectation that the earlier in life children begin to attend to nonverbal communication, the more they will profit from naturally occurring social and language learning opportunities.

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## Short-Term Objective

Conduct a feasibility study of our training context and content, and identify any needed changes prior to conducting Pilot Study

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## Brief Description of Procedure



### Child's Perspective:

Sit in a helicopter and watch clips of favorite tv programs or movies

### Investigator's Perspective:

Concealed eye-tracking camera captures child's gaze direction. Instructional video is presented at intervals by 'Virtual Buddies'. Performance of target gaze behaviors is rewarded with clips of preferred video.

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## Introduction to Helicopter Setting

- On entering lab suite, encounter helicopter room, with door open and child's preferred video playing
- Parent asked to assist child into helicopter if he chooses, but under no circumstances to persuade
- If child does not choose to enter, parent asked to sit, not initiate interaction, door is closed, video continues, but not fully visible until child is seated
- Once child is seated, parent can choose to remain or not, is asked not to distract child

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## Participant Characteristics

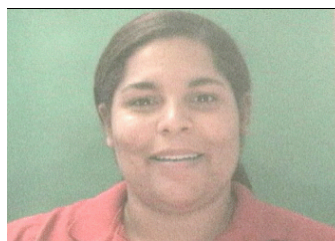
S#	Ethnicity	Gender	Age	Language
S02	Other	M	4, 4	< 5 words
S03	Asian	M	3, 3	Mild language delay
S04	Other	M	2, 0	No expressive language
S05	Caucasian	M	3, 9	Repertoire of single words
S06	African-American	F	4, 11	Repertoire of single words
S07	Caucasian	M	4, 7	Mild language delay

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## Dyadic Attention Training

The Virtual Buddy appears, greets and compliments the child. Child's gaze is recorded.

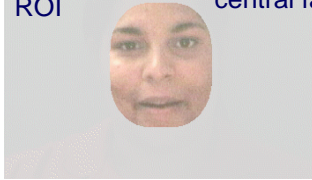


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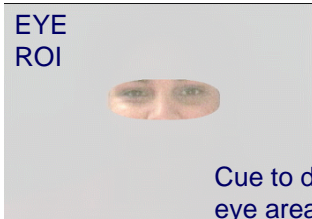
## Dyadic Attention Training, cont'd

FACE  
ROI



Cue to draw attention to  
central face

EYE  
ROI



Cue to draw attention to  
eye area

Each trial scored for time looking at central face and eyes, and gaze latency.

Cues offered based on running average score.

Once child looks at eyes for at least 0.5 sec in 3 / 10 non-cued trials, move on to joint attention.

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## Joint Attention Training

Small Virtual Buddy appears, directs child's attention to one of 4 corner targets.

When child's gaze enters corresponding ROI, reward of brief video in target is delivered.

On random, frequent schedule, this is followed by full-screen preferred video.


Unsuccessful trial is followed by cued trial.

Criterion for moving up to the next level of complexity -  
4 / 5 uncued trials correct.


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output field  
13532 CalibStatus false  
unassigned key.




# Manual pointing




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output field  
19343 CalibStatus false  
unassigned key.




# Head turn




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output field  
17941 CalibStatus false  
unassigned key:  
unassigned key:  
unassigned key:



## Gaze point



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output field  
23968 CalibStatus false  
unassigned key:  
unassigned key:  
unassigned key:



## Manual pointing – sibling



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## ROI's for Joint Attention



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## Acceptance - Preliminary Results

- Of 6 children, all have been willing to sit in the helicopter and watch the video by the first or second session.
- Most continue to participate willingly and even eagerly.
- One, initially willing, currently is not.
- No children demonstrated avoidance of gaze at face or eyes.
- There was a strong tendency to look at the mouth of a speaking person

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## Participant Performance

S#	Manual pointing		Head Turn Only	
	L/R	4 Targets	L/R	4 Targets
S02	9*	-	-	-
S03	5	5	5	6
S04	-	-	-	-
<b>S05</b>	<b>29</b>	<b>29</b>	-	-
<b>S06</b>	<b>10</b>	<b>14</b>	<b>6</b>	-
S07	4	4	5	5

\* No. of trials to accomplish each level

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## Preliminary Predictors To whom might this be useful?

Children who find videos highly rewarding,

and whose language is at the level of functional single words, but not phrase speech

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## Issues

- Eye-tracking with no equipment mounted to the child is desirable. Absence of face-tracking capability reduces efficacy of training because of number of trials lost.
- Need to avoid boredom with training component motivates increasing use of preferred video rewards (rather than home-made animated toy videos)
- Children who do not become engaged by video are not going to participate

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## Preliminary Conclusions

- Virtual Buddy can function as a training technique freely chosen and enjoyed by some children with autism spectrum disorder (ASD)
- It remains to be seen whether and to what extent new learning in the VR context generalizes to real-world reciprocal social behavior.

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